#### Dombivli Shikshan Prasarak Mandal's K. V. Pendharkar College of Arts, Science and Commerce, Dombivli Autonomous

DEPARTMENT OF ZOOLOGY

APPLIED COMPONENTS: ENTOMOLOGY

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<b>Theory</b> (Any four units to be opted)				
Course	Unit	Торіс	Credits L /	L /
			Week	Week
	Ι	Systematics of insects		
	II	Morphology, anatomy and physiology		
		of useful insects		
	III	Anatomy and physiology of harmful	2	4
		insects		
	IV	Agro-support and conservation of		
USACEEN1501		insects		
	V	Apiculture		
	VI	Sericulture		
	VII	Lac culture		
	VIII	Case studies		
Practicals				
USACEENT5P1	Pract	icals based on Course USACEENT501	2	4

# Semester VI

Theory (Any four units to be opted)				
Course	Unit	Торіс	Credits L /	L /
			Week	Week
	Ι	Integrated pest management (IPM),		
		Organic and biological pest control in		
		agriculture		
	II	Chemical pest control in agriculture	2	4
USACEENT601	III	Urban and domestic pest control		
	IV	Neo-avenues in Entomology		
	V	Government schemes		
	VI	Finance		
	VII	Sales and Marketing		
	VIII	Open unit		
Practicals				
USACEENT56P1	Pract	icals based on Course USACEENT601	2	4

# **SEMESTER V**

# CLASSICAL ENTOMOLOGY AND ECONOMIC ENTOMOLOGY

# T.Y.B.Sc.

Economic Entomology

Credit based Semester and Grading System. To Be Implemented from the Academic Year 2013-2014.

# Semester V

# Theory

# CLASSICAL ENTOMOLOGY AND ECONOMIC ENTOMOLOGY

(Any 4 units to be opted)

Course code: USACEENT501

(2 credits)

Unit I –Systematics of insects			
<b>Objectives:</b>	1) To introduce classification of insects up to order level.		
	2) To enable learners to categorize insects on the basis of morphological characteristics.		
Desired outcome:	<ol> <li>Learners would be able to classify insect up to their respective orders.</li> <li>Learners would understand basis of classification.</li> </ol>		

# 1.1. Classification of insects

- **1.1.1.** Insect classification.
- **1.1.2.** Broad characteristics and few examples of:
  - a) Thysanura, Orthoptera, Isoptera
  - b) Hemiptera, Lepidoptera, Diptera
  - c) Hymenoptera, Coleoptera, Odonata (Minimum three example of each order except Thysanura)

# Unit II- Morphology, anatomy and physiology of useful insects

Objective:	<ol> <li>To introduce the morphology of typical insect</li> <li>To study the general anatomy and physiology of specific useful and harmful insect</li> </ol>	
Desired outcomes:	1) Learners would understand the basic body plan of insects.	

2) Learners are able to understand the difference in the life cycles of insects.

3) To make the learner understand various physiological aspects in insect with their speciality of usefulness and harmfulness.

# 2.1 General morphology and development of insects:

- 2.1.1. External morphology of typical insect.
- 2.1.2. Types of Metamorphosis.
- 2.1.3. Types of larvae and pupae.

# 2.2 General anatomy and physiology of insects

Brief out line of Digestive system, Respiratory system, Circulatory system, Reproductive systems of male and female, Excretory system, Nervous system, Endocrine system.

# 2.3 Anatomy and physiology of useful insects

a) Honey bees

b) Silk moth

c) Lac insect

# Unit III- Anatomy and physiology of harmful insects

**Objectives:**1) To study the various systems of harmful insects.2) To study the different life processes of harmful insects.

# **Desired outcomes:** 1) To familiarize students about anatomy of typical harmful insects. 2) Learners would understand life processes of certain harmful insects.

# 3.1. Anatomy and physiology of harmful insects w.r.t. agriculture:

- a) Grasshopper
- b) Aphids
- c) Ants or Helicoverpa or Red cotton bug or Thrips

# 3.2. Anatomy and physiology of harmful insects w.r.t. human:

- a) Mosquitoes
- b) Tsetse fly
- c) House fly

# 3.3. Anatomy and physiology of harmful insects w.r.t. animal husbandry:

- a) Horse fly
- b) Bot fly

# Unit IV- Agro-support and conservation of insects

Objectives:	<ol> <li>To study the versatile roles of insects in agriculture.</li> <li>To survey the various strategies of insect conservation.</li> </ol>
Desired outcomes:	<ol> <li>Learners understand the various ecological importance of insects.</li> <li>Learners would be able to construct the butterfly gardens.</li> </ol>

3) Learners would understand need of conservation of insects.

# 4.1 Agro-supportive role of insect

- 4.1.1. Insect as a pollinator: Honey bees, Bumble bees, Fruit flies, Fig wasps.
- 4.1.2. Insect as soil composer: Termites.
- 4.1.3. Insect as predators: Wasps, Fireflies, Assassin bug, Ants.
- 4.1.4. Insect as parasites and parasitoids: Lepidoptera (Lycaenidae) and Hymenoptera (Ichneumon wasp).

# 4.2 Conservation of insect

- 4.2.1. Strategies for insect conservation
- 4.2.2. Honey bees: Colony collapse disorder (CCD)
- 4.2.3. Butterfly gardens and state butterfly of Maharashtra (Blue mormon)
- 4.2.4. Endangered insect species in India (any 4)

# **Unit V- Apiculture**

<b>Objectives:</b>	1) To introduce the domestic species of honey bees.
	2) To study the modern methods of apiculture/beekeeping.
	3) To familiarize the learners to the economic aspects of apiculture.
Desired outcomes:	1) Learners would adopt modern rearing techniques of honey bees.
	2) Learners would realize the economic scope of apiculture.
	3) Learners would be able to correlate growth of crop production with the pollinator
	role of honey bee.

5.1. Different species of bees: Apisdorsata, Apis mellifera, Apis florae and Apis indica. Trigona sp. 5.2. Economic importance of honey bees: The Apiculture business: structure of artificial bee hive, method of cultivation, tools used, management of apiary.

- 5.3. Natural enemies of honey bees.
- 5.4. Products: honey, wax, royal jelly, venom, propolis and economic importance of bee keeping
- 5.5. Co-operative and socio-economic aspect (avenues) of economic entomology.

# **Unit VI- Sericulture**

Objectives:	1) To study the various types of silk worms.
	2) To expose the students to laboratory techniques of rearing of silkworms.
	3) To understand the commercial uses of silk of biological origin.
Desired outcomes:	1) Learners would be introduced to different types of silkworms.
	2) Learners would understand the merit of modern methods of sericulture.
	3) Learners would understand products of sericulture.

- 6.1. Different types of silk moth. Life cycle of Mulberry silk moth
- 6.2. The Sericulture business: cultivation of mulberry, laboratory setup, rearing of worms (Procuring eggs, incubation, hatching and maintenance of larvae), overall management, diseases of silk worms.
- 6.3. Process of obtaining silk from cocoons and variations with reference to other silk moths.
- 6.4. Uses of silk and economics of sericulture.

# **Unit VII- Lac culture**

	Unit VII- Lac culture
Objectives:	1) To equip learners with the knowledge of methodology of Lac culture.
	2) To enable the learner to understand the processing and uses of Lac.
Desired outcomes:	1) Learners would acquire basic knowledge of methodology of Lac culture.
	2) Learners would understand the processing techniques of stick Lac to powder Lac.
	3) Learners would understand the commercial uses of Lac.

7.1. The Lac insect, life cycle, hosts, culture techniques.

7.2.Natural enemies of Lac insects.

7.3. Processing of raw Lac to fine Lac and uses of Lac.

# **Unit VIII- Case studies**

# Objectives: 1) To help learner to understand success stories of ento-entrepreneur. 2) To inculcate learners to adapt innovative ideas and through provoking creative concepts of ento-entrepreneur. Desired outcomes: 1) Learners would be inspired to become ento-entrepreneur and consult others to become the same. 2) Learners would become capable to form consultation firm in the field of entomology.

Colleges/institutes have to select the topics as per their local needs and available resources related to Entomology. Suggested case studies are as follws: Patanjali honey, Mad honey, Halal lipsticks, Odomos, Kapse and Soni Paithani Saree, Hotlix (Ant candy, Larvets), Jaipurwala.com, Trichograma sp. (Wasp eggs for sale by BASARASS Biocon India Pvt. Ltd. Chennai) etc.

# SEMESTER-V PRACTICAL Course code: USACEENT5P1 (Credits – 2)

- 1. Mountings/ study of Head sclerites, thoracic segments, abdominal segments of cockroach.
- 2. Mountings/ study of Types of antennae. Filiform, Moniliform, Aristate, Capitate, Clavate, Clubbed, Plumose, Pilose, Pectinate, Bipectinate, Setaceous and Geniculate, Lamellate, Serrate. (Any two mountings and rest for study with photo/permanent slides). (Preferably pests)
- **3.** Halter and wing of house fly. Study of wing types: membranous, hemitegmina, tegmina, hemielytra, elytra with photos or permanent slides.
- 4. Study of wing venation e.g. Cockroach and dragonfly.
- **5.** Types of legs- Typical, Cursorial, Fossorial, Saltatory, Natatorial and Scansorial (Mountings/study of any two and rest for study with photo/permanent slides).

- **6.** Abdominal appendages- Styles, cerci of cockroach. Study of abdominal gills using photos/ permanent slides).
- 7. Cornea (Cockroach or Housefly).
- 8. Mouth parts of Cockroach.
- 9. Malpighian tubules (cockroach).
- **10.** Haemocytes from cockroach.
- 11. Case Study Report Submission.

# **Dissections (Virtual):**

- 1. Digestive system Cockroach.
- 2. Nervous system Cockroach.

# Study of: (for identification)

- 1. Any one sound producing organ (Photo / specimen).
- 2. Identification, classification and description: *Lepisma*, cricket, termite, giant water bug, any one type of butterfly or moth, *Sarcophaga*, potter wasp, long horn beetle or water beetle, dragonfly, damselfly. use Photo/specimen.
- 3. Types of larvae and pupae, Types of metamorphosis.
- 4. Life cycle of lac insect, honey bee, silk moth.
- 5. Products Lac, bee wax, silk.
- 6. Equipments used in apiculture, sericulture, Lac culture.
- Examples of mimicry, camouflage and concealment (Specimens or photos). e.g. Plain tiger and Danaid egg fly. Stick insect, leaf insect. Field visit / Assignment / Play and ponder. Give actual handling of bees/ silk moth / Lac insect or visit to any one of these units.

# **Instructions for USACEENT501**

Total four units are to be selected per theory course for formal teaching by the concerned teachers in consultation with the head of the department and having discussed with the students, enabling optimum utilization of the available infrastructure, experties of the teachers, human resources and opportunities in the local area. Though it is desirable to encourage the students to undertake assignments / seminars / learning through guest lectures / entrepreneurial skill development / field visits, etc. From the topics which are not formally taught by the teacher/s in order to have an overview of the subject.

It is not compulsory to do so and that assignments / seminars / learning through guest lectures / entrepreneurial skill development / field visits, etc. To also be based on the topics formally taught by the teacher/s. The decision in this matter can be taken with full freedom as may be academically desired.

# **Modality of Assessment**

# **Theory Examination Pattern**

# A) Internal Assessment - 25%

ation type	5
ass Test	
Active participation in routine class instructional deliveries	
Overall conduct as a responsible student, manners, skill in	
articulation, leadership qualities demonstrated through	
zing co-curricular activities, etc.	

# B) External examination -75 % Semester End Theory Assessment - 75%

75 marks

1. Duration - These examinations shall be of 2.5 hours duration.

- 2. Theory question paper pattern:
  - i. There shall be five questions each of 15 marks (30 marks with internaloption)

ii. On each unit there will be one question & fifth question will be based onentire syllabus.

iii. All questions shall be compulsory with internal choice within thequestions.

iv. Questions may be sub divided into sub questions as a, b, c, d & e, etc & the

allocation of marks depends on the weightage of the topic.

# **Practical Examination Pattern**

# (A) Internal Examination:

There will not be any internal examination/ evaluation for practicals.

# (B) External (Semester end practical examination):

Sr.No.	Particulars	Marks
	atory work	
	.1	

Assessment pattern for semester end / External practical examination of 80 marks shall be finalized in the workshop of the subject Semester end practical examination in applied component shall be conducted by the concerned department of the Institute/ College at the end of each semester and the marks of the candidates are to be sent to the University in the prescribed format.

# Semester V

Practical examination will be held at the college / institution at the end of the semester.

The students are required to present a duly certified journal for appearing at the practical examination, failing

# 25 marks

which they will not be allowed to appear for the examination.

In case of loss of Journal and/ or Report, a Lost Certificate should be obtained from Head of the Department/ Co-ordinator of the department ; failing which the student will not be allowed to appear for the practical examination.

# Model Question Paper for Theory Examination T.Y.B.Sc. (CBSGS) 2017-18 CLASSICAL ENTOMOLOGY AND ECONOMIC ENTOMOLOGY SEMESTER-V (Applied component)

Durati	on 2 <sup>1</sup> / <sub>2</sub> hrs Course code: USACEENT501	Marks 75
Instru	ctions for students:	
1.	Question 1 is compulsory.	
2.	Attempt any FOUR questions from Q.2 to Q.9.	
3. 4	All questions carry equal marks.	
4. 5.	Figures to the right indicate full marks.	
Q.1	Write short note on (Any 5)	15
	Odonata, Thysanura, Types of Pupae, Types of larvae, ants, Head louse,	
	Assassin Bugs, Fireflies, Bee wax, Bee venom, Diseases of silk worm, Uses	
	of silk, Species of La insects, Host of lac insect.	
Q.2	Describe with suitable example characteristics of Order Diptera and Order	15
	Coleoptera. Add a note on insect classification.	
	OR	
	a) Classify and describe Order Hemiptera	7
	b) Classify and describe with suitable example Order Orthoptera	8
Q.3	Explain Morphology of typical insect.	15
	OR	
	a) Describe Digestive system of insect.	7
	b) What is metamorphosis? Explain metamorphosis in insects.	8
Q.4	Explain lifecycle of following insects and their effect on agriculture.	15
	1) Grass hopper, 2) Aphid	
	OR	
	a) Describe lifecycle of mosquito.	7
	b) Describe lifecycle of Tsetse fly and Bedbug.	8
Q.5	Explain the role of insect I agriculture and add a note on "Termites as soil	15

composer"

# OR

	a) Explain CCD of honeybee.	7
	b) What are different strategies of insect conservation? Add a note on	8
	Butterfly garden.	
Q6	Describe economic importance of Honeybee. Add a note on cooperative and socio-economic aspect of apiculture.	15
	OR	
	a) Describe structure of artificial hive. Add note on various tools use in apiculture.	8
	b) Describe species of honey bee found in India.	7
<b>Q.7</b>	What is Sericulture? Explain how different types of silk obtained.	
	OR	
	a) Explain in detail life cycle of Mulberry silk moth.	8
	b) Explain the processing of silk cocoons.	7
<b>Q.8</b>	Explain the management and financial avenues of lac culture business.	15
	OR	
	a) Explain culture techniques of Lac and add notes on it's natural enemies	8
	b) Explain processing of lac.	7
Q.9	Case Study*	15

\* Any one case study to be given and questions to be asked based on it.

SKELETON QUESTION PAPER FOR PRACTICAL T. Y. B. Sc. (CBSGS) 2017- 18 SEMESTER-V (Applied component) PRACTICAL

#### **Economic entomology (Applied component)**

Time : 5 hrs

fication(a,b,c,d) five mark each

neat and labeled diagram of -----system.

Complete the given system by drawing the missing part and describe the function of all labeled parts.

OR

inge the parts of the given system and explain the functions of different parts.

3. diagrammatic representation of following parts of -----and describe the region where it is situated in the animal along with its function.

mission of 5 insect photographs.

b) Assignment and Viva based on it Journal

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# MODEL CASE STUDY

# **1. PAITHANI**

Paithani is a sari made of silk and zari.It is named after the Paithan town in Aurangabad, Maharashtra state where they are woven by hand.The art of weaving Paithani thrived in 200 B.C., during satvahana era and promptly became well-known.The special love of Peshwas for Paithani in 18th century has endowed a name to Paithani as "Queen Of Sarees". By tradition, Paithanis used a coloured, cotton muslin field withzari patterning.However, in the 19th century, silk fields were also woven.They became so widespread during this era that it became a tradition for every Maharashtrian woman to have at least one Paithani sari. It is made from very fine silk and it is also considered as one of the richest saris in India.

The Government of Maharashtra & a few Non Government Organizations (NGO's) took the Colossal task of "Revival of Paithani". The initial step to revive this lost art was to boost the morale of the weavers and then set up centers for training & weaving. Their cooperative determination paid off & the last 3 decades saw the growth in demand of Paithani sarees from all over the world. Today, Yeola itself has more than 2000 skilled weavers.

Two entrepreneurs took the opportunity to build their fortune in business of making and selling paithani, by which they made a world-renowned brand namely Soni Paithani and Kapse Paithani.

**Ramdayal Hanumandas Soni,** also known as Soni Paithani - a name that has grew for over five generations in the manufacturing of Paithani sarees. Soni Paithani came into life in the year 1860 and since then many of the weaver's families are linked with them. They have passed their knowledge & unique weaving techniques to new generation. A Paithanir equires processes like cleaning and dying of silk, which demands for

the input of the whole family.

Kapse Paithani established in year 2000 at KK Handloom. They are the foremost suppliers of Maharashtrian Sarees like YeolaPaithani, Brocket Paithani, Special Padar Paithani, Benarasi Silk Paithani.

Saree is the most elegant Indian wear and the oldest form of women's wearing, to keep up with the change of time Kapse Paithani merged the traditional artwork with modern designs to lure the international young market.

In the early days, Exquisite Silk from Paithani was exported to many countries in exchange for gold and precious stones. In the past days, the Jari used in making Paithani was drawn from Pure Gold. But today Silver is replaced for Gold and in some cases Copper substitutes Silver making the Paithani affordable to many People. It costs nowdays between Rs 7,000/- to Rs 3,50,000/- approximatly, depending upon the design.Silk-Mark is an assurance that every Silk Paithani is made from finest Pure Natural Silk. Each product is tested and validated for quality, sustainability and accompany Silk-Mark.

The Paithani Saree and Fabrics known for their elaborate designs are protected under Geographical Indication Act 1999 of India. At present it is unorganized sector.

The skills gap for Silk weavers are:

- Need to transform from traditional looms to automated looms
- Limited understanding of the 52 steps in silk weaving
- Training is required on usage of computers in designing
- Ability to create diversified products new varieties, replacing jute or cotton products with silk
- Export market awareness
- Dying techniques
- Processing techniques

The Paithani Cluster at Yeola, a Rs 20-crore project, is spread over 4,800 sq m where around 3,000 local artisans put their products on display under one roof and tourism centre on its premises to educate people. If the silk produced in Maharashtra would be used in Yeola for Paithani saris, then it would be much cost effective than to depend on Bengaluru for silk. There are 3,500 looms in Yeola and the material, particularly silk, is brought from Bengaluru. In one month, 6,000 Paithani saris are made in Yeola. Around one kg of silk is needed to weave one sari.

Markets of Paithani saree need to be created across the nation to popularize the art. To sustain the craft and the craftsmen, diversification of Paithani textile into several products such as waistcoats, pouches, wall hangings and even women's salwar suits is required to increase their market size.

- 1. What are the skills silk weavers can be trained to create more effective sales of Paithani? Justify your answer with explanation.
- 2. What entrepreneur opportunity you can see in the above case? Illustrate a detail planning and feasibility statement.
- 3. Enlist the uses of Paithani fabric and emphasis on the marketing strategy for it.

# 2. ODOMOS

The household insecticide market in India is sized around Rs 1600 crore. Insecticide market of mosquito coil is worth Rs 900 crore, while mosquito repellent creamis worth Rs 50 crore. Odomos is a 40 year old brand which has a generic status in the mosquito repellent cream market in India. The brand which was initially from Balsara came into Dabur's hold after the acquisition of Balsara Hygiene Products in 2005.Odomospossiblyinitiatedcream based insect repellent as a branded offering.Odomos has a virtual monopoly in the cream market.

Dabur is the front-runner in the personal application mosquito repellent category under the Odomos brand with annual sales of around Rs 50 crore and growing at 8-10 per cent per annum. **Dabur Odomos** is a clinically tested and certified mosquito repellent offering most effective protection for as long as 12 hours from mosquitoes, the carriers of deadly diseases like Dengue, Chikungunya, Malaria, Filaria and Encephalitis etc. Odomos is the only mosquito repellent endorsed by the National Integrated Medical Association (NIMA). Since Odomos does not contain any chemicals which kill mosquitoes thus it is one of the safest mosquito repellants. Odomos Natural Cream with natural Citronella and Aloe Vera has the goodness of Almond Oil and Vitamin-E.

Contrary to popular notion, diseases like Dengue and Chikungunya are transmitted by daytime mosquitoes. Children, when they go out to play or during school, are at danger of being bitten by these mosquitoes. Even people inoffices are at risk of being bitten by mosquitoes. Odomos is the only personal application product that offers protection fromdaytime mosquitoes.

Mosquitoes detect you by the odours your body emits.Odomos, when applied on the skin, masks these odours andhence mosquitoes do not detect you.

Odomos displays the message of being "Skin Friendly" in their packs. Another bold step that the brand took was to target kids.

Odomos has product forms of Cream, Lotion and Oil. Odomos mosquito repellent oil targets rural areas because oil product form has more acceptance in that market. More over oil applies better on the skin and is more effective.

**Odomo snow** have smaller packs of Rs 5 and Rs 10, which improves affordability and thus encourage more buys. In times where mosquitoes are now immune to coils and vaporizers, Odomos has proven to be a best option for a good night sleep and daytime assurance.

1. Do you think Odomos targeting kids was a risky move? Justify your answer with explanation.

2. What entrepreneur opportunity you can see in the above case? Illustrate a detail planning and feasibility statement.

# **SEMESTER VI**

# INTEGRATED PEST MANAGEMENT AND ENTREPRENEURSHIP

# Semester VI Theory

INTEGRATED PEST MANAGEMENT AND ENTREPRENEURSHIP

**Course code: USACEENT601** 

(Any 4 units to be opted)

(2 credits)

	(This to be opted)
Ţ	Unit I –Organic and biological pest control in agriculture
<b>Objectives:</b>	1) To introduce concept of advantages and limitations of IPM.
	2) To enable the learners to understand the advanced methods of
	biological control of insect population.
	3) To understand pest population and about natural insecticides.
Desired outcomes:	1) Learners would be introduced with merits and demerits of IPM.
	2) Learner would be able to understand different methods of biological

- 3) They would also be introduced the insecticides of plant origin.1.1.Integrated pest management (IPM): Definition, need and planning of IPM with suitable examples.
- Advantages and limitations of IPM.

control of insect pest.

# **1.2.Biological pest control :**

- a) Predators
  - b) Parasites
  - c) Pathogens (Bacteria, viruses, fungi)
  - d) Nematodes
- 1.3. Use of Hormones and Pheromones.
- **1.4.**Sterile male technique.
- **1.5.Natural organics** oils, insecticides of plant origin (Pyrethrins, Nicotine, Azadiractin), insecticides of animal origin (Chitin, Chitosan based insecticides)

# Unit II - Chemical pest control in agriculture

Objectives:	1) To study the various types of insecticides.
	2) To acquire the knowledge about the modes of operation of duster and
	sprayers. 3) To correlate use of natural insecticides with synthetic insecticides.
Desired outcomes:	1) Learner would understand the classification of insecticides on the basis

of mode of action of insecticides.

- 2) Learner would understand specific use of sprayer and duster.
- 3) Lerner would understand the feasibility of natural insecticides better
  - than synthetic insecticides.
- **2.1.** Broad classification of insecticides.
- **2.2.** Inorganic insecticides (Arsenicals, Lime sulphur, Mercury compounds, Fluorine compounds), Fumigants (Para dichlorobenzene, Methyl bromide, Hydrogen cyanide).
- 2.3. Synthetic Organics Chlorinated Hydrocarbons (BHC, Methoxychlor) Organophosphate (Malathion, Parathion, Dicrotophos, Chlorpyriphos)Carbamates (Carbaryl, Propoxur) and Pyrethroids (Allethrin, Cypermethrin). (Give mode of action and applications of insecticides. Mention important characters of insecticides and precautions to be taken during applications)
- 2.4. Insecticide Formulations (Dust, Granules, Emulsifiable concentrates, Wettable powders, Aerosols.
- **2.5.** Techniques of fumigation and equipments used for insecticide applications: Dusters, Sprayers (Hand operated, Back snap, Foot operated) Precautions and maintenance of the equipments.
- 2.6. Advantages and disadvantages of insecticides.

# Unit III – Urban and domestic pest control

Objectives:	<ol> <li>To introduce the various types of insect pest.</li> <li>To study the nature of damage and preventive measures of urban and domestic pest.</li> <li>To create awareness about serious household pests and pest on pet animal.</li> </ol>
Desired outcomes:	<ol> <li>Learner would be made aware about economic loss caused by insect pest.</li> <li>Learner would understand type of urban and domestic insect pest and their preventive measures.</li> </ol>

# **3.1 Control of house-hold pests:**

- a) Cockroaches, flies (*Musca sps. Glossina, Phlebotomus*), ants, Mosquitoes, *Pediculus humanus, Xenopsylla*.
- b) Silverfish, book lice, cloth moth, carpet damaging insects.
- c) Powder post beetle, Termites.
- **3.2.Agricultural pests:** Grasshoppers, bugs, caterpillars, scale insects, leaf hoppers, *Bruchus,* Meal worm.
- 3.3. Stored grain pests: Sitophilus oryzae, Tenebrio, Trogoderma, Tribolium confusum
- 3.4. Pests on animals: Bird louse, Hypoderma, screw worms, Gastrophilus.

# Unit IV- Neo-avenues in Entomology

<b>Objectives:</b>	1) To introduce different values of insects in modern lifestyle and
	mankind.
	2) To understand the role of certain insects in forensic science.

**Desired outcomes:** 1) Learner would take more interest in the study of insects due to their

versatile nature.

2) Learner would understand the use of some insects in the investigation of crime (Forensic science).

# 4.1. Neo-avenues

- **4.1.1.** Insect as a food (Entomophagy).
- **4.1.2.** Insect as a medicine (Entomotherapy).
- **4.1.3.** Insect as weapons (Entomological warfare's).
- **4.1.4.** Insect as a pet.

# 4.2. Insect in forensic science

- **4.2.1.** Brief mention of Common insects of Forensic importance Order Diptera- Calliphoridae, Sarcophagidae and Muscidae Order Coleoptera -Staphylinidae, Histeridae, Silphidae, Dermestidae and Cleridae.
- **4.2.2.** Collection of entomological evidence during a death investigation. Temperature and climatic records, collection, preservation and handling of insects/maggots from the crime scene.
- **4.2.3.** Analysis of entomological evidence and estimating PMI (Post Mortem Index) using Maggot age and Insect succession.

# 4.3. Insect biotechnology

- 4.3.1. General introduction to insect biotechnology.
- 4.3.2. Use of insects in tissue culture and genetic studies as model animals.
- 4.3.3. Importance of insects in medicine and cosmetics w.r.t biotechnology.

# **Unit V – Government schemes**

Objectives:	1) To help learners to tap resources from Government scheme to start Ento- based bio-industry.
	2) To introduce learners about funding agencies like NABARD, KVIC, DIC etc.
	3) To help learners to understand feasibility report.
Desired outcomes:	1) Learners would get knowledge about various schemes to avail resources.
	2) Learners would be well introduced about various funding agencies and guidelines to apply for subsidized loan.
	3) Learners would understand the viability of the project on the basis of feasibility report.

# 5.1. Government schemes

- **5.1.1.** Schemes for sericulture.
- **5.1.2.** Schemes for bee-keeping.
- **5.1.3.** Schemes for Lac-culture.
- 5.1.4. NABARD (National Bank for Agriculture and Rural Development), KVIC (Khadi and Village Industries Commission), DIC (District Industries Centre), MUDRA, START-UP INDIA, STAND-UP INDIA.

**5.2.**Entrepreneurship opportunities in post-processing w.r.t. products of sericulture, apiculture and Lac culture.

# **5.3. Feasibility report:**

- 5.3.1. Area of production
- 5.3.2. Marketing strategies
- 5.3.3. Prime cost
- 5.3.4. Capital raising
- 5.3.5. Evaluation of project
- 5.3.6. Profitability of project
- 5.3.7. Actual production
- 5.3.8. Actual sale
- 5.3.9. Audit of variances

# **Unit VI – Finance**

Objectives:	1) To study the financial aspects and bio-industry like apiculture, sericulture, and Lac-culture.
	2) To introduce the various concepts of general account like costing, budget, depreciation to maintain the business.
Desired outcomes:	1) Learners would be able to understand financial entomology based

# **Desired outcomes:** 1) Learners would be able to understand financial entomology based projects.

# 2) Learners would familiarize with basic concepts in accountancy.

# 6.1. Costing

- 6.1.1. Basic concept: types of cost (historical, standard and managerial).
- 6.1.2. Budget: budgetary control-types of costing (process, batch, job, service).

6.1.3. Variances: Material, labour and overheads.

# **6.2. Basic accountancy:**

- 6.2.1. Basic terms, Golden rules in accounts, types of accounts (Indian), general entry, ledger posting, subsidiary book, single column cash book, double column cash book.
- 6.2.2. Depreciation: fixed installment, reducing balance method.
- 6.2.3. Bank reconciliation.
- 6.2.4. Rectification of error.
- 6.2.5. Final account.

# **Unit VII- Sales and Marketing**

# **Objectives:**

To understand the fundamental concepts of marketing.
 To help learners to find profitability in the entomology based industries.

3) To understand distribution and storage of products.4) To learn to advertise and to do branding of the products.

**Desired outcomes:** 1) Learners understand and apply marketing strategies.

2) Learners learn to manage and distribute products unto the satisfaction of market.

- 3) Learners also focus attention on branding of product.
- 7.1. Fundamental marketing.
- 7.2. Concept of 4 P's (Product, Price, Promotion and Place)
- 7.3. Distribution and logistics.
- 7.4. Advertising.
- 7.5. Branding.

# Unit VIII- Open unit

# **Objectives:**

- 2) To avail the vast literature on apiculture, sericulture and lac culture and IPM.
- 3) To build confidence among young learners about entrepreneurship.
- 4) To inculcate research aptitude among science graduates.

1) To motivate learner for self-employment.

- 5) To encourage learners to work in association of partners to reduce economic burden in the initial stage.
- 6) To boost the learners interest to renew natural resources.

(Colleges/institutes have to select the topics as per their local needs and available resources related to Entomology)

# SEMESTER-VI PRACTICAL Course code: USACEENT6P1 (Credits – 2)

- 1. Observation of slides or photographs of legs of honey bee.
- 2. Mounting of mouth parts of mosquito.

- 3. Digestive and Reproductive system Housefly.
- 4. Study of LC50 on suitable insect. Preferably mosquito larvae/rice weevil/flour beetle/ Chironomus larvae.
- 5. Study the effect of following insecticides on suitable insects. (Behavioural parameters and mortality)
  - a) Contact poison.
  - b) Stomach poison.
  - c) Fumigant.
- 6. Insecticide formulations. (Dust, Granules, Emulsifiable concentrates, sprays, wettable Powders).
- 7. Equipments Sprayers, Dusters as in theory.
- Study of Damage caused and control of - Grasshopper, plant bug, caterpillar, scale insect. Leaf hopper, Rice weevil, *Bruchus*, Meal moth, Flea, Bird louse, *Anopheles, Culex, Aedes, Glossina, Phlebotomus, Hypoderma*, Screw worm fly.
- 9. Morphogenetic characteristics of Drosophila (Eye color and Wing size.
- 10. Vertebrates important in Biological control Guppy fish, Frogs, Wall gecko, Wood pecker, Bats, Scaly anteater, Bear.
- 11. Any two insect types breeding in flesh of dead body. One Diptera, one Coleoptera
- 12. Demonstration of Household pest control (Use of different equipments such as drills, sprayers, dusters and insecticides).
- 13. Qualitative estimation of proteins and sugars from different varieties of honey.
- 14. A project based on any applied topic from paper USACEET601, to be assigned to individual student. (Preparation of feasibility report w.r.t. ento-entrepreneurship)

\* The assessment will be done during practical USACEENT6P1 through examination of project report, presentation of data and viva-voce.

**Instructions for USACEENT601** 

Total four units are to be selected per theory course for formal teaching by the concerned teachers in consultation with the head of the department and having discussed with the students, enabling optimum utilization of the available infrastructure, expertises of the teachers, human resources and opportunities

in the local area. Though it is desirable to encourage the students to undertake assignments / seminars / learning through guest lectures / entrepreneurial skill development / field visits, etc. From the topics which are not formaly taught by the teacher/s in order to have an overview of the subject.

It is not compulsory to do so and that assignments / seminars / learning through guest lectures / entrepreneurial skill development / field visits, etc. Too also be based on the topics formally taught by the teacher/s. The decision in this matter can be taken with full freedom as may be academically desired.

# **Modality of Assessment**

# **Theory Examination Pattern**

# A) Internal Assessment - 25%

•	ation type	5
	ass Test	
	Active participation in routine class instructional deliveries	
	Overall conduct as a responsible student, manners, skill in	
	articulation, leadership qualities demonstrated through	
	zing co-curricular activities, etc.	

# B) External examination -75 % Semester End Theory Assessment - 75%

# 75 marks

25 marks

1. Duration - These examinations shall be of 2.5 hours duration.

2. Theory question paper pattern: -

i. There shall be five questions each of 15 marks (30 marks with internaloption)

ii. On each unit there will be one question & fifth question will be based onentire syllabus.

iii. All questions shall be compulsory with internal choice within thequestions.

iv. Questions may be sub divided into sub questions as a, b, c, d & e, etc & the

allocation of marks depends on the weightage of the topic.

# **Practical Examination Pattern**

# (C) Internal Examination:

There will not be any internal examination/ evaluation for practicals.

# (D) External (Semester end practical examination):

Sr.No.	Particulars	Marks
	atory work	
	.1	

Assessment pattern for semester end / External practical examination of 80 marks shall be finalized in the workshop of the subject Semester end practical examination in applied component shall be conducted by the concerned department of the Institute/ College at the end of each semester and the marks of the candidates are to be sent to the University in the prescribed format.

# Semester VI

Practical examination will be held at the college / institution at the end of the semester.

The students are required to present a duly certified journal for appearing at the practical examination, failing which they will not be allowed to appear for the examination.

In case of loss of Journal and/ or Report, a Lost Certificate should be obtained from Head of the Department/ Co-ordinator of the department; failing which the student will not be allowed to appear for the practical examination.

# **Model Question Paper for Theory Examination** T.Y.B.Sc. (CBSGS) 2017-18 INTEGRATED PEST MANAGEMENT AND ENTREPRENEURSHIP **SEMESTER-VI** (Applied component)

# Duration 2<sup>1</sup>/<sub>2</sub> hrs

**Course code: USACEENT601** 

Marks 75

# **Instructions for students:**

- 1. Question 1 is compulsory.
- 2. Attempt any FOUR questions from Q.2 to Q.9.
- 3. All questions carry equal marks.

4. Draw and label diagrams wherever necessary.5. Figures to the right indicate full marks.

Q.1	Write Short note (Any 5) Advantages of IPM, Nematodes as biological for pest control, Pyrethroids, Dust & Granules formulations, Screw worm, meal moth, Entomotherapy, Insect as weapons	15
Q.2	Define IPM. Explain need & planning of IPM with suitable example.	15
	<ul><li>a) Explain biological pest control with help of predators &amp; Pathogens.</li><li>b) Describe the use of hormones &amp; Pheromones in pest control. Add note on Sterile male technique.</li></ul>	7 8
Q.3	Explain classification of insecticides. Add a note on Inorganic insecticide. OR	15
	<ul><li>a) Describe disadvantages o chemical pesticides.</li><li>b) Explain techniques of fumigation. What are different equipment used for insecticide application.</li></ul>	7 8
Q.4	Describe in detail damage & control of any THREE hose hold pest OR	15
0.5	<ul> <li>a) Explain damage and control of <i>Sitophilus oryzae</i></li> <li>b) Explain damage and control of Bird louse &amp; leaf hopper</li> <li>Describe use of various insect in Forensic Science.</li> </ul>	7 8 15
OR		
<b>Q.</b> 6	<ul><li>a) Explain Entomophagy.</li><li>b) Describe use of insect in tissue culture and genetic studies Explain the scope of NABARD w.r.t. ento-entrepreneurship.</li></ul>	7 8 15
-	OR	
Q.7	<ul> <li>a) Write note on KVIC scheme for apiculture w.r.t. finance.</li> <li>b) Scope of ento-entrepreneurship in START-UP scheme.</li> <li>Poona Transport purchased a truck on 1<sup>st</sup> June 2012 at Rs. 190000. One more truck they purchased on 31<sup>st</sup> Dec 2013 at Rs. 260000. The company sold parts of the truck on 31<sup>st</sup> march 2014 at Rs. 20000 which was purchased on 1<sup>st</sup> June 2012. The company charged 12% depreciation on 31<sup>st</sup> March every year under Reducing Balance Method.</li> <li>a) Show all necessary accounts.</li> </ul>	7 8 15
	OR b) Draw journal entries in the book of company.	
	OR	_
	<ul><li>a) What are the Golden rules in account Discuss with suitable example.</li><li>b) The following information related with Mr. Atul Jain Bank of Maharashtra for the month of June 2016. Prepare Bank reconciliation statement.</li></ul>	7 8

Particulars

	01	Balance as per passbook Rs. 12000/-		
	05	Cheque of Rs. 6000 issued to Mrs. Neeta but not vet presented.		
	11	Cheque of Rs. 10000 deposited into Bank but not yet cleared.		
	28	Cheque dishonored charges charged by bank Rs. 500/-		
	29	Cheque directly deposited by customer Rs. 2000/-		
	30	Bank deposited divided at Rs. 300 into our A/c		
	30	Bank charges deducted Rs. 150/-		
Q.8	What i	s branding? Why branding is necessary for business.	15	
		OR		
	a) What is marketing and explain features of marketing.			
	b) Write brief note on functions of marketing.			
Q.9	Open u	unit.	15	

# SKELETON QUESTION PAPER FOR PRACTICAL T.Y.B.Sc. (CBSGS) 2017-18 **SEMESTER-VI** (Applied component) PRACTICAL

<b>Eco</b> Tim	nomic entomology (Applied component)Course code: USACEENTe : 5hrsTotal Marks : 100	<b>Course code: USACEENT6P1</b> Total Marks : 100	
1.	Identification (05 marks each)	20	
	a) Identify and describe the damage caused and control		
	b) Identify and describe the damage caused and control		
	c) Identify and describe the damage caused and control		
	d) Identify and describe		
2.	a) Draw neat and labeled diagram of digestive/reproductive system of House fly. Complete the given system by drawing the missing part and describe the function of all labeled parts.	20	
	b) Mounting/ Study of mouth parts of different mosquito species.	10	
3.	a) Qualitative estimation of proteins from different varieties of honey.	15	
	OR		
	a) Effect of given insecticide on suitable organism. OR	15	
	a) Identification and description of morphogenetic characteristics in <i>Drosophila</i> .	15	
4.	Feasibility Project report and Viva based on it.	15	
5.	Field report	10	
6.	Journal	10	

# ANNEXURES

# Annexure-I

# List of reference books

- A Text book of insect morphology, physiology and endocrinology Tembhare D B Chand Publication.
- Principles of insect morphology- Snodgrass R E Tata McGraw Hill.
- Text book of Entomology—Ross John Wiley publ.
- General and applied Entomology David and Ananthakrishnan. Tata McGraw Hill
- Principles of insect physiology Wigglesworth. ELBS Publication.
- A General textbook of entomology -- A D Imms. Asia Publication.
- Insect endocrinology and physiology Tembhare D B S Chand publication.
- Applied Entomology Awasthi. Scientific Publication.
- Forensic Entomology-The utility of Arthropods in legal investigations. –Jason H. Byrd and James L. Castner. CRC Press.
- Agricultural insect pests and their control. V.B. Awasthi. Scientific Publication.
- A manual of practical entomology. M M Trigunayat. Scientific Publication.
- Laboratory manual of entomology Alaka Prakash . New Age Publishers.
- Applied Entomology Alaka Prakash and Fennemore. New Age Publishers.
- Photographic Atlas of Entomology and guide to insect identification.-Castner. Seline press Florida. Marketed by Scientific Publication.

• The Insects - Structure and Function - 4th Edition, R. F. Chapman (ed.). Cambridge University Press 1998.

- Entomology and Pest Management -Larry P. Pedigo. Pearson Education.
- Destructive and Useful Insects.- Metcalf and Flint. McGraw Hill Publication.
- Insect Year Book of Agriculture- American Agriculture Department Publication.
- Economic Zoology- Shukla, Upaddhaya and Srivastava. S. Chand Publication.
- Edible insects: Future prospects for food and feed security- Arnald van Huis, Joost Van Itterbeeck, Harmke Klunder, Esther Mertens, Afton Halloran, Giulia Muir and Paul Vantomme, FAO of the United Nations, Rome, 2013. (Available online).
- Insect Jewelry by Roger D. Akre., Laurel D. Hansen, and Richards S. Zack: in Summer (1991). (Online available as research article).
- Jeffrey A. Lockwood Entomological warfare: History of the use of insects as weapons of Wars: in Bulletin of the ESA in Summer (1987). (Online available as research article).

- E. Paul Cherniack, M.D. (2010): Bugs as Drugs, Part 1: Insects. The "New" Alternative Medicine for the 21<sup>st</sup> Century. Alternative Medicine review, 15 (2), 124-135.
- Theodore A. Evans., Tracy Z. Dawes, Philip R. Ward and Nathan Lo (2011) : Ants, and termite increases crop yield in dry climate. Nature communication. 262. doi:10.1038/ncomms1257
- S. Turner (2008): Termites: Friends or Foe. AGRICOLA.
- Irwin, M. E. and Kampmeier, G. E. (2002): Commercial products, from Insect. In V. H. Resh and R. Carde (eds.) Encyclopedia of insects. Academic press, San Diego.
- Cost Accounting by Manan Publication F.Y.BAF.

# **Books in Marathi:**

- Keetak nirikshak amchasobati: Purushottam Joshi, Continental publication, Pune.
- *Gruhaupayagi keetak :* Purushottam Joshi, Continental publication, Pune.
- Keetak Parichay wa Sangraha: Purushottam Joshi, Continental publication, Pune.
- *Pikanvareel Keed Keetak:* Purushottam Joshi, Continental publication, Pune.
- Madhmashya Jeevan aani Palan: R. V. Ranade, Continental publication, Pune.

# Annexure-II

# N. B:

- 1. It is pertinent to note that we have to adhere strictly to the directions as given in the UGC Circular F14-4/2006 (CPP-II).
- 2. Apart from the institutional Animal Ethics Committee (IAEC) and any other Committee
- appointed by a Competent Authority/Body from time to time, every college should constitute the following Committees :
  - a. A Committee for the Purpose of Care and Supervision of Experimental Animals (CPCSEA) and
  - b. A Dissection Monitoring Committee (DMC)
  - c. **Composition of DMC** shall be as follows:
  - i) Head of the Concerned Department (Convener/Chairperson)
  - ii) Two Senior Faculty Members of the concerned Department
  - iii) One Faculty of related department from the same College
  - iv) One or two members of related department from neighboring colleges.

# Annexure-III

# Course Code: USACEENT5P1 Group Assignments (Maximum 5 students in a group)

- 1. Visit Govt. office to find subsidies for different entomology related industries.
- 2. Collect information on available pesticides.

- 3. Study the wholesale and retail marketing of the insecticide.
- 4. Study the production of insecticides in the industry.
- 5. Study marketing of insecticides by interacting with the salesman/others concerned.
- 6. Study any one unit of sericulture /culture/apiculture.
- 7. Survey recent research trends in biological control of insect pests.
  - a. Study the institutes actively guiding on Biological control.
  - b. Study the insecticide /formulations available in the market and decide their demand in the market.
- 8. Obtain from internet/books/journals, taxonomic keys for different insect orders.
  - a. Species of Bees (solitary & social) and their role as pollinators.
  - b. Diseases and natural enemies of bees.
  - c. Bee products and their uses.
  - d. Types of silk moths (wild & semi domesticated) and their contribution to the National silk production.
- 9. Diseases and enemies of silk moths.
- 10. Comparison of the current status of lac industry in Bihar and Maharashtra.
- 11. Diseases of lac insects and uses of lac in industry.
- 12. Role of Mahila Aarthik Vikas Mahamandal in insect related small scale enterprise (sericulture, Lac culture).
- 13. Role of Khadi and Village Industry in encouraging insect related enterprises (Apiculture, Biocontrol).
- 14. Damage caused by insects to stored grain, cattle, poultry and man.
- 15. Feasibility of Biocontrol for household pests (Godrej case study).
- 16. Comparative study of social life of Bees, Ants and Termites.
- 17. Insecticide formulations and applications.
- 18. Maintenance and working of equipments used in insecticide application.
- 19. Advantages of IPM quoting successful case studies.

# **Annexure IV**

# Course Code: USACEENT5P1 Play and ponder

1. Maintain a bee hive.

- 2. Maintain a stingless bee colony.
- 3. Behaviour studies.
- 4. Toxicological studies.
- 5. Grow larvae/nymphs of insects to study life cycle.
- 6. Maintain silk moth larvae.
- 7. Study Lac culture.
- 8. Grow in laboratory, flies/beetles breeding on flesh and note the details of their behavior.
- 9. Does the scent or color of a flower attract an insect?
- 10. Temperature prediction by recording cricket chirps per minute.
- 11. Effect of sex pheromones on insects.
- 12. Inter species communication talking to fireflies.
- 13. Maintain an ant hill to understand community living.

# Annexure V

# Course Code: USACEENT5P1 Field visits

- Visit the to an apiculture unit.
- Visit the to a sericulture unit.
- Visit the to a Lac culture unit.
- Observe insects from the given area to study diversity.
- Observe and study aquatic insects.
- Collect different types of mosquitoes.
- The topics listed in annexure 1 to 4 are suggestions only, leaving scope for further identifying suitable topics in the relevant areas.

# **Annexure VI**

# Course Code: USACEENT6P1

# Projects for individual student

- Prepare feasibility report on apiculture unit small/medium/large scale.
- Prepare feasibility report on sericulture unit small/medium/large scale.
- Prepare feasibility report on Lac culture unit small/medium/large scale.
- Prepare feasibility report on setting pest control business.
- Study of behavior of pest insects.
- Collect dead insects to find the infection by fungi, bacteria, viruses and other pathogens.
- To compare the toxicity of insecticide using different insect models or stages of insects.
- To prepare different types of baits and test their efficacy.
- To try different plant extracts/ chemicals for their synergistic activity.
- Monitor the life cycle of insects of forensic importance, throughout the year to record seasonal differences.

# **Annexure VII**

# Assignments- AC: Economic Entomology

1. Visit KVIC website and find out various subsidies offered to Apiculturist.

2. Find out from the internet, which insect species are reared as pets? Which are Indigenous species of insects being reared as pets?

3. Visit KVIC website and find out marketing support to Sericulturist and Lacculturist.

4. What are insects? How many total orders belong to **Class:Insecta**? Explain various roles of insects in different trophic levels of food chain .Give examples of such insects.

5. On the basis of colour of eyes or structure of wings, take some photographs of *Drosophila melanogaster* either by keeping banana or any fruit in the window of your house or lab or obtained information from internet. Find some of the mutants of fruit flies. Comment on any two mutants of them.

4. Visit any one website or home page of insecticide or pesticide manufacturing Co.Note their products and try to categorize them as an insecticide on the basis of mode of action. Also try to search their annual

turnover. Explain any two pesticides with examples. (Contact poison, Fumigants, Stomach poison etc.) 5. What do you mean by Biovectors? Which insects as biovectors do spread bubonic plague, Elephantiasis, Chickunguniya, Yellow fever, Dengue fever, Malaria, Sleeping sickness and Oriental sore? Give modes of transmission of above diseases and morphology of any two respective biovectors.

6. Visit food and drug administrative office and find out the norms of standard marketed honey.

7.Visit DIC office in your district and find out the various loan schemes based on Applied Entomology for unemployed science graduates.

8. Give the best measures to control mosquito population without using chemicals other than natural insecticides. Also find economically useful methods to control mosquitoes.

9. Comment on the *Muscasps*.(Houseflies) as a biological vectors. Give its preventive and natural control methods.

10. Find from internet, insects pheromones or hormones strategic use in the control of horticultural insect pests.

# DOMBIVLI SHIKSHAN PRASARAK MANDAL'S K.V.Pendharkar College of Arts, Science and Commerce [AUTONOMOUS COLLEGE]

# SYLLABUS FOR MATHEMATICAL AND STATISTICAL TECHNIQUES AT F.Y.B.Com. EXAMINATION

<u>(WITH EFFECT FROM THE</u> <u>ACADEMIC YEAR 2021-</u> <u>2022)</u>

# **SYLLABUS**

# Semester I

#### Course: PUCMSI21-125

# Mathematical and Statistical Techniques-I [A]<u>SECTION-I</u> <u>MATHEMATICS: (24 marks)</u>

#### **Unit I: Percentage. Shares and Mutual Funds**

- a. **Percentage:** Concept of Percentage and Simple Examples.
- b. **Shares**: Concept of share, face value, market value, dividend, equity shares, preferential shares, bonus shares. Simple examples.
- c. **Mutual Funds**: Simple problems on calculation of Net income after considering entry load, dividend, change in Net Asset Value (N.A.V.) and exit load. Averaging of price under the Systematic Investment Plan (S.I.P.)

#### Unit II: Permutation, Combination and Linear Programming Problems:

a. **Permutation and Combination:** Factorial Notation, Permutation as an arrangement, Simple examples(without repetation), combination as selection, Simple

examples, Relation between  ${}^{n}C_{r}$  and  ${}^{n}P_{r}$  Examples on commercial application of permutation and combination.

permutation and combination.

b. Linear Programming Problems: Equation of line, Point of intersection of lines. Sketching of graphs of (i) linear equation Ax + By + C = 0 (ii) linear inequalities. Mathematical Formulation of Linear Programming Problems upto 3 variables. Solution of Linear Programming Problems using graphical method up totwo variables.

#### [B] SECTION-II STATISTICS: (36 marks)

#### **Unit III: Measures of Central Tendencies:**

Definition of Average, Types of Averages: Arithmetic Mean, Median, and Mode for grouped as well as ungrouped data. Quartiles, Deciles and Percentiles. Using Ogive locate median and Quartiles. Using Histogram locate mode. Pie Chart. Combined and Weighted mean.

#### **Unit IV: Measure of Dispersions:**

Concept and idea of dispersion. Various measures Range, Quartile Deviation, Mean Deviation, Standard Deviation, Variance, Combined Variance.

#### **Unit V: Decision Theory**:

Decision making situation, Decision maker, Courses of Action, States of Nature, Pay-off and Pay-off matrix; Decision making under uncertainty, Maximin, Maximax, Minimax regret and Laplace criteria; simple examples to find optimum decision. Formulation of Payoff Matrix. Decision making under Risk, Expected Monetary Value (EMV); Decision Tree; Simple Examples based on EMV. Expected Opportunity Loss (EOL), simple examples based on EOL.

#### <u>Semester II</u> Course:PUCMSII21-226

#### Mathematical and Statistical Techniques-II

#### [A]SECTION-I MATHEMATICS : (24 marks)

#### Unit I :\_Quadratic Equations, Functions, Derivatives and Their Applications

- a. Quadratic Equations: Rational roots of quadratic equation.
- b. Concept of real functions: constant function, linear function, x<sup>n</sup>, e<sup>x</sup>, a<sup>x</sup>, log x.
   Demand, Supply, Total Revenue, Average Revenue, Total cost, Average cost and Profitfunction.
   Equilibrium Point, Break-even point.

# c. Derivative of functions:

- i. Derivative as rate measure, Derivative of  $x^n$ ,  $e^x$ ,  $a^x$ ,  $\log x$ .
- ii. Rules of derivatives: Scalar multiplication, sum, difference, product, quotient(Statements only), Simple problems. Second order derivatives.
- iii. Applications: Marginal Cost, Marginal Revenue, Elasticity of Demand. Maxima andMinima for functions in Economics and Commerce.
   (Examination Questions on this unit should be application oriented only.)

#### **Unit II: Interest and Annuity:**

- a. **Interest:** Simple Interest, Compound Interest (Nominal & Effective Rate of Interest), Calculations involving up to interest compounded quarterly.
- b. Annuity: Annuity Immediate and its Present value, Future value. Equated Monthly Installments (EMI) using flat interest rate & amortization of loans. Stated Annual Rate & Affective Annual Rate Perpetuity and its present value. Simple problemsinvolving up to interest compounded quarterly.

# [B] SECTION-II STATISTICS: (36 marks)

# Unit III: Bivariate Linear Correlation and Regression

- a. **Correlation Analysis:** Meaning, Types of Correlation, Determination of Correlation: Scatter diagram, Karl Pearson's method of Correlation Coefficient (excluding Bivariate Frequency Distribution Table) and Spearman's Rank Correlation Coefficient.
- b. **Regression Analysis:** Meaning, Concept of Regression equations, Slope of the Regression Line and its interpretation. Regression Coefficients (excluding BivariateFrequency Distribution Table), Relationship between Coefficient of Correlation and Regression Coefficients, Finding the equations of Regression lines by method of Least Squares.

# **Unit IV : Time series and Index Numbers:**

- a. **Time series**: Concepts and components of a time series. Representation of trend by Freehand Curve Method, Estimation of Trend using Moving Average Method and Least Squares Method (Linear Trend only). Estimation of Seasonal Component using Simple Arithmetic Mean for Additive Model only (For Trend free data only). Concept of Forecasting using Least Squares Method.
- b. Index Numbers: Concept and usage of Index numbers, Types of Index numbers, Aggregate and Relative Index Numbers, Lasperye's, Paasche's, Dorbisch-Bowley's, Marshall-Edgeworth and Fisher's ideal index numbers, Test of Consistency: Time Reversal Test and Factor Reversal Test. Chain Base Index Nos. Shifting of Base year. Cost of Living Index Numbers, Concept of Real Income, Concept of Wholesale Price Index Number. (Examples on missing values should not be taken)

# Unit V: Elementary Probability Theory and

# <u>Continuous Probability Distributions:</u>

a. **Probability Theory:** Concept of random experiment/trial and possible outcomes; Sample Space and Discrete Sample Space; Events their types, Algebra of Events, Mutually Exclusive and Exhaustive Events, Complimentary events.

Classical definition of Probability, Addition theorem (without proof), conditional probability. Independence of Events:  $P(A \cup B) = P(A) P(B)$ . Simple examples.

- b. **Random Variable**: Probability distribution of a discrete random variable; Expectation and Variance of random variable, simple examples on probability distributions.
- c. **Continuous Probability distribution:** Normal Distribution. (Properties and applications only, no derivations are expected)

# Tutorial:

Two tutorials to be conducted on each unit i.e. 10 tutorials per semester.

# **EVALUATION PATTERN**

1.	INTERNAL ASSESSMENT	40 Marks
1.1	One Class test (Objectives/ Multiple Choice)	15 Marks
1.2	Project using survey method (Preparing	20 Marks
	Ouestionnaire)/assignment/ case study	
1.2	Questionnane), assignmente case staay	05 14 1
1.3		05 Marks
	Participation, Overall performance	
-		(0, 1
2.	IERM END EXAMINATION ASSESSMENT	60 marks
	A) Section-I(Maths):Examples 24 Marks	40%
	D) Casting U(Casta). Energy las/Theory 2(Mayles	600/
	D) Section-II(Stats):Examples/Theory 36Warks	0070

# Examination:

#### Semester End Examination: 60 marks

At the end of each semester, there will be a Semester End Examination of 60 marks, 2 hours duration and question paper pattern as shown below.

#### Question Paper Pattern : (Course: PUCMSI21-125 and Course: PUCMSII21-226)

#### 1. In Section I (based on Mathematics);

i) Two questions carrying 12 marks each. First question should be from Unit I and Second question should be from Unit II.

ii) In each question there should be 5 sub-questions carrying 4 marks each. Students should be asked to answer any 3 sub questions from each question.

# 2. In Section II (based on Statistics);

i) Three questions carrying 12 marks each. Thirdquestion should be from Unit III, Fourth question should be from Unit IV and Fifthquestion should be from Unit V.

ii) In each question there should be 5 sub-questions carrying 4 marks each. Students should be asked to answer any 3 sub questions from each question.

# **Reference Books:**

- Mathematics for Economics and Finance Methods and Modelling by Martin Anthony and Norman Biggs, Cambridge University Press, Cambridge low-priced edition, 2000, Chapters 1, 2,4, 6 to 9 & 10.
- 2. Applied Calculus: By Stephen Waner and Steven Constenoble, Brooks/Cole Thomson Learning, second edition, Chapter 1 to 5.
- 3. Business Mathematics By D. C. Sancheti and V. K. Kapoor, Sultan Chand & Sons, 2006, Chapter 1,5, 7, 9 &10.
- 4. Mathematics for Business Economics: By J. D. Gupta, P. K. Gupta and Man Mohan, Tata Mc-Graw Hill Publishing Co. Ltd., 1987, Chapters 9 to 11 & 16.
- 5. Quantitative Methods-Part-I By S. Saha and S. Mukerji, New Central Book Agency, 1996, Chapters 7 & 12.
- 6. Mathematical Basis of Life Insurance By S.P. Dixit, C.S. Modi and R.V. Joshi, Insurance Institute ofIndia, Chapters 2: units 2.6, 2.9, 2.20 & 2.21.
- 7. Securities Laws & Regulation of Financial Market : Intermediate Course Paper 8, Institute of Company Secretaries of India, Chapter 11.
- 8. Investments By J.C. Francis & R.W. Taylor, Schaum's Outlines, Tata Mc-Graw Hill Edition 2000, Chapters 2,4 & section 25.1.
- Indian Mutual Funds Handbook : By Sundar Shankaran, Vision Books, 2006, Sections 1.7,1.8.1,
   6.5 & Annexures 1.1to 1.3.
- 10. STATISTICS by Schaum Series.
- 11. Operations Research by Gupta and Kapoor
- 12. Operations Research by Schaum Series
- 13. Fundamentals of Statistics D. N. Elhance.
- 14. Statistical Methods S.G. Gupta (S. Chand & Co.
- 15. Statistics for Management Lovin R. Rubin D.S. (Prentice Hall of India)
- 16. Statistics Theory, Method & Applications D.S.Sancheti & V. K. Kapoor.
- 17. Modern Business Statistics (Revised}-B. Pearles & C. Sullivan –Prentice Hall of India.
- 18. Business Mathematics & Statistics : B Aggarwal, Ane Book Pvt. Limited
- 19. Business Mathematics : D C Sancheti & V K Kapoor, Sultan Chand & Sons
- 20. Business Mathematics : A P Verma, Asian Books Pvt. :Limited
## **QUESTION PAPER – SET I**

#### MARKS:- 60 TIME:- 2HRS

#### **N.B**: (1) ALL QUESTION ARE COMPALSORY

(2) ALL QUESTION CARRY EQUAL MARKS

(3) FIGURES TO THE RIGHT INDICATES MARKS TO A SUB-QUESTION.

(4) GRAPGH PAPER WILL BE SUPPLIED ON REQUEST.

(5) USE OF NON-PROGRAMMABLE CALCULATOR IS ALLOWED.

#### **SECTION-I**

#### Q.1 ATTEMPT ANY THREE OF THE FOLLOWING

(a) 4 Marks	(b) 4 Marks	(c) 4 Marks	(d) 4 Marks (e) 4 Marks	12 Marks
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#### Q.2 ATTEMPT ANY THREE OF THE FOLLOWING

(a) 4 Marks (b) 4 Marks (c) 4 Marks (d) 4 Marks (e) 4 Marks 12 Marks

#### **SECTION-II**

Q.3 ATTEMPT ANY THREE OF THE FOLLOWING	
(a) 4 Marks (b) 4 Marks (c) 4 Marks (d) 4 Marks (e) 4 Marks	12 Marks
Q.4 ATTEMPT ANY THREE OF THE FOLLOWING	
(a) 4 Marks (b) 4 Marks (c) 4 Marks (d) 4 Marks (e) 4 Marks	12 Marks
Q.5 ATTEMPT ANY THREE OF THE FOLLOWING	
(a) 4 Marks (b) 4 Marks (c) 4 Marks (d) 4 Marks (e) 4 Marks	12 Marks

<u>Academic Council dated 20th May, 2021 as per Item Number: 2.03</u>



# DOMBIVLI SHIKSHAN PRASARAK MANDAL'S,

# K.V. PENDHARKAR COLLEGE OF ARTS, SCIENCE AND COMMERCE, (AUTONOMOUS) DOMBIVLI (EAST), DIST. THANE

(Affiliated to University of Mumbai)

# **Faculty of Science**

# **DEPARTMENT OF INFORMATION TECHNOLOGY**

(Programme: Bachelor of Science: B.Sc. I.T.)

# **SYLLABUS FOR**

F. Y. B.Sc. I.T. – Information Technology (Semester I and II)

**Choice Based Credit System (CBCS)** 

(with effect from the Academic Year: 2021-2022

**CONTENT Programme - Bachelor of Science in Information Technology (B.Sc. I.T.)** 

F.Y.B.Sc. IT						
	Semester – 1					
<b>Course Code</b>	Course Type	Course Title		No of		
			Credits	lectures		
PUSITI21-191	Core Subject	Imperative Programming	2	5		
PUSITI21-192	Core Subject	Digital Electronics	2	5		
PUSITI21-193	Core Subject	Operating Systems	2	5		
PUSITI21-194	Core Subject	Discrete Mathematics	2	5		
PUSITI21-195	Ability Enhancement	Communication Skills	2	5		
	Skill					
	Course					
PUSITI21-P19	Core Subject	Imperative Programming	2	3		
1	Practical	Practical				
PUSITI21-P19	Core Subject	Digital Electronics Practical	2	3		
2	Practical					
PUSITI21-P19	Core Subject	<b>Operating Systems Practical</b>	2	3		
3	Practical					
PUSITI21-P19	Core Subject	Discrete Mathematics	2	3		
4	Practical	Practical				
PUSITI21-P19	Ability Enhancement	Communication Skills	2	3		
5	Skill Course	Practical				
	Practical					
Total Credits			20			

Semester – 2					
Course Code	Course Type	Course Title	Credit s	No of lectures	
PUSITII21-29 1	Core Subject	Object oriented Programming	2	5	
PUSITII21-29 2	Core Subject	Microprocessor Architecture	2	5	
PUSITII21-29 3	Core Subject	Web Programming	2	5	
PUSITII21-29 4	Core Subject	Numerical and Statistical Methods	2	5	
PUSITII21-29 5	Ability Enhancement Skill Course	Green Computing	2	5	
PUSITII21-P2 91	Core Subject Practical	Object Oriented Programming Practical	2	3	

PUSITII21-P2	Core Subject	Microprocessor	2	3
92	Practical	Architecture		
		Practical		
PUSITII21-P2	Core Subject	Web Programming Practical	2	3
93	Practical			
PUSITII21-P2	Core Subject	Numerical and Statistical	2	3
94	Practical	Methods Practical		
PUSITII21-P2	Ability Enhancement	Green Computing Practical	2	3
95	Skill Course			
	Practical			
		Total Credits	20	

# Guidelines & Syllabus Structure:

- 1. In F.Y.B.Sc.I.T.(CBCS) there will be five theory papers and five practicals in each semester with 2 credits per paper.
- 2. In S.Y.B.Sc.I.T.(CBCS) there will be five theory papers and five practicals in each semester with 2 credits per paper.
- 3. In T .Y.B.Sc.I.T.(CBCS) there will be five theory papers and five practicals in each semester with 2 credits per paper.

# F.Y.B.Sc .I.T. (PRACTICAL)

Students will have to perform minimum 08 practical in each semester and all 08 practical should be reported in journal.

F.	Y.	BSc.	I.T.
SF	M	ESTF	CR_I

		-		
<b>B. Sc (Information Technol</b>	Semester – I			
Course Name: Imperative Prog	Course Name: Imperative Programming			
Periods per week (1 Period is 50	5			
Credits		2		
		Hours	Marks	
Evaluation System	Theory Examination	2	60	
	Internal		40	

### Learning Outcomes:

- 1. Students will get to know the basic idea about the logic and development of programs.
- 2. Students will get familiar with operators and i/o library functions available in C.

- 3. Students will be able to use conditional statements and loops to solve various complex programs and using functions in the program.
- 4. Students will get familiar with preprocessor directives and arrays.
- 5. Students will get to know the concept of pointers and structures in c programming.

Unit	Details	No. of Lectures
Ι	<ul> <li>Introduction: Types of Programming languages, History, features and application. Simple program logic, program development cycle, pseudocode statements and Algorithm, flowchart symbols, sentinel value to end a program, programming and user environments, evolution of programming models., desirable program characteristics. Structure of Program with its sections</li> <li>Fundamentals:</li> <li>Compilation and Execution of a program, Character Set, identifiers and keywords, data types, constants, variables and array declarations, expressions, statements, Variable definition, symbolic constants.</li> </ul>	(12)
II	<ul> <li>Operators and Expressions: Arithmetic operators, unary operators, relational and logical operators, assignment operators, assignment operators, the conditional operator, library functions.</li> <li>Data Input and output: Single character input and output, entering input data, scanf function, printf function, gets and puts functions, interactive programming. String functions</li> </ul>	(12)
III	<ul> <li>Conditional Statements and Loops: Decision Making Within A Program, Conditions, Relational Operators, Logical Connectives, If Statement, If-Else Statement, Loops: While Loop, Do While, For Loop. Nested Loops, Infinite Loops, Switch Statement, use of break, continue, go to statement.</li> <li>Functions: Overview, defining a function, accessing a function, passing arguments to a function, specifying argument data types, function prototypes, recursion, modular programming and functions, standard library of c functions, prototype of a function: parameter list, return type, function call, block structure, passing arguments to a function: call by reference, call by value. Inline Function</li> </ul>	(12)
IV	Definitio <b>Program structure:</b> Storage classes, automatic variables, external variables, static variables, multi file programs, more library functions <b>Preprocessor:</b> Features, #define and #include, Directives and Macros	(12)

	Arrays: n, processing, passing arrays to functions, Array Operations multidimensional arrays, arrays and string and its functions	
V	<b>Pointers:</b> Fundamentals, declarations, Pointers Address Operators, Pointer Type Declaration, Pointer Assignment, Pointer Initialization, pointer, Pointer with function	(12)
	Structures and Unions: Structure Variables, Initialization, Structure Assignment, Nested Structure, Structures and Functions, Structures and Arrays: Arrays of Structures, Structures Containing Arrays, Unions.	

## **References:**

Books and References:						
Sr. No.	Title	Author/s	Publisher	Edition	Year	
1.	Programming with C	Byron Gottfried	Tata McGRAW- Hill	2 <sup>nd</sup>	1996	
2.	Programming Logic and	Joyce Farell	Cengage	8 <sup>th</sup>	2014	
	Design		Learning			
3.	"C" Programming"	Brian W. Kernighan and Denis M. Ritchie.	PHI	2. <sup>nd</sup>		
4.	Let us C	Yashwant P. Kanetkar,	BPB publication			
5.	C for beginners	Madhusudan Mothe	X-Team Series	1 <sup>st</sup>	2008	
6.	21 <sup>st</sup> Century C	Ben Klemens	OReilly	1 <sup>st</sup>	2012	

<b>B. Sc (Information Technol</b>	Semester – I		
Course Name: Digital Electronic	Course Code: PUSITI21-192		
Periods per week (1 Period is 50	5		
Credits	2		
		Hours	Marks
Evaluation System Theory Examination		2	60
	Internal		40

- 1. Get information about the Number system and their arithmetic operations.
- 2. Get in detail study of Boolean algebra as well as K-maps technique.
- 3. Study in detail about combinational circuits.
- 4. Get to know about Encoder, decoder and different types of Flip-flop Circuits.
- 5. Understand in detail about the Counter and Shift register.

Unit	Details	No. of Lectures	
I	Number System: Analog System, digital system, numbering system, binary number system, octal number system, hexadecimal number system, conversion from one number system to another, floating point numbers, weighted codes binary coded decimal, non-weighted codes Excess – 3 code, Gray code, Alphanumeric codes – ASCII Code, EBCDIC, ISCII Code, Hollerith Code, Morse Code, Teletypewriter (TTY), Error detection and correction, Universal Product Code, Code conversion.		
	<b>Binary Arithmetic:</b> Binary addition, Binary subtraction, Negative number representation, Subtraction using 1's complement and 2's complement, Binary multiplication and division, Arithmetic in octal number system, Arithmetic in hexadecimal number system, BCD and Excess –3 arithmetic.		
Π	<ul> <li>Boolean Algebra and Logic Gates:</li> <li>Introduction, Logic (AND OR NOT), Boolean theorems, Boolean Laws, De Morgan's Theorem, Perfect Induction, Reduction of Logic expression using Boolean Algebra, Deriving Boolean expression from given circuit, exclusive OR and Exclusive NOR gates, Universal Logic gates, Implementation of other gates using universal gates, Input bubbled logic, Assertion level.</li> </ul>		
	Minterm, Maxterm and Karnaugh Maps: Introduction, minterms and sum of minterm form, maxterm and Product of maxterm form, Reduction technique using Karnaugh maps – 2/3/4/5/6 variable K-maps, Grouping of variables in K-maps, K-maps for product of sum form, minimize Boolean expression using K-map and obtain K-map from Boolean expression,Quine McClusky method. Don't care conditions using K-maps for product of sum form and product of sum form		
III	<b>Combinational Logic Circuits:</b> Introduction, Multi-input, multi-output Combinational circuits, Code converters design and implementations	(12)	

	Arithmetic Circuits: Introduction, Adder, BCD Adder, Excess – 3 Adder, Binary Subtractors, BCD Subtractor, Multiplier, 2 bit Comparator and 4 bit Comparator.	
IV	<b>Multiplexer, Demultiplexer, ALU, Encoder and Decoder:</b> Introduction, Multiplexer, Demultiplexer, Implementation of Mux and Demux <u>,</u> Decoder, ALU, Encoders.	(12)
	<b>Sequential Circuits: Flip-Flop:</b> Introduction, Terminologies used, S-R flip-flop,clocked S-R flip-flop,D flip-fop, JK flip- flop, Race-around condition, Master – slave JK flip-flop, T flip-flop, conversion from one type of flip-flop to another, Application of flip-flops.	
V	<b>Counters:</b> Introduction, Asynchronous counter, Terms related to counters, IC 7493 (4-bit binary counter), Synchronous counter, Bushing, Type T Design, Type JK Design, Presettable counter, Synchronous counter ICs, Analysis of counter circuits, What is IC? Types of IC's	(12)
	<b>Shift Register:</b> Introduction, parallel and shift registers, serial shifting, serial–in serial– out, serial–in parallel–out, parallel–in parallel–out, Ring counter, Johnson counter, Applications of shift registers, Pseudo-random binary sequence generator, Seven Segment displays, analysis of shift counters.	

Books and References:						
Sr. No.	Titl	Author/s	Publisher	Edition	Year	
	e					
1.	Digital Electronics and	N. G. Palan	Technova			
	Logic Design					
2.	Make Electronics	Charles Platt	O'Reilly	1 st	2010	
3.	Modern Digital Electronics	R. P. Jain	Tata	<b>3</b> <sup>rd</sup>		
			McGraw			
			Hill			
4.	Digital Principles and	Malvino and	Tata			
	Applications	Leach	McGraw			
			Hill			
5.	Digital Electronics:	Anil K.	Wiley		2007	
	Principles, Devices and	Maini				
	Applications,					

<b>B. Sc (Information Technology)</b>		Semester – I		
Course Name: Operating Systems		Course Code: PUSITI21-193		
Periods per week 1 Period is 50	5			
Credits		2		
		Hours	Marks	
Evaluation System	Theory Examination	2	60	
	Internal		40	

- 1. To learn about system design so they can extend the features of operating system solve any problem occurring in operating system.
- 2. Understand how program memory addresses relate to physical memory addresses, memory management in base-limit machines, and swapping.
- 3. Get broad idea about Input and output devices & its functionality as well as the power management.
- 4. Learn about virtualization so they get knowledge about how virtualization process will take place.
- 5. Get familiar with different types of operating system & its functionality in detail.

Unit	Details	No. of Lectures
Ι	<ul> <li>Introduction:</li> <li>What is an operating system? History of operating system, computer hardware, different operating systems, operating system concepts, system calls, operating system structure.</li> <li>Processes and Threads:</li> <li>Processes, threads, interprocess communication, scheduling, IPC problems.</li> </ul>	(12)
II	Memory Management:         No memory abstraction, memory abstraction: address spaces, virtual memory, design issues for paging systems, implementation issues, and segmentation.         File Systems:         Files, directories, file system implementation, file-system management and optimization, MS-DOS file system, UNIX V7 file system, CD ROM file system, What is Shell? Basic Shell commands.	(12)
ш	Input-Output:	(12)

	Principles of I/O hardware, Principles of I/O software, I/O software layers, disks, clocks, user interfaces: keyboard, mouse, monitor, thin clients, power management <b>Deadlocks:</b> Resources, introduction to deadlocks, deadlock detection and recovery, deadlock avoidance, deadlock prevention.	
IV	<ul> <li>Virtualization and Cloud: History, requirements for virtualization, type 1 and 2 hypervisors, techniques for efficient virtualization, hypervisor microkernels, memory virtualization, I/O virtualization Clouds.</li> <li>Multiple Processor Systems Multiprocessors, multicomputer, distributed systems.</li> </ul>	(12)
V	<ul> <li>Case Study on LINUX and ANDROID: History of Unix and Linux, Linux Overview, Processes in Linux, Memory management in Linux, I/O in Linux, Linux file system, security in Linux. Android</li> <li>Case Study on Windows: History of windows through Windows 10, programming windows, system structure, processes and threads in windows, memory management, caching in windows, I/O in windows, Windows NT file system, Windows power management, Security in windows.</li> </ul>	(12)

Books and	Books and References:						
Sr. No.	Title	Author/s	Publisher	Edition	Year		
1.	Modern Operating	Andrew S.	Pearson	$4^{\text{th}}$	2014		
	Systems	Tanenbaum,					
		Herbert Bos					
2.	Operating Systems – Internals and Design Principles	Willaim Stallings	Pearson	8 <sup>th</sup>	2009		
3.	Operating System Concepts	Abraham Silberscha tz, Peter B. Galvineg Gagne	Wiley	<b>R</b> <sup>th</sup>			

4.	Operating Systems	Godbole and	McGraw	3 <sup>rd</sup>	
		Kahate	Hill		

<b>B. Sc. (Information Technology)</b>		Semester – I		
Course Name: Discrete Mathematics		Course Code: PUSITI21-194		
Periods per week (1 Period is 50	5			
Credits		2		
		Hours	Marks	
Evaluation System	Theory Examination	2	60	
	Internal		40	

- 1. Simplify and evaluate basic logic statements.
- 2. Develops reasoning and problem-solving abilities, with an emphasis on proof.
- 3. Apply rules of inference, tests for validity, and methods of proof including direct and indirect proof forms, proof by contradiction, proof by cases, and mathematical induction and write proofs using symbolic logic and Boolean Algebra
- 4. Demonstrate the ability to use iterative and recursive processes to prove properties of integers.
- 5. Demonstrate the ability to use a problem-solving approach in applying counting techniques in order to determine probabilities.

Unit	Details	No. of Lectures
Ι	<b>Introduction</b> : Introduction to Discrete mathematics and its applications, Variables, The Language of Sets, The Language of Relations and Function	(12)
	<b>Set Theory</b> : Definitions and the Element Method of Proof, Properties of Sets, Disproofs, Algebraic Proofs, Boolean Algebras	
	<b>The Logic of Compound Statements</b> : Logical Form and Logical Equivalence, Converse, inverse and contrapositive of statement Conditional Statements, Valid and Invalid Arguments	
	<b>Relations</b> : Relations on Sets, Reflexivity, Symmetry, and Transitivity, Equivalence Relations, Partial Order Relations	
	<b>Functions</b> : Functions Defined on General Sets, One-to-One and Onto, Inverse Functions, Composition of Functions, Cardinality	

Π	<ul> <li>Quantified Statements: Predicates and Quantified Statements, Statements with Multiple Quantifiers, Arguments with Quantified Statements</li> <li>Elementary Number Theory and Methods of Proof: Introduction to Direct Proofs, Rational Numbers, Divisibility, Division into Cases and the Quotient-Remainder Theorem, Floor and Ceiling.</li> </ul>	(12)
III	<ul> <li>Sequences, Mathematical Induction: Sequences, Mathematical Induction, Strong Mathematical Induction and the Well- Ordering Principle for the Integers, Correctness of algorithms.</li> <li>Recursion: Defining sequences recursively, solving recurrence relations by iteration, Second order linear homogeneous recurrence relations with constant coefficients. general recursive definitions and structural induction.</li> </ul>	(12)
IV	<ul> <li>Graphs: Definitions and Basic Properties, Trails, Paths, and Circuits, Matrix Representations of Graphs, Isomorphism of Graphs, Eulerian graph, Planar graph, Graph Colouring</li> <li>Trees: Rooted Trees, spanning trees and shortest paths, Minimum spanning tree by using Prim's Algorithm, Kruskal's Algorithm and Djkstra's Algorithm</li> </ul>	(12)
V	<ul> <li>Counting: Introduction, Possibility Trees and the Multiplication Rule, Possibility Trees and the Multiplication Rule, Counting Elements of Disjoint Sets: The Addition Rule, The Pigeonhole Principle, Counting Subsets of a Set: Combinations, r- Combinations with Repetition Allowed</li> <li>Probability: Introduction to random experiment, Sample space Events and types of events, Axioms and Expected Value, Conditional Probability, Bayes' Formula, and Independent Events.</li> </ul>	(12)

Books and References:						
Sr.	Title	Author/s	Publisher	Edition	Year	
No.						
1.	Discrete Mathematics with	Sussana S.	Cengage	$4^{\text{th}}$	2010	
	Applications	Ерр	Learning			

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2.	Discrete Mathematics, Schaum's Outlines Series	Seymour Lipschutz, Marc	Tata MCGraw Hill	2007
		Lipson		
3.	Discrete Mathematics and its Applications	Kenneth H. Rosen	Tata MCGraw Hill	
4.	Discrete mathematical Structures	B Kolman RC Busby, S Ross	PHI	
5.	Discrete structures	Liu	Tata MCGraw Hill	

B. Sc (Information Technology)		Semester – I		
Course Name: Communication Skills		Course Code: PUSITI21-195		
Periods per week (1 Period is 50 minutes)		5		
Credits		2		
		Hours	Marks	
Evaluation System Theory Examination		2	60	
	Internal		40	

- 1. Understands the process of communication and its effects on giving and receiving messages.
- 2. Create a resume, a cover on professional level along with the interviewing process.
- 3. Chiseling of students communication skills to help manage the communication style required in the organization.
- 4. Understand the need of enhancing internal and external communication.
- 5. Hone their presentation making and giving skills and make them able to cope with corporate presentation skills.

Unit	Details	No. of Lectures
Ι	The Seven Cs of Effective Communication: Completeness, Conciseness, Consideration, Concreteness, Clarity, Courtesy, Correctness Understanding Business Communication: Nature and Scope of Communication, Non-verbal Communication, Cross-cultural communication, Technology-enabled Business Communication	(12)
II	Writing Business Messages and Documents:Businesswriting, BusinessCorrespondence,InstructionsBusinessBusiness	(12)

	Reports and Proposals, Career building and Resume writing. <b>Developing Oral Communication Skills for Business:</b> Effective Listening, Business Presentations and Public Speaking, Conversations, Interviews Creative Writing: Business Emails	
ш	Developing Oral Communication Skills for Business:Meetingsand Conferences, Group Discussions and TeamPresentations, Team BriefingUnderstanding Specific Communication Needs: Communication across Functional Areas	(12)
IV	<b>Understanding Specific Communication Needs:</b> Corporate Communication, Persuasive Strategies in Business Communication, Ethics in Business Communication, Business Communication Aids	(12)
V	<b>Presentation Process:</b> Planning the presentations, executing the presentations, Impressing the audience by performing, Planning stage: Brainstorming, mind maps / concept maps, executing stage: chunking theory, creating outlines, Use of templates. Adding graphics to your presentation: Visual communication, Impress stage: use of font, colour, layout, Importance of practice and performance.	(12)

Books and References:					
Sr. No.	Title	Author/s	Publishe	Edition	Year
			r		
1.	Business Communication	Edited by	Oxford	Second	
		Meenakshi	Universi		
		Raman and	ty Press		
		Prakash Singh			
2.	Professional	Aruna Koneru	Tata		
	Communication		McGra		
			w Hill		
3.	Strategies for	Prof. M. S.	Shroff		2016
	improving your	Rao	publishers		
	business		and		
	communication		distributor		
			S		
4.	Business	Dr. Rishipal	SPD		2014
	Communication	and			

		Dr. Jyoti Sheoran			
5.	Graphics for Learning: Proven Guidelines for Planning, Designing, and Evaluating Visuals in Training Materials	Ruth C. Clark, Chopeta Lyons,	Pfeiffer, Wiley		2011
6.	Basic Business Communication: Skills for Empowering the Internet Generation	Lesikar Raymond V and Marie E. Flatley.	Tata McGraw- Hill	10 <sup>th</sup>	2005
7.	Nonverbal Communication: Notes on the Visual Perception of Human Relations	Ruesh, Jurgen and Weldon Kees	University of California Press		1966
8.	Business Communication Today	Bovee, Courtland L.; Thill, John <u>V.</u>	Pearson Education Ltd.		2015
9.	Communication Skills	Dr. Nageshwar Rao Dr. Rajendra P. Das	Himalaya Publishing House		

# **PRACTICALS:**

<b>B. Sc (Information Technol</b>	Semester – I		
Course Name: Imperative Prog	Course Co	de: PUSITI21-P191	
Periods per week (1 Period is 50		3	
Credits			2
		Hours	Marks
Evaluation System Practical		21/2	50
	Examination		
	Internal		

List of Practical: (Can be done in any imperative language)

1.	Basic Programs:
a.	Write a program to display the message HELLO WORLD.
b.	Write a program to declare some variables of type int, float and double. Assign
	some values to these variables and display these values.
c.	Write a program to find the addition, subtraction, multiplication and division of
	two numbers.
2.	Programs on variables:
a.	Write a program to swap two numbers without using third variable.
b.	Write a program to find the area of rectangle, square and circle.
c.	Write a program to find the volume of a cube, sphere, and cylinder.
3.	Conditional statements and loops(basic)
a.	Write a program to enter a number from the user and display the month name. If
	number >13 then display invalid input using switch case.
b.	Write a program to check whether the number is even or odd.
c.	Write a program to check whether the number is positive, negative or zero.
d.	Write a program to find the factorial of a number.
e.	Write a program to check whether the entered number is prime or not.
f.	Write a program to find the largest of three numbers.
4.	Conditional statements and loops(advanced)
a.	Write a program to find the sum of squares of digits of a number.
b.	Write a program to reverse the digits of an integer.
c.	Write a program to find the sum of numbers from 1 to 100.
d.	Write a programs to print the Fibonacci series.
e.	Write a program to find the reverse of a number.
t.	Write a program to find whether a given number is palindrome or not.
g.	Write a program that solve the quadratic equation
	$-b+\sqrt{b^2-4ac}$
	$x = \frac{-2}{2a}$
h.	Write a program to check whether the entered number is Armstrong or not.
i.	Write a program to count the digit in a number
5.	Programs on patterns:
a.	Programs on different patterns.
6.	Functions:
a.	Programs on Functions.
7.	Recursive functions
a.	Write a program to find the factorial of a number using recursive function.
b.	Write a program to find the sum of natural number using recursive function.

<b>8</b> .	Arrays
a.	Write a program to find the largest value that is stored in the array.
b.	Write a program using pointers to compute the sum of all elements stored in an
	array.
с.	Write a program to arrange the 'n' numbers stored in the array in ascending and
	descending order.
d.	Write a program that performs addition and subtraction of matrices.
e.	Write a program that performs multiplication of matrices.
9.	Pointers
a.	Write a program to demonstrate the use of pointers.
b.	Write a program to perform addition and subtraction of two pointer variables.
10.	Structures and Unions
a.	Programs on structures.
b.	Programs on unions.

B. Sc (Information Technology)		Semester – I			
<b>Course Name: Digital Electronics Practical</b>		Course Code: PUSITI21-P192			
Periods per week (1 Period is 50 minutes)			3		
Credits				2	
			Hours	Marks	
Evaluatio	n System	Practical	21/2	50	
		Examination			
		Internal			
List of P	ractical				
1.	Study of Logic gates	and their ICs and univer	rsal gates:		
a.	Study of AND, OR, NOT, XOR, XNOR, NAND and NOR gates				
b.	IC 7400, 7402, 7404, 7408, 7432, 7486, 74266				
c.	Implement AND, OR	, NOT, XOR, XNOR using	g NAND gates		
d.	Implement AND, OR	, NOT, XOR, XNOR using	g NOR gates.		
2.	Implement the given	Boolean expressions using	ng minimum	number of gates.	
a.	Verifying De Morgan's laws.				
<u>b.</u>	Implement other give	n expressions using minim	um number of	f gates.	
c.	Implement other give	n expressions using minim	um number of	f ICs.	
	· · · ·				
3.	Implement combina	tional circuits.			
a.	Design and implement combinational circuit based on the problem given and				
	minimizing using K-maps.				
A	Implement and a	routour			
4.	Implement code converters.				
a.	Design and implement Binary – to – Gray code converter.				
b.	Design and implement Gray – to – Binary code converter.				

C.	Design and implement Binary – to – BCD code converter	
d.	Design and implement Binary – to – XS-3 code converter	
5.	Implement Adder and Subtractor Arithmetic circuits.	
a.	Design and implement Half adder and Full adder.	
b.	Design and implement BCD adder.	
С.	Design and implement XS – 3 adder.	
d.	Design and implement binary subtractor.	
e.	Design and implement BCD subtractor.	
f.	Design and implement XS – 3 subtractor.	
6.	Implement Arithmetic circuits.	
a.	Design and implement a 2-bit by 2-bit multiplier.	
<u>b.</u>	Design and implement a 2-bit comparator.	
7	Implement Encode and Decoder and Multipleyer and Demultipleyers	
7.	Design and implement 8:2 anacder	
a.	Design and implement 3.5 encoder.	
D.	Design and implement 3.8 decoder.	
C.	Design and implement 4:1 multiplexer. Study of IC /4153, /415/	
d.	Design and implement 1:4 demultiplexer. Study of IC 74139	
e.	Implement the given expression using IC 74151 8:1 multiplexer.	
t.	Implement the given expression using IC 74138 3:8 decoder.	
8.	Study of flip-flops and counters.	
a.	Study of IC 7473.	
<u>b.</u>	Study of IC 7474.	
С.	Study of IC 7476.	
d.	Conversion of Flip-flops.	
e.	Design of 3-bit synchronous counter using 7473 and required gates.	
f.	Design of 3-bit ripple counter using IC 7473.	
9.	Study of counter ICs and designing Mod-N counters.	
a.	Study of IC 7490, 7492, 7493 and designing mod-n counters using these.	
b.	Designing mod-n counters using IC 7473 and 7400 (NAND gates)	
10.	Design of shift registers and shift register counters.	
a.	Design serial – in serial – out, serial – in parallel – out, parallel – in serial – out,	
	parallel – in parallel – out and bidirectional shift registers using IC 7474.	
b.	Study of ID 7495.	
C.	Implementation of digits using seven segment displays.	

B. Sc (Information Technology)	Semester – I
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<b>Course Name: Operating Systems Practical</b>		Course Code: PUSITI21-P193				
Periods p	s per week (1 Period is 50 minutes)		3			
Credits			2			
		Hours Marks				
Evaluatio	on System	Practical	21/2	50		
		Examination				
	Internal					
List of Practical						
1.	Installation of virtual machine software.					
2.	Installation of Linux of	operating system (RedHat	/ Ubuntu) on vi	rtual machine.		
3.	Installation of Window	ws operating system on vir	tial machine.			
4.	Linux commands: W	Vorking with Directories:				
a.	pwd, cd, absolute and	relative paths, ls, mkdir, r	mdir,			
b.	file, touch, rm, cp. my	y, rename, head, tail, cat, ta	ic, more, less, s	trings, chmod		
5.	Linux commands: W	orking with files:				
a.	ps, top, kill, pkill, bg,	fg,				
b.	grep, locate, find, locate,	ate.				
с.	date, cal, uptime, w, v	vhoami, finger, uname, ma	n, df, du, free,	whereis, which.		
d.	Compression: tar, gzi	р.				
6.	Windows (DOS) Col	mmands – 1				
a.	Date, time, prompt, m	nd, cd, rd, path.				
b.	Chkdsk, copy, xcopy,	format, fidsk, cls, defrag,	del, move.			
7.	Windows (DOS) Con	$\frac{\text{nmands} - 2}{1}$				
a.	Diskcomp, diskcopy,	diskpart, doskey, echo				
b.	Edit, fc, find, rename,	, set, type, ver				
0						
8.	Working with Linux	Desktop and utilities				
a.	The vi editor.					
b.	Graphics					
C.						
d.	Adjusting display resolution					
e.	Using the browsers					
f.	Configuring simple networking					
g.	Creating users and sh	ares				
9.	Working with Shell	Scripts.				
10.	Installing utility soft	ware on Linux and Wind	lows			

B. Sc. (Information Technology)		Semester – I		
Course Name: Discrete Mathematics Practical		Course Code: PUSITI21-P194		
Periods per week (1 Period is 50 minutes)		0 minutes)		3
Credits	χ	2		2
			Hours	Marks
Evaluatio	n System	Practical	21/2	50
		Examination		
		Internal		
List of P	ractical: Write the pro	ograms for the following	using SCILA	B
1.	Set Theory			
a.	Inclusion Exclusion p	rinciple.		
b.	Power Sets			
с.	Mathematical Induction	on		
2.	Functions and Algor	rithms		
a.	Recursively defined f	unctions		
b.	Cardinality			
C.	Polynomial evaluation	n		
d.	Greatest Common Dr	visor		
3.	Counting			
a.	Sum rule principle			
b.	Product rule principle	,		
C.	Factorial			
d.	Binomial coefficients			
<u>e.</u>	Permutations			
t.	Permutations with rep	betitions		
<u>g</u> .	Combinations	,•,•		
h. ·	Combinations with re	petitions		
1. ·	Ordered partitions			
J.	Unordered partitions			
A	Drobability Theory			
	Sample space and eve	anto		
a. b	Finite probability spa			
0. C	Fauiprobable spaces			
d.	Addition Principle			
<u>и.</u> Р	Conditional Probabili	ty		
f	Multiplication theorem	<u>v</u> n for conditional probabili	tv	
σ.	Independent events		<i>•j</i>	
<u> </u>	Repeated trials with t	wo outcomes		
5.	Graph Theory			
	Simpli incorg			

a.	Paths and connectivity
b.	Minimum spanning tree
С.	Isomorphism
6.	Directed Graphs
a.	Adjacency matrix
b.	Path matrix
7.	Properties of integers
a.	Division algorithm
b.	Primes
C.	Euclidean algorithm
d.	Fundamental theorem of arithmetic
e.	Congruence relation
f.	Linear congruence equation
8.	Algebraic Systems
a.	Properties of operations
b.	Roots of polynomials
9.	Boolean Algebra
a.	Basic definitions in Boolean Algebra
b.	Boolean algebra as lattices
10.	Recurrence relations
a.	Linear homogeneous recurrence relations with constant coefficients
b.	Solving linear homogeneous recurrence relations with constant coefficients
С.	Solving general homogeneous linear recurrence relations

<b>B. Sc (Information Technology)</b>		Semester – I			
Course Na	Course Name: Communication Skills Practical			Course Code: PUSITI21-P195	
Periods p	er week (1 Period is 5	0 minutes)	3		
Credits				2	
		Hours	Marks		
Evaluation System		Practical	21/2	50	
		Examination			
		Internal			
List of P	ractical Questions:				
1.	Communication Ori	gami, Guessing Game, G	uessing the emo	otion	
2.	Body Language, Follow All Instructions, Effective Feedback Skills			Skills	

3.	The Name Game, Square Talk (Effective Communication), Room 101
	(Influential and persuasive skills)
4.	Back to Back Communication, Paper Shapes (Importance of two-way
	communication), Memory Test(Presentation Skills)
5.	Exercises on Communication Principles
6.	Exercises on communication icebreakers
7.	Communication exercises
	For the following practicals, Microsoft Office, Open Office, Libre Office or
	any other software suite can be used.
8.	Use of word processing tools for communication
	Group Discussion, PPT presentation, Debate
9.	Use of spreadsheet tools for communication
10.	Use of presentation tools for communication

Minimum 8 experiments from the list should be completed in the each subject of first semester. Certified journal is must to be eligible to appear for the semester end practical.

# **SEMESTER II**

B. Sc. (Information Technology)		Semester – II		
Course Name: Object Oriented Programming		Course Code: PUSITII21-291		
Periods per week (1 Period is 50	minutes)	5		
Credits		2		
		Hours	Marks	
Evaluation System	Theory Examination	2	60	
	Internal		40	

### Learning outcomes:

- 1. Students understand the basic concept of OOPs, difference between procedure oriented and object-oriented approach, advantages of OOPs. How OOPs can handle real world problems.
- 2. students get understanding of Classes and Objects. Understand the use of constructor and destructor.
- 3. students understand the concept of polymorphism with operator overloading and function

overloading. Understand the virtual function and abstract classes.

- 4. students understand the concept of inheritance. How code reuse can be achieved using inheritance. Understand what is Exception, how exceptions are handled and importance of exception handling.
- 5. Student Understand the generic classes and generic functions. Understand the use of file handling.

Unit	Details	No. of Lectures
Ι	<ul> <li>Object Oriented Methodology: Introduction, Advantages and Disadvantages of Procedure Oriented Languages, what is Object Oriented? Benefits and Application of OOPS, characteristics of oops, Difference between C and C++, Basic Data Types in C++, Variables in C++, Scope of variables.</li> <li>Principles of OOPS: Basic Concepts of OOPS: Objects, Classes, Data Abstraction and Data Encapsulation, Inheritance, Polymorphism, Dynamic Binding, Message Passing.</li> </ul>	(12)
	<b>Functions:</b> Returning values from functions, Reference arguments, Inline function, Default arguments.	
п	Classes and Objects: Simple classes (Class specification, class members accessing), Defining member functions, passing object as an argument, Returning object from functions, friend classes, Pointer to object. Constructors and Destructors: Introduction, Default Constructor, Parameterized Constructor and examples. Destructors	(12)
III	<ul> <li>Polymorphism: Concept of function overloading, overloaded operators, overloading unary and binary operators, overloading arithmetic assignment operator, overloading comparison operator, overloading stream operator. Conversion: Basic conversion (Type casting), Data Conversion between objects and basic types.</li> <li>Exception Handling: Introduction, Exception Handling Mechanism,</li> </ul>	(12)
	Concept of throw & catch with example.	
IV	<ul> <li>Inheritance: Introduction, understanding inheritance, Advantages provided by inheritance, choosing the access specifier, Derived class declaration, derived class constructors, class hierarchies, multiple inheritance, multilevel inheritance, containership, hybrid inheritance.</li> <li>Virtual Functions: Introduction and need, Pure Virtual Functions, Static</li> </ul>	(12)
	Functions, this Pointer, abstract classes, virtual destructors.	
V	<b>Templates:</b> Introduction, Function Template and examples, Class Template and examples.	(12)

Working with Files: Introduction, File Operations, Various File Modes,
File Pointer and their Manipulation

Т

Books and	Books and References:					
Sr. No.	Title	Author/s	Publisher	Edition	Year	
1.	Object Oriented Analysis	Timothy	ТМН	3 <sup>rd</sup>	2012	
	and Design	Budd				
2.	Mastering C++	K R Venugopal, Rajkumar Buyya, T Ravishankar	Tata McGraw Hill	2 <sup>nd</sup> Edition	2011	
3.	C++ for beginners	B. M. Hirwani	SPD		2013	
4.	Effective Modern C++	Scott Meyers	SPD			
5.	Object Oriented Programming with C++	E. Balagurusamy	Tata McGraw Hill	$4^{th}$		
6.	Learning Python	Mark Lutz	O' Reilly	5 <sup>th</sup>	2013	
7.	Mastering Object Oriented Python	Steven F. Lott	Pact Publishing		2014	

B. Sc. (Information Technology)		Semester – II		
Course Name: Microprocessor Architecture		Course Code: PUSITII21-292		
Periods per week (1 Period is 50	per week (1 Period is 50 minutes) 5		5	
Credits		2		
		Hours	Marks	
Evaluation System	Theory Examination	2	60	
	Internal		40	

### Learning outcomes:

Τ

- 1. Student get basic information regarding microprocessor 8085&8155
- 2. Students get information regarding assembly language programme
- 3. Student get information regarding stack, counters and time delays in 8085 microprocessors
- 4. Student get basic information regarding various code conversion in 8085 microprocessors
- 5. Students get detailed information regarding new Processors in the market.

Unit	Details	No. of Lectures
Ι	Microprocessor, microcomputers, and Assembly Language: Microprocessor, Microprocessor Instruction Set and Computer Languages, From Large Computers to Single-Chip Microcontrollers, Applications. Microprocessor Architecture and Microcomputer System: Microprocessor Architecture and its operations, Memory, I/O Devices, Microcomputer System, Logic Devices and Interfacing, Microprocessor-Based System Application. 8085 Microprocessor Architecture and Memory Interface: Introduction, 8085 Microprocessor unit, 8085-Based Microcomputer, Memory Interfacing, Interfacing the 8155 Memory Segment, Illustrative Example: Designing Memory for the MCTS Project, Testing and Troubleshooting Memory Interfacing Circuit, 8085-Based Single-Board microcomputer, 8086 pin diagram.	(12)
Π	<ul> <li>Interfacing of I/O Devices         Basic Interfacing concepts, Interfacing Output Displays, Interfacing Input Devices, Memory Mapped I/O     </li> <li>Introduction to 8085 Assembly Language Programming:         The 8085 Programming Model, Instruction Classification, Instruction, Data and Storage, Writing assembling and Execution of a simple program, Overview of 8085 Instruction Set, Writing and Assembling Program.     </li> <li>Introduction to 8085 Instructions:         Data Transfer Operations, Arithmetic Operations, Logic Operation, Branch Operation, Writing Assembly Languages Programs, Debugging a Program.     </li> </ul>	(12)
III	<ul> <li>Programming Techniques With Additional Instructions:         <ul> <li>ProgrammingTechniques: Looping, Counting and Indexing, Additional Data Transfer and 16-BitArithmetic Instructions, Arithmetic Instruction Related to Memory, Logic Operations: Rotate, Logics Operations: Compare, Dynamic Debugging.</li> </ul> </li> <li>Counters and Time Delays:         <ul> <li>Counters and Time Delays, Illustrative Program: Hexadecimal Counter, Illustrative Program: Generating Pulse Waveforms, Debugging Counter and Time-Delay Programs.</li> </ul> </li> <li>Stacks and Sub-Routines:         <ul> <li>Stack, Subroutine, Restart, Conditional Call, Return Instructions, Advanced Subroutine concepts.</li> </ul> </li> </ul>	(12)
IV	<b>Code Conversion, BCD Arithmetic, and 16-Bit Data Operations:</b> BCD-to-Binary Conversion, Binary-to-BCD Conversion, BCD-to- Seven-Segment-LED Code Conversion, Binary-to-ASCII and ASCII-	(12)

	to-Binary Code Conversion, BCD Addition, BCD Subtraction, Introduction To Advanced Instructions and Applications, Multiplication, Subtraction With Carry.	
	<b>Software Development System and Assemblers:</b> Microprocessors-Based Software Development system, Operating System and Programming Tools, Assemblers and Cross-Assemblers, Writing Program Using Cross Assemblers.	
	Interrupts: The 8085 Interrupt, 8085 Vectored Interrupts, Restart as S/W Instructions, Additional I/O Concepts and processes.	
V	<b>The Pentium and Pentium Pro microprocessors:</b> Introduction, Special Pentium registers, Memory management, Pentium instructions, Pentium Pro microprocessor, Special Pentium Pro features.	(12)
	<b>Core 2 and later Microprocessors:</b> Introduction, Pentium II software changes, Pentium IV and Core 2, i3, i5,i7, i9 processors specification., SUN SPARC Microprocessor: Architecture, Register file, data types and instruction format	

Books and References:					
Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Microprocessors Architecture,	Ramesh	PENRAM	Fifth	2012
	Programming and	Gaonkar			
	Applications with the				
	8085.				
2.	Computer System	M. Morris	PHI		1998
	Architecture	Mano			
3.	Structured Computer	Andrew C.	PHI		
	Organization	Tanenbau			
		m			

<b>B. Sc (Information Technology)</b>	Semester – II		
Course Name: Web Programming	Course Code: PUSITII21-293		
Periods per week (1 Period is 50 minutes)	5		

Credits		2	
		Hours	Marks
Evaluation System	<b>Theory Examination</b>	2	60
	Internal		40

- 1. Students will get basic knowledge about the Internet & its functionality, protocols, different types of web browsers & its working.
- 2. Students will learn about HTML Scripting language so they are able to create their own webpage.
- 3. Students will be able to create their own scripts.
- 4. PHP is one of the many server-side languages so students can learn to build websites.
- 5. Students will get advanced knowledge about how to implement databases in PHP using MYSQL, How to create & Set Cookies & Session so they can create their Websites more user-friendly & attractive.

Unit	Details	No. of Lectures
Ι	<ul> <li>Internet and the World Wide Web:</li> <li>What is the Internet? Introduction to the internet and its applications, E-mail, telnet, FTP, e-commerce, video conferencing, e-business. Internet service providers, domain name server, internet address, World Wide Web (WWW):</li> <li>World Wide Web and its evolution, uniform resource locator (URL), browsers – internet explorer, Netscape navigator, opera, Firefox, chrome, Mozilla. search engine, web saver – apache, IIS, proxy server, HTTP protocol</li> <li>HTML5:</li> <li>Introduction, Why HTML5? Formatting text by using tags, using lists and backgrounds, Creating hyperlinks and anchors. Style sheets, CSS formatting text using style sheets, formatting paragraphs using style</li> </ul>	(12)
Π	<ul> <li>HTML5 Page layout and navigation:</li> <li>Creating navigational aids: planning site organization, creating text based navigation bar, creating graphics based navigation bar, creating graphical navigation bar, creating image map, redirecting to another URL, creating division based layouts: HTML5 semantic tags, creating divisions, creating HTML5 semantic layout, positioning and formatting divisions.</li> <li>HTML5 Tables, Forms and Media:</li> <li>Creating tables: creating simple table, specifying the size of the table, specifying the width of the column, merging table cells, using tables for page layout, formatting tables: applying table borders, applying background and foreground fills, changing cell padding, spacing and alignment, creating user forms: creating basic form, using check boxes and option buttons, creating lists, additional input types in HTML5, Incorporating sound and video: audio and video in HTML5, HTML multimedia basics, embedding video clips,</li> </ul>	(12)

	incorporating audio on web page.			
III	<b>Core JavaScript (Properties and Methods of Each) :</b> Array, Boolean, Date, Function, Math, Number, Object, String, regExp	(12)		
	Applet, layer			
	<b>Events and Event Handlers :</b> General Information about Events, Defining Event Handlers, event, onAbort, onBlur, onChange, onClick, onDblClick, onDragDrop, onError, onFocus, onKeyDown, onKeyPress, onKeyUp, onLoad, onMouseDown, onMouseMove, onMouseOut, onMouseOver, onMouseUp, onMove, onReset, onResize, onSelect, onSubmit, onUnload <b>INTRODUCTION TO JSON</b>			
IV	<b>PHP:</b> Why PHP and MySQL? Server-side scripting, PHP syntax and variables, comments, types, control structures, branching, looping, termination, functions, passing information with PHP, GET, POST, formatting form variables, superglobal arrays, strings and string functions, regular expressions, arrays, number handling, basic PHP errors/problems	(12)		
V	Advanced PHP and MySQL : PHP/MySQL Functions, Integrating web forms and databases, Displaying queries in tables, Building Forms from queries, String and Regular Expressions, Sessions, Cookies and HTTP, E-Mail	(12)		

Books and References:					
Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Web Design The	Thomas Powell	Tata		-
	Complete Reference		McGraw		
			Hill		
2.	HTML5 Step by Step	Faithe Wempen	Microsoft		2011
			Press		
3.	PHP 5.1 for Beginners	Ivan Bayross	SPD		2013
		Sharanam			
		Shah,			
4.	PHP Project for	SharanamShah,	SPD		2015
	Beginners	Vaishali Shah			
5.					

6.	PHP 6 and MySQL Bible	Steve Suehring, Tim Converse, Joyce Park	Wiley		2009
7.	Head First HTML 5 programming	Eric Freeman	O'Reilly		2013
8.	JavaScript 2.0: The Complete Reference	Thomas Powell and Fritz Schneider	Tata McGraw Hill	2 <sup>nd</sup>	

B. Sc. (Information Technology)		Semester – II		
Course Name: Numerical and Statistical Methods		Course Code: PUSITII21-294		
Periods per week (1 Period is 50 minutes)		5		
Credits		2		
		Hours	Marks	
Evaluation System Theory Examination		2	60	
	Internal		40	

- 1. Develops the mathematical skills of the students in the areas of numerical methods.
- 2. Develops problem solving skills with both theoretical and computational oriented problems.
- 3. Develops problem solving skills with both theoretical and computational oriented problems.
- **4.** Understand numerical techniques to find the roots of nonlinear equations and solutions of systems of linear equations.
- 5. Explores the basic concepts of modern probability theory and its applications for decision-making in economics, business, and other fields of social sciences.

Unit	Details	No. of Lectures
Ι	Introduction to Numerical Analysis and their applications.	(12)
	<b>Mathematical Modeling and Engineering Problem Solving:</b> A Simple Mathematical Model, Conservation Laws and Engineering Problems	
	<b>Approximations</b> and Round-Off Errors: Significant Figures, Accuracy and Precision, Error Definitions, Round-Off Errors	
	<b>Truncation Errors and the Taylor Series:</b> The Taylor Series, Error Propagation, Total Numerical Errors, Formulation Errors and Data Uncertainty	
	Interpolation: Forward Difference, Backward Difference, Newton's Forward Difference	

	Interpolation, Newton's Backward Difference Interpolation, Lagrange's Interpolation.			
Π	<b>Solutions of Algebraic and Transcendental Equations:</b> The Bisection Method, The Newton-Raphson Method, The Regula-falsi method, The Secant Method.			
	Solution of simultaneous algebraic equations (linear) using iterative methods: Gauss Elimination Method, Gauss-Jordan Method, Gauss-Seidel Method.			
ш	<b>Numerical differentiation and Integration:</b> Numerical differentiation, Numerical integration using Trapezoidal Rule, Simpson's 1/3 <sup>rd</sup> and 3/8 <sup>th</sup> rules.	(12)		
	<b>Numerical solution of 1st and 2nd order differential equations:</b> Taylor series, Euler's Method, Modified Euler's Method, Runge-Kutta Method for 1 <sup>st</sup> and 2 <sup>nd</sup> Order Differential Equations.			
IV	<b>Random variables:</b> Discrete and Continuous random variables, Probability density function, Probability distribution of random variables, Expected value, Variance.	(12)		
	<b>Distributions:</b> Discrete distributions: Binomial, Poisson, Bernoulli, Continuous distributions: uniform distributions (derivation of mean and variance only and state other properties and discuss their applications) Normal distribution states all the properties and its applications.			
V	<b>Correlation and regression:</b> <b>Correlation</b> , Linear Regression, Multiple Linear regression, General Linear Least Squares, Nonlinear Regression,	(12)		
	<b>Linear Programming:</b> Linear optimization problem, Formulation and Graphical solution, Basic solution and Feasible solution.			

Books and References:					
Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Introductory Methods of	S. S. Shastri	PHI	Vol - 2	
	Numerical Methods				
2.	Numerical Methods for Engineers	Steven C. Chapra, Raymond P. Canale	Tata Mc Graw Hill	6 <sup>th</sup>	2010

3.	Numerical Analysis	Richa rd L. Burde n, J. Douglas Faires	Cengage Learning	9 <sup>th</sup>	2011
4.	Fundamentals of Mathematical Statistics	S. C. Gupta, V. K. Kapoor			
5.	Elements of Applied Mathematics	P.N.Wartikar and J.N.Wartikar	A. V. Griha, Pune	Volume 1 and 2	

B. Sc. (Information Technology)		Semester – II		
Course Name: Green Computin	Course Code: PUSITII21-295			
Periods per week (1 Period is 50	Period is 50 minutes) 5			
Credits		2		
		Hours	Marks	
Evaluation System Theory Examination		2	60	
	Internal		40	

- 1. Students will get an overview of green computing and they will also get to know various initiatives and standards followed by various countries.
- 2. Students will get to know various ways to reduce power consumption.
- 3. They will know how to change their behavior in day-to-day life. They will also get familiar with the advantages of going paperless.
- 4. Students will learn about the benefits of Recycling and selecting a proper hardware for use.
- 5. Students will know about green information systems and different ways of keeping the organization green.

Unit	Details	No. of Lectures
Ι	<ul> <li>Overview and Issues:</li> <li>Problems: Toxins, Power Consumption, Equipment Disposal, Company's Carbon Footprint: Measuring, Details, reasons to bother, Plan for the Future, Cost Savings: Hardware, Power.</li> <li>Initiatives and Standards: Global Initiatives: United Nations, Basel Action Network, Basel Convention, North America: The United States, Canada, Australia, Europe, WEEE Directive, RoHS, National Adoption, Asia: Japan, China, Korea.</li> </ul>	(12)

Π	<ul> <li>Minimizing Power Usage:</li> <li>Power Problems, Monitoring Power Usage, Servers, Low-Cost Options, Reducing Power Use, Data Deduplication, Virtualization, Management, Bigger Drives, Involving the Utility Company, Low- Power Computers, PCs, Linux, Components, Servers, Computer Settings, Storage, Monitors, Power Supplies, Wireless Devices, Software.</li> <li>Cooling:</li> <li>Cooling Costs, Power Cost, Causes of Cost, Calculating Cooling Needs, Reducing Cooling Costs, Economizers, On-Demand Cooling, HP's Solution, Optimizing Airflow, Hot Aisle/Cold Aisle, Raised Floors, Cable Management, Vapour Seal, Prevent Recirculation of Equipment Exhaust, Supply Air Directly to Heat Sources, Fans, Humidity, Adding Cooling, Fluid Considerations, System Design, Data Centre Design, Centralized Control, Design for Your Needs, Put Everything Together.</li> </ul>	(12)
Ш	<ul> <li>Changing the Way of Work:</li> <li>Old Behaviours, starting at the Top, Process Reengineering with Green in Mind, Analysing the Global Impact of Local Actions, Steps: Water, Recycling, Energy, Pollutants, Teleworkers and Outsourcing, Telecommuting, Outsourcing, how to Outsource.</li> <li>Going Paperless:</li> <li>Paper Problems, The Environment, Costs: Paper and Office, Practicality, Storage, Destruction, Going Paperless, Organizational Realities, Changing Over, Paperless Billing, Handheld Computers vs. the Clipboard, Unified Communications, Intranets, What to Include, Building an Intranet, Microsoft Office SharePoint Server 2007, Electronic Data Interchange (EDI), Nuts and Bolts, Value Added Networks, Advantages, Obstacles.</li> </ul>	(12)
IV	<ul> <li>Recycling:</li> <li>Problems, China, Africa, Materials, Means of Disposal, Recycling, Refurbishing, Make the Decision, Life Cycle, from beginning to end, Life, Cost, Green Design, Recycling Companies, Finding the Best One, Checklist, Certifications, Hard Drive Recycling, Consequences, cleaning a Hard Drive, Pros and cons of each method, CDs and DVDs, good and bad about CD and DVDs disposal, Change the mind-set, David vs. America Online</li> <li>Hardware Considerations:</li> <li>Certification Programs, EPEAT, RoHS, Energy Star, Computers, Monitors, Printers, Scanners, All-in-Ones, Thin Clients, Servers, Blade Servers, Consolidation, Products, Hardware Considerations, Planned Obsolescence, Packaging, Toxins, Other Factors, Remote Desktop, Using Remote Desktop, Establishing a Connection</li> </ul>	(12)
V	Greening Your Information Systems:	(12)

Initial Improvement Calculations, Selecting Metrics, Tracking Progress, Change Business Processes, Customer Interaction, Paper Reduction, Green Supply Chain, Improve Technology Infrastructure, Reduce PCs and Servers, Shared Services, Hardware Costs, Cooling. Staying Green: Organizational Check-ups, Chief Green Officer, Evolution, Sell the CEO, SMART Goals, Equipment Check-ups, Gather Data, Tracking the data, Baseline Data, Benchmarking, Analyze Data, Conduct Audits, Certifications, Benefits, Realities,

# PRACTICALS

B. Sc. (Information Technology)		Semester – II		
Course Name: Object Oriented Programming		Course Code: PUSITII21-P291		
Practical				
Periods per week (1 Period is 50 minutes)		3		
Credits			2	
			Hours	Marks
Evaluatio	n System	Practical	21/2	50
		Examination		
		Internal		
List of P	ractical: To be implen	ented using Object-Ori	ented languag	ge
1.	Classes and methods			
a.	Design an employee class for reading and displaying the employee information, the			loyee information, the
	getInfo() and displayInfo() methods will be used respectively. Where getInfo() will			
	be private method			
b.	Design the class student containing getData() and displayData() as two of its			
	methods which will be	e used for reading and dis	splaying the stu	udent information
	respectively.Where ge	etData() will be a private	method.	
C.	Design the class Demo which will contain the following methods: readNo(),			
	factorial() for calcula	ting the factorial of a n	umber, revers	eNo() will reverse the
	given number, isPalin	drome() will check the gi	ven number is	palindrome,
	isArmstrong() which	will calculate the given	number is arr	mStrong or not.Where
	readNo() will be a pri	vate method.		
d.	Write a program to demonstrate function definition outside class and accessing			
	class members in function definition.			
2.	Using friend function	ns.		

a.	Write a friend function for adding the two complex numbers, using a single class	
b.	Write a friend function for adding the two different distances and display its sum,	
	using two classes.	
c.	Write a friend function for adding the two matrix from two different classes and	
	display its sum.	
3.	Constructors and method overloading.	
a.	Design a class Complex for adding the two complex numbers and also show the	
	use of constructor.	
b.	Design a class Geometry containing the methods area() and volume() and also	
	overload the area() function .	
c.	Design a class StaticDemo to show the implementation of static variable and static	
	function.	
4.	Operator Overloading	
a.	Overload the operator unary(-) for demonstrating operator overloading.	
b.	Overload the operator + for adding the timings of two clocks, And also pass objects	
	as an argument.	
c.	Overload the + for concatenating the two strings. For e.g "Py" + "thon" = Python	
5.	Inheritance	
a.	Design a class for single level inheritance using public and private type derivation.	
b.	Design a class for multiple inheritance.	
c.	Implement the hierarchical inheritance.	
6.	Virtual functions and abstract classes	
a.	Implement the concept of method overriding.	
<u>b.</u>	Show the use of virtual function	
C.	Show the implementation of abstract class.	
7.	String handling	
a.	String operations for string length , string concatenation	
<u>b.</u>	String operations for string reverse, string comparison,	
C.	Console formatting functions.	
8.	Exception handling	
a.	Show the implementation of exception handling	
b.	Show the implementation for exception handling for strings	
C.	Show the implementation of exception handling for using the pointers.	
9.	File handling	
a.	Design a class FileDemo open a file in read mode and display the total number of	
1.	Words and lines in the file.       Design a close to handle multiple files and file anomations.	
i D	Design a class to nangle multiple files and file operations	

c.	Design a editor for appending and editing the files
10.	Templates
a.	Show the implementation for the following
b.	Show the implementation of template class library for swap function.
c.	Design the template class library for sorting ascending to descending and vice-
	versa

B. Sc. (Information Technology)		Semester – II	
Course Name: Microprocessor Architecture Practical		Course Code: PUSITII21-P292	
Periods per week (1 Period is	50 minutes)		3
Credits		2	
		Hours	Mar ks
Evaluation System	Practical Examination	21/2	50
	Internal		

List of Practical				
1.	Perform the following Operations related to memory locations.			
a.	Store the data byte 32H into memory location 4000H.			
b.	Exchange the contents of memory locations 2000H and 4000H			
2.	Simple assembly language programs.			
a.	Subtract the contents of memory location 4001H from the memory location 2000H			
	and place the result in memory location 4002H.			
b.	Subtract two 8-bit numbers.			
c.	Add the 16-bit number in memory locations 4000H and 4001H to the 16-bit number in memory locations 4002H and 4003H. The most significant eight bits of the two numbers to be added are in memory locations 4001H and 4003H. Store the result in memory locations 4004H and 4005H with the most significant byte in memory location 4005H.			
d.	Add the contents of memory locations 40001H and 4001H and place the result in the memory locations 4002Hand 4003H.			
e.	Subtract the 16-bit number in memory locations 4002H and 4003H from the 16-bit number in memory locations 4000H and 4001H. The most significant eight bits of the two numbers are in memory locations 4001H and 4003H. Store the result in memory locations 4004H and 4005H with the most significant byte in memory			
	location 4005H.			
----	--	--	--	--
f.	Find the I's complement of the number stored at memory location 4400H and store			
	the complemented number at memory location 4300H.			
g.	Find the 2's complement of the number stored at memory location 4200H and			
-	store			
	the complemented number at memory location 4300H.			
3.	Packing and unpacking operations.			
a.	Pack the two unpacked BCD numbers stored in memory locations 4200H and			
	4201H			
	and store results in memory location 4300H. Assume the least significant digit is			
	stored at 4200H.			
b.	Two digit BCD number is stored in memory location 4200H. Unpack the BCD			
	number and store the two digits in memory locations 4300H and 4301H such that			
	memory location 4300H will have a lower BCD digit.			
4.	Register Operations.			
a.	Write a program to shift an eight bit data four bits right. Assume that data is in			
	register C.			
b.	Program to shift a 16-bit data 1 bit left. Assume data is in the HL register pair			
c.	Write a set of instructions to alter the contents of the flag register in 8085.			
d.	Write a program to count number of l's in the contents of D register and store the			
	count in the B register.			
5.	Multiple memory locations.			
a.	Calculate the sum of a series of numbers. The length of the series is in memory			
	location 4200H and the series begins from memory location 4201H. a. Consider			
	the sum to be an 8 bit number. So, ignore carries. Store the sum at memory			
	location 4300H.			
	b. Consider the sum to be a 16 bit number. Store the sum at memory locations			
	4300H			
	and 4301H			
b.	Multiply two 8-bit numbers stored in memory locations 2200H and 2201H by			
	repetitive addition and store the result in memory locations 2300H and 2301H.			
C.	Divide 16 bit number stored in memory locations 2200H and 2201H by the 8 bit			
	number stored at memory location 2202H. Store the quotient in memory locations			
	2300H and 2301H and remainder in memory locations 2302H and 2303H.			
d.	Find the number of negative elements (most significant bit 1) in a block of data.			
	The length of the block is in memory location 2200H and the block itself begins in			
	memory location 2201H. Store the number of negative elements in memory			
	location			
	2300Н			
e.	Find the largest number in a block of data. The length of the block is in memory			
	location 2200H and the block itself starts from memory location 2201H. Store the			

	maximum number in memory location 2300H. Assume that the numbers in the block are all 8 bit unsigned binary numbers.
6.	Calculations with respect to memory locations.
a.	Write a program to sort given 10 numbers from memory location 2200H in the ascending order.
b.	Calculate the sum of a series of even numbers from the list of numbers. The length of the list is in memory location 2200H and the series itself begins from memory location 2201H. Assume the sum to be 8 bit number so you can ignore carries and store the sum at memory location 2Sample problem:
c.	Calculate the sum of a series of odd numbers from the list of numbers. The length of the list is in memory location 2200H and the series itself begins from memory location 2201H. Assume the sum to be 16-bit. Store the sum at memory locations 2300H and 2301H.
d.	Find the square of the given numbers from memory location 6100H and store the result from memory location 7000H
e.	Search the given byte in the list of 50 numbers stored in the consecutive memory locations and store the address of memory location in the memory locations 2200H and 2201H. Assume byte is in the C register and the starting address of the list is 2000H. If byte is not found store 00 at 2200H and 2201H
f.	Two decimal numbers, six digits each, are stored in BCD package form. Each number occupies a sequence of byte in the memory. The starting address of first number is 6000H Write an assembly language program that adds these two numbers and stores the sum in the same format starting from memory location 6200H
g.	Add 2 arrays having ten 8-bit numbers each and generate a third array of results. It is necessary to add the first element of array 1 with the first element of array-2 and so on. The starting addresses of array 1, array2 and array3 are 2200H, 2300H and 2400H, respectively

7.	Assembly programs on memory locations.
a.	Write an assembly language program to separate even numbers from the given list
	of 50 numbers and store them in the another list starting from 2300H. Assume
	starting address of 50 number list is 2200H
b.	Write assembly language program with proper comments for the following:
	A block of data consisting of 256 bytes is stored in memory starting at 3000H.
	This block is to be shifted (relocated) in memory from 3050H onwards. Do not
	shift
	the block or part of the block anywhere else in the memory.
c.	Add even parity to a string of 7-bit ASCII characters. The length of the string is in
	memory location 2040H and the string itself begins in memory location 2041H.
	Place even parity in the most significant bit of each character.

d.	A list of 50 numbers is stored in memory, starting at 6000H. Find number of			
	negative, zero and positive numbers from this list and store these results in			
	memory			
	locations 7000H, 7001H, and 7002H respectively			
е.	Write an assembly language program to generate fibonacci numbers.			
f.	Program to calculate the factorial of a number between 0 to 8.			
8.	String operations in assembly programs.			
a.	Write an 8085 assembly language program to insert a string of four characters			
	from			
	the tenth location in the given array of 50 characters			
b.	Write an 8085 assembly language program to delete a string of 4 characters from			
	the tenth location in the given array of 50 characters.			
c.	Multiply the 8-bit unsigned number in memory location 2200H by the 8-bit			
	unsigned number in memory location 2201H. Store the 8 least significant bits of			
	the result in			
	memory location 2300H and the 8 most significant bits in memory location			
	2301H.			
d.	Divide the 16-bit unsigned number in memory locations 2200H and 2201H (most			
	significant bits in 2201H) by the B-bit unsigned number in memory location			
	2300H store the quotient in memory location 2400H and remainder in 2401H			
e.	DAA instruction is not present. Write a subroutine which will perform the same			
	task as DAA.			
9.	Calculations on memory locations.			
a.	To test RAM by writing '1' and reading it back and later writing '0' (zero) and			
	reading			
	it back. RAM addresses to be checked are 40FFH to 40FFH. In case of any error,			
	it is indicated by writing 01H at port 10			
b.	Arrange an array of 8 bit unsigned no in descending order			
c.	Transfer ten bytes of data from one memory to another memory block. Source			
	memory block starts from memory location 2200H where as destination memory			
	block starts from memory location 2300H			
d.	Write a program to find the Square Root of an 8 bit binary number. The binary			
	number is stored in memory location 4200H and the square root in 4201H.			
e.	Write a simple program to Split a HEX data into two nibbles and store it in			
	memory			
10.	<b>Operations on BCD numbers.</b>			
a.	Add two 4 digit BCD numbers in HL and DE register pairs and store result in			
	memory locations, 2300H and 2301H. Ignore carry after 16 bit.			
h	Subtract the BCD number stored in E register from the number stored in the D			
	register			
с	Write an assembly language program to multiply 2 BCD numbers			

B. Sc. (Information Technology)			Semester – II		
Course N	ame: Web Programm	ing Practical	Course Code: PUSITII21-P293		
Periods p	Periods per week (1 Period is 50 minutes) 3			3	
Credits 2				2	
Hours Marks					
Evaluation SystemPractical21/250					
		Examination			
		Internal			
List of P	ractical				
1.	Use of Basic Tags				
a.	Design a web page us	ing different text formattin	ig tags.		
b.	Design a web page wi	ith links to different pages	and allow nav	rigation between	
	web pages.				
C.	Design a web page de	monstrating all Style sheet	types		
2					
2.	Image maps, Tables, Forms and Media				
a. 	Design a web page wi	ith Imagemaps.			
0.	Design a web page de	monstrating different sema		ain a table as that	
C.	c. Design a web page with different tables. Design a webpages using table so that				
4	the content appears well placed.				
<u>u.</u>	Design a web page wi	abadding with multimadia	footures		
е.	Design a web page en	indedding with multimedia	leatures.		
3.	Java Script				
a.	Using JavaScript desi	gn, a web page that prints	factorial/Fibo	nacci series/any	
	given series.				
b.	Design a form and va	lidate all the controls place	d on the form	using Javascript.	
c.	Write a JavaScript pro	ogram to display all the prin	me numbers ł	between 1 and 100.	
a.	Write a JavaScript pro	ogram to accept a number f	from the user	and display the sum	
	of its digits.				
d.	Write a program in JavaScript to accept a sentence from the user and display the				
	number of words in it. (Do not use split () function).				
e.	Write a javascript pro	gram to design a simple ca	lculator.		
4.	Control and looping	statements and Java Scri	ipt reference	8	
a.	Design a web page de	monstrating different cond	litional statem	nents.	
b.	Design a web page de	monstrating different loop	ing statement	S.	

C.	Design a web page demonstrating different Core JavaScript references (Array,			
	Boolean, Date, Function, Math, Number, Object, String, regExp).			
5.	Basic PHP I			
a.	Write a PHP Program to accept a number from the user and print it factorial.			
b.	Write a PHP program to accept a number from the user and print whether it is prime			
	or not.			
6.	Basic PHP II			
a.	Write a PHP code to find the greater of 2 numbers. Accept the no. from the user.			
b.	Write a PHP program to display the following Binary Pyramid: 1			
	0 1			
	1 0 1			
	0 1 0 1			
7.	String Functions and arrays			
a.	Write a PHP program to demonstrate different string functions.			
b.	Write a PHP program to create a one dimensional array.			
8.	PHP and mysql			
a.	Write a PHP code to create:			
	Create a database College			
	• Create a table Department (Dname, Dno, Number_Of_faculty)			
b.	Write a PHP program to create a database named "College". Create a table named			
	"Student" with the following fields (sno, sname, percentage). Insert 3 records of your			
	choice. Display the names of the students whose percentage is between 35 to 75			
	in a tabular format.			
С.	Design a PHP page for authenticating a user.			
9.	Email			
a.	Write a program to send email with attachment.			
10.	Sessions and Cookies			
a.	Write a program to demonstrate use of sessions and cookies.			

<b>B. Sc. (Information Technology)</b>	Semester – II		
<b>Course Name: Numerical and Statistical</b>	Course Code: PUSITII21-P294		
Methods Practical			

Periods	eriods per week (1 Period is 50 minutes)			3		
Credits	redits			2		
			Hours Marks			
Evaluati	on System	Practical	21/2	50		
	·	Examination				
	Internal					
List of	Practical (Using scilab)					
1.	Iterative Calculation					
a.	Program for iterative c	alculation.				
b.	Program to calculate the	ne roots of a quadratic equ	uation using th	e formula.		
C.	Program to evaluate $e^{2}$	using infinite series.				
2.	Solution of algebraic	and transcendental equ	ations:			
a.	Program to solve algeb	praic and transcendental e	quations by bi	section method.		
b.	Program to solve algeb	praic and transcendental e	quations by fa	lse position method.		
C.	Program to solve algeb	praic and transcendental e	equations by Se	ecant method.		
d.	Program to solve algeb	praic and transcendental e	quation by Ne	wton Raphson		
	method.					
3.	Interpolation					
a.	Program for Newton's	forward interpolation.				
b.	Program for Newton's	backward interpolation.				
C.	Program for Lagrange's interpolation.					
		•				
4.	Solving linear system	of equations by iterativ	e methods			
a.	Program for solving li	near systems of equations	using Gauss J	ordan method.		
b.	Program for solving li	near systems of equations	using Gauss S	Seidel method.		
5.	Numerical Differenti	ation				
a.	Programming to obtain	n derivatives numerically.				
6.	Numerical Integratio	n				
a.	Program for numerical	l integration using Trapez	oidal rule.			
b.	Program for numerical	l integration using Simpso	on's $1/3^{rd}$ rule.			
С.	Program for numerical	l integration using Simpso	on's 3/8 <sup>th</sup> ru	le.		
7.	Solution of differenti	al equations				
a.	Program to solve diffe	rential equation using Eul	ler's method			
b.	Program to solve diffe	rential equations using me	odified Euler's	s method.		
c.	Program to solve diffe	rential equation using Ru	nge-kutta 2 <sup>nd</sup> o	order and 4 <sup>th</sup> order		
	methods.					
8.	Random variables an	d distributions				
a.	Program to generate ra	indom variables.				
b.	Program to fit binomia	al distribution.				

C.	Program to fit Poisson distribution.
9	Distributions
a.	Program for Uniform distribution.
b.	Program for Bernoulli distribution
с.	Program for Negative binomial distribution.
10.	Correlation and Regression
a.	Program for Correlation
b.	Program for Linear regression.
С.	Program for multiple linear regression.
d.	Program for nonlinear regression

<b>B. Sc. (Information Technology)</b>			Semester – II	
<b>Course Name: Green Computing Practical</b>			Course Code: PUSITII21-P295	
Periods per week (1	1 Period is 50	minutes)	3	
Credits			2	
			Hours	Marks
Evaluation System Practical Examination		21/2	50	
	Γ	Internal		
List of Practical's				
1. Green IT	1			
2. Green Ha	Green Hardware			
3. Green So	Green Software			
4. Green Co	Green Computing			
5. Green Da	Green Datacenter			
6. Green Co	Green Communication and Networking			
7. Green Da	Green Data Storage			
8. Green Er	Green Enterprises and Roll of IT			
9. Green Cl	Green Cloud computing			
10. Green IT	Green IT Strategies.			

# Pedagogy

The learning process is very crucial for the overall growth development of students. It is a reflection of an institution's teaching methodology. We believe in being open to new and innovative teaching practices. Being backed up by our dedicated faculty, guest faculty and experts' promoters we work extensively in imparting best knowledge to the student's force.

- Participative Learning.
- Case Study method.
- Live Projects.
- Role Play Method.
- Workshops.

# **PARTICIPATIVE LEARNING:**

We encourage our students to interact and participate amongst themselves in discussions and with faculty to enrich themselves, through lectures, practical, assignments and Live Projects.

### **CASE STUDY METHOD:**

The very purpose of management is decision making. The students are making to go through real life situations and enable them to understand the actual working of an industry, to interpret complex data, to refine their analytical skills thereby strengthening their ability to resolve organizational issues while working in a complex business environment.

#### LIVE PROJECTS:

Project work is assigned to students so that they become less trainer dependent. They are on their own so that, thus improving their methodological skills, exposing them more to the complex management issues of the corporate world.

#### **ROLE PLAY METHOD:**

The budding managers are trained to sharpen their abilities of leadership, team building and negotiation skills.

#### WORKSHOPS:

Workshops provide the students with actual hands-on experience in the latest upcoming avenues in their respective fields. Experts from various organizations and our own faculty conduct workshops for students.

# **Evaluation:**

- 1. Core Courses: The College will conduct all the semester examinations of 100 marks per Theory Paper in the prescribed pattern of 40 marks of internal assessment/Project work and 60 marks for semester end examination. The student will have to secure a minimum of 40% marks in internal assessment as well as semester end examination per theory paper, for all the above theory papers.
- 2. In each semester, the student will have to submit Project/Assignment/Journal for theory papers in the College before appearing for the Semester End Examination. The last date of submission of the Project will be officially declared by the College.
- 3. The Project work will be carried out by the student with the guidance of the concerned Faculty Member who will be allotted to the student as the Guide for the

Project.

4. The College will conduct all the semester examinations of 50 marks per Practical Paper at the end of each semester. The student will have to secure a minimum of 40% marks in the examination per practical paper, for all the above practical papers.

# **Evaluation Pattern**

## For F.Y. BSc.IT. (Theory)

1.	INTE	RNAL ASSESSMENT	40 Marks
1.1	One c	lass test (Subjective/Objectives/ Multiple Choice)	20 Marks
1.2	Assig	nment/ Project/ Presentation	15 Marks
1.3	Activ	e Participation in class, Overall performance	05 Marks
2.	EXTE	CRNAL ASSESSMENT (Semester End Examination)	60 Marks
	N.B. 1	. All questions are compulsory	
	2	. All questions carry equal marks.	
	Q1.	Unit – I	10
		Attempt any TWO	
	A)		
	B)		
	C)		
	D)		10
	Q2.	Unit – II Attempt any TWO	10
	A)	Attempt any Two	
	B)		
	C)		
	D)		
	-		
	Q3.	Unit – III	10
	• >	Attempt any TWO	
	A) D)		
	B) C)		
	D)		
	2)		
	Q4.	Unit – IV	10
		Attempt any TWO	
	A)		
	B)		
	C)		
	D)		
			1

Q5.	Unit – V	10
	Attempt any TWO	
A)		
B)		
C)		
D		
,		
Q6.	Unit-I, II, II, IV, V	10
	Attempt any TWO	
A)		
B)		
C)		
D)		
E)		

# **Evaluation Pattern for Practical**

2.	EXTERNAL ASSESSMENT	50 Marks
	Practical –I	20
	Practical –II	20
	Viva	05
	Journal	05
	TOTAL MARKS	50

# DOMBIVLI SHIKSHAN PRASARAK MANDAL'S,

# K.V. PENDHARKAR COLLEGE OF ARTS, SCIENCE AND COMMERCE, DOMBIVLI (EAST), DIST. THANE (AUTONOMOUS)

Affiliated to University of Mumbai

**Faculty of Sciences** 

# **DEPARTMENT OF COMPUTER SCIENCE**

**Program: Bachelor of Science PROPOSED SYLLABUS FOR:** 

S.Y.B.Sc. (Semester III and IV) Course: Computer Science With effect from 2022-2023

**Credit Based Semester and Grading System** 

SEMESTER III					
Course	TOPICS	Credits	L / Week		
USCS301	Theory of Computation	2	3		
USCS302	Core JAVA	2	3		
USCS303	Operating System	2	3		
USCS304	Database Management Systems		3		
USCS305	Combinatorics and Graph Theory	2	3		
USCS306	Physical Computing and IoT Programming		3		
USCS307	Skill Enhancement: Web Programming	2	3		
USCSP301	USCS302+USCS303+USCS304	3	9		
USCSP302	USCS305+USCS306+USCS307	3	9		

SEMESTER IV				
Course	TOPICS	Credits	L / Week	
USCS401	Fundamentals of Algorithms	2	3	
USCS402	Advanced JAVA	2	3	
USCS403	Computer Networks	2	3	
USCS404	USCS404 Software Engineering		3	
USCS405	S405 Linear Algebra using Python		3	
USCS406	S406 .NET Technologies		3	
USCS407	Skill Enhancement: Android Developer	2	3	
	Fundamentals			
USCSP401	USCS401+ USCS402+ USCS403	3	9	
USCSP402	USCS405+ USCS406+ USCS407	3	9	

# **SEMESTER III**

# THEORY

Cou	irse:	TOPICS (C	redits : 02 Lectures/Week:03)		
USC	S301	The	eory of Computation		
Obj	ectives:				
Тор	provide com	prehensive insight into t	heory of computation by understa	nding grammar, lan	guages
and	other eleme	nts of modern language	e design. Also to develop capabili	ties to design and d	levelop
form	nulations for	computing models and	identify its applications in diverse	e areas.	
Exp	ected Learn	ning Outcomes:			
	1. Understa	and Grammar and Langu	lages		
	2. Learn ab	out Automata theory an	d its application in Language Des	sign	
	3. Learn ab	out Turing Machines ar	nd Pushdown Automata		
2	4. Understa	and Linear Bound Autor	nata and its applications		
Unit	OLD Syl	labus	New Syllabus	Justification	Lectures
	Automat	a Theory: Defining	Automata Theory: Defining	No changes	
	Automato	on, Finite Automaton,	Automaton, Finite	0	
	Transitios	s and Its properties,	Automaton, Transitions and		
<b>T</b> T.•	Acceptab	ility by Finite	Its properties, Acceptability		1.51
t I	Automato	on, Nondeterministic	by Finite Automaton,		15L
	Finite Sta	te Machines, DFA and	Nondeterministic Finite State		
	NDFA ec	uivalence, Mealy and	Machines, DFA and NDFA		
	Moore N	Iachines, Minimizing	equivalence, Mealy and		
	Automata	1.	Moore Machines, Minimizing		
	Formal	Languges: Defining	Automata.		
	Grammar	, Derivations,	Formal Languges: Defining		
	Languges	generated by	Grammar, Derivations,		
	Grammar	, Chomsky	Languges generated by		
	Classifica	ation of Grammar and	Grammar, Chomsky		
	Language	es, Recursive	Classification of Grammar		
	Enumeral	ole Sets, Operations on	and Languages, Recursive		
	Language	es, Languages and	Enumerable Sets, Operations		

	Automata	on Languages, Languages and		
		Automata		
	Regular Sets and Regular	Regular Sets and Regular	No Changes	
	Grammar: Regular Grammar,	Grammar: Regular Grammar,		
	Regular Expressions, Finite	Regular Expressions, Finite		1.51
Uni t II	automata and Regular	automata and Regular		15L
	Expressions, Pumping Lemma	Expressions, Pumping Lemma		
	and its Applications, Closure	and its Applications, Closure		
	Properties, Regular Sets and	Properties, Regular Sets and		
	Regular Grammar	Regular Grammar		
	Context Free Languages:	Context Free Languages:		
	Context-free Languages,	Context-free Languages,		
	Derivation Tree, Ambiguity of	Derivation Tree, Ambiguity of		
	Grammar, CFG simplification,	Grammar, CFG simplification,		
	Normal Forms, Pumping Lemma	Normal Forms, Pumping		
	for CFG	Lemma for CFG		
	<b>Pushdown</b> Automata: Definitions, Acceptance by PDA, PDA and CFG	<b>Pushdown</b> Automata: Definitions, Acceptance by PDA, PDA and CFG		
Unit	Linear Bound Automata: The	Linear Bound Automata: The	Added new	15L
III	Linear Bound Automata Model,	Linear Bound Automata	topic in Turing	
	Linear Bound Automata and	Model, Linear Bound	Machine	
	Languages.	Automata and Languages.	chapter so	
	Turing Machines: Turing	Turing Machines: Turing	student will	
	Machine Definition,	Machine Definition,	understand	
	Representations, Acceptability	Representations, Acceptability	relation of both	
	by Turing Machines, Designing	by Turing Machines, Designing	concept	
	and Description of Turing	and Description of Turing		
	Machines, Turing Machine	Machines, Turing Machine		
	Construction, Variants of Turing	Construction, Variants of		
	Machine,	Turing Machine,		
	<b>Undecidability:</b> The Church- Turing thesis, Universal Turing	Model of Linear Bounded Automata and Context		
	Problem Introduction to	Sensitive Language		
	Unsolvable Problems	Undecidability: The Church-		

Turing thesis, Universal Turing Machine, Halting	
Problem, Introduction to Unsolvable Problems	

**Tutorials :** 

- 1. Problems on generating languages for given simple grammar
- 2. Problems on DFA and NDFA equivalence
- 3. Problems on generating Regular Expressions
- 4. Problems on drawing transition state diagrams for Regular Expressions
- 5. Problems on Regular Sets and Regular Grammar
- 6. Problems on Ambiguity of Grammar
- 7. Problems on working with PDA
- 8. Problems on working with Turing Machines
- 9. Problems on generating derivation trees
- 10. Problems on Linear Bound Automata/Universal Turing Machine

#### Textbook(s):

- 1) Theory of Computer Science, K. L. P Mishra, Chandrasekharan, PHI,3<sup>rd</sup> Edition
- 2) Introduction to Computer Theory, Daniel Cohen, Wiley, 2<sup>nd</sup> Edition
- 3) Introductory Theory of Computer Science, E.V. Krishnamurthy, Affiliated East-West Press.

#### **Additional Reference(s):**

- 1) Theory of Computation, Kavi Mahesh, Wiley India
- 2) Elements of The Theory of Computation, Lewis, Papadimitriou, PHI
- Introduction to Languages and the Theory of Computation, John E Martin, McGraw-Hill Education
- 4) Introduction to Theory of Computation, Michel Sipser, Thomson

#### MOOC Courses:

1. https://onlinecourses.nptel.ac.in/noc21\_cs83/preview

Course:	TOPI	TOPICS (Credits : 02 Lectures/Week:03) Core			
USCS302	,	Java			
Objectives	:				
The objecti	ve of this course is to teach the	e learner how to use Object Oriente	d paradigm to deve	elop code and	
understand	the concepts of Core Java and	to cover-up with the prerequisites of	f Core java. <b>Expec</b>	ted Learning	
Outcomes	:				
1.	Object oriented programming	concepts using Java.			
2.	Knowledge of input, its proces	ssing and getting suitable output.			
3.	Understand, design, implement	at and evaluate classes and applets.			
4.	Knowledge and implementation	on of AWT package.	1		
Unit	Old Syllabus	New Syllabus	Justification	No.Of Lectures	
	The Java Language:	<b>The Java Language:</b> Features of	Addition:		
	Features of Java, Java	Java, Java programming format,			
	programming format, Java	Difference between Java and C	Get Detail		
	Tokens, Java Statements,	language,	information		
Unit I	Java Data Types,	Java Tokens, Java Statements,		15L	
	Typecasting, Arrays	Java Data Types, Typecasting,	between C-		
	OOPS: Introduction, Class,	Arrays	Programming		
	Object, Static Keywords,	<b>OOPS</b> : Introduction, Class,	and Java.		
	Constructors, this Keyword,	Object, Static Keywords,			
	Inheritance super	Constructors, this Keyword,	Information		
	Kauwand Dalumamhiam	Inheritance, super Keyword,	about static		
	Keyword, Porymorphism	Polymorphism (overloading and	and late		
	(overloading and	overriding), Abstraction,			
	overriding), Abstraction,	Encapsulation, Static and	binding in		
	Encapsulation, Abstract	Dynamic Binding, Abstract	oops concept		
	Classes, Interfaces.	Classes, Interfaces.			
		String Manipulations: String,			
	String Manipulations:	String Buffer, String Tokenizer			
	String, String Buffer, String				
	ı okemizer	<b>Packages:</b> Introduction to			
		predefined packages (java.lang,			

	Packages: Introduction to	java.util, java.io, java.sql,		
	predefined packages	java.swing), User Defined		
	(java.lang, java.util, java.io,	Packages, Access specifiers		
	java.sql, java.swing), User			
	Defined Packages, Access			
	specifiers			
	Exception Handling:	Exception Handling:	No Change	
	Introduction, Pre-Defined	Introduction, Pre-Defined		
	Exceptions, Try-Catch-	Exceptions, Try-Catch-Finally,		
Unit II	Finally, Throws, throw, User	Throws, throw, User Defined		15L
	Defined Exception examples	Exception examples		
	Multithreading: Thread	Multithreading: Thread		
	Creations, Thread Life	Creations, Thread Life Cycle, Life		
	Cycle, Life Cycle Methods,	Cycle Methods, Synchronization,		
	Synchronization, Wait()	<pre>Wait() notify() notify all()</pre>		
	notify() notify all() methods	methods		
	I/O Streams: Introduction,	I/O Streams: Introduction, Byte-		
	Byte-oriented streams,	oriented streams, Character-		
	Character- oriented streams,	oriented streams, File, Random		
	File, Random access File,	access File, Serialization		
	Serialization	Networking:Introduction,Socket,		
	Networking:Introduction,S ocket,Server socket,Client– Server Communication	Communication		

			No Change	
	Wrapper Classes:	Wrapper Classes:		
Unit III	Introduction, Byte, Short,	Introduction, Byte, Short,		15L
	Integer, Long, Float,	Integer, Long, Float, Double,		
	Double, Character,	Character, Boolean classes		
	Boolean classes	Collection Framework:		
	<b>Collection Framework:</b>	Introduction, util Package		
	Introduction, util Package	interfaces, List, Set, Map, List		
	interfaces, List, Set, Map,	interface & its classes, Set		
	List interface & its	interface & its classes, Map		
	classes, Set interface & its	interface & its classes		
	classes, Map interface &			
	its classes	Inner Classes: Introduction,		
		Member inner class, Static		
	Inner Classes:	inner class, Local inner class,		
	Introduction, Member	Anonymous inner class.		
	inner class, Static inner	AWT: Introduction,		
	class, Local inner class,	Components, Event-		
	Anonymous inner class	Delegation-Model, Listeners,		
	<b>AWT:</b> Introduction,	Layouts, Individual		
	Components, Event-	components Label, Button,		
	Delegation-Model,	CheckBox, Radio Button,		
	Listeners, Layouts,	Choice, List, Menu, Text		
	Individual components	Field, Text Area.		
	Label, Button,			
	CheckBox, Radio			
	Button, Choice, List,			
	Menu, Text Field, Text			
	Area			
L				

1) Herbert Schildt, Java The Complete Reference, Ninth Edition, McGraw-Hill Education, 2014

#### **Additional Reference(s):**

- 1) E. Balagurusamy, Programming with Java, Tata McGraw-Hill Education India, 2014
- 2) Programming in JAVA, 2nd Ed, Sachin Malhotra & Saurabh Choudhary, Oxford Press
- 3) The Java Tutorials: http://docs.oracle.com/javase/tutorial/

#### **MOOC Courses:**

1. https://onlinecourses.nptel.ac.in/noc21\_cs56/preview

Course:	TOPICS (Credits : 02 Lectures/Week:03)
USCS303	Operating System

### **Objectives:**

Learners must understand proper working of operating systems. To provide a sound understanding of the

Computer operating system, its structures, functioning and algorithms.

# **Expected Learning Outcomes:**

- 1. To provide a understanding of operating system, its structures and functioning
- 2. Develop and master understanding of algorithms used by operating systems for various purposes.

Unit	Old Syllabus	New Syllabus	Justification Lectures
	Introduction and Operating-	Introduction and	No Change
	Systems Structures: Definition of	<b>Operating-Systems</b>	
	Operating system, Operating	Structures: Definition of	
	System's role, Operating-System	Operating system, Operating	
Unit I	Operations, Functions of Operating	System's role, Operating-	15L
	System. Computing Environments	System Operations.	
	Onerating-System Structures:	Functions of Operating	
	Operating System Services User	System Computing	
	and Operating System Interface	Environmente	
	and Operating-System Interface,		
	System Calls, Types of System	Operating-System	
	Calls, Operating-System Structure	Structures: Operating-	
	Processes: Process Concept,	System Services, User and	
	Process Scheduling, Operations on Processes,	Operating-System Interface,	
	Interprocess Communication	System Calls, Types of	
		System Calls, Operating-	
		System Structure	
		Processes:ProcessConceptProcessSchedulingOperations on Processes,	
		Interprocess Communication	
	Threads: Overview, Multicore	Threads: Overview,	
	Programming, Multithreading	Multicore Programming,	
	Models	Multithreading Models	

	Process Synchronization:	Process Synchronization:	Deletion:	
	General structure of a typical	General structure of a typical	Thread Schodlling	
	process, race condition, The	process, race condition, The	Scheuling.	
	Critical-Section Problem,	Critical-Section Problem,		
Unit II	Peterson's Solution,	Peterson's Solution,		15L
	Synchronization Hardware, Mutex	Synchronization Hardware,		
	Locks, Semaphores, Classic	Mutex Locks, Semaphores,		
	Problems of Synchronization,	Classic Problems of		
	Monitors CPU Scheduling: Basic	Synchronization, Monitors		
	Concepts, Scheduling Criteria,	CPU Scheduling: Basic		
	Scheduling Algorithms (FCFS,	Concepts, Scheduling		
	SJF, SRTF, Priority, RR,	Criteria, Scheduling		
	Multilevel Queue Scheduling,	Algorithms (FCFS, SJF,		
	Multilevel Feedback Queue	SRTF, Priority, RR,		
	Scheduling), Thread Scheduling	Multilevel Queue		
	Deadlocks: System Model,	Scheduling, Multilevel		
	Deadlock Characterization,	Feedback Queue		
	Methods for Handling Deadlocks,	Scheduling), Thread		
	Deadlock Prevention, Deadlock	Scheduling		
	Avoidance, Deadlock Detection,	Deadlocks: System Model,		
	Recovery from Deadlock	Deadlock Characterization,		
		Methods for Handling		
		Deadlocks, Deadlock		
		Prevention, Deadlock		
		Avoidance, Deadlock		
		Detection,		
		Recovery from Deadlock		

	Main Memory: Background,	Main Memory: Background,	No Chnage
	Logical address space, Physical	Logical address space,	
	address space, MMU, Swapping,	Physical address space,	
	Contiguous Memory Allocation,	MMU, Swapping,	
	Segmentation, Paging, Structure of	Contiguous Memory	
Unit	the Page Table	Allocation, Segmentation,	151
III	Virtual Memory: Background,	Paging, Structure of the Page	1312
	Demand Paging, Copy-on-Write,	Table	
	Page Replacement, Allocation of	Virtual Memory:	
	Frames, Thrashing	Background, Demand Paging,	
	Mass-Storage Structure:	Copy-on-Write, Page	
	Overview, Disk Structure, Disk	Replacement, Allocation of	
	Scheduling, Disk Management	Frames, Thrashing	
	File-System Interface: File	Mass-Storage Structure:	
	Concept, Access Methods,	Overview, Disk Structure,	
	Directory and Disk Structure, File-	Disk Scheduling, Disk	
	System Mounting, File Sharing	Management	
	File-System Implementation:	File-System Interface: File	
	File-System Structure, File-System	Concept, Access Methods,	
	Implementation, Directory	Directory and Disk Structure,	
	Implementation, Allocation	File-System Mounting, File	
	Methods, Free-Space	Sharing	
	Management	File-System	
		Implementation: File-	
		System Structure, File-	
		System Implementation,	
		Directory Implementation,	
		Allocation Methods, Free-	
		Space	
		Management	

 Abraham Silberschatz, Peter Galvin, Greg Gagne, Operating System Concepts, Wiley,8<sup>th</sup> Edition

#### **Additional Reference(s):**

- 1. Achyut S. Godbole, Atul Kahate, Operating Systems, Tata McGraw Hill
- 2. Naresh Chauhan, Principles of Operating Systems, Oxford Press
- Andrew S Tanenbaum, Herbert Bos, Modern Operating Systems, 4e Fourth Edition, Pearson Education, 2016

#### MOOC Courses:

- 1. <u>https://onlinecourses.nptel.ac.in/noc21\_cs72/preview</u>
- 2. https://onlinecourses.swayam2.ac.in/cec21\_cs20/preview

Course:	TOPICS	G (Credits : 02 Lectures/Week:03)			
USCS304	Database Management Systems				
Objectives:					
To develop und	derstanding of concepts and te	echniques for data management and le	arn about widely used		
systems for imp	blementation and usage.				
Expected Lear	ning Outcomes:				
1. Learn al	oout using PL/SQL for data m	nanagement			
<ol> <li>Master of</li> <li>Underst</li> </ol>	concepts of stored procedure a and concepts and implementa	and triggers and its use. tions of transaction management and	crash recovery		
Unit Old Sy	yllabus	New Syllabus	Justification No.Of lecture	f res	
StoredbeneficreatincreatinexecutalterinUnit IUnit ITriggenimplentriggentriggendeletinand entriggentriggendeletinand entriggenaseqand Iand sdata stindexiorganifiles, s	<b>I Procedures:</b> Types and ts of stored procedures, ag stored procedures, ing stored procedures, g stored procedures. ers: Concept of triggers, menting triggers – creating rs, Insert, delete, and update rs, nested triggers, viewing, and modifying triggers, forcing data integrity through rs. <b>nces</b> : creating sequences, neing, altering and dropping uence. <b>File Organization</b> <b>indexing:</b> Cluster, Primary econdary indexing, Index ructure: hash and Tree based ng, Comparison of file zation: cost model, Heap sorted files, clustered files. ng,	<ul> <li>Fundamentals of PL/SQL: Defining variables and constants, PL/SQL expressions and comparisons: Logical Operators, Boolean Expressions, CASE Expressions Handling, Null Values in Comparisons and Conditional Statements, PL/SQL Datatypes: Number Types, Character Types, Boolean Type, Date time and Interval Types.</li> <li>Overview of PL/SQL Control Structures: Conditional Control: IF and CASE Statements, IF-THEN Statement, IF-THEN-ELSE Statement, IF THEN-ELSE Statement, IF THEN-ELSEIF Statement, CASE Statement, Iterative Control: LOOP and EXIT Statements, WHILE-LOOP, FOR- LOOP, Sequential Control: GOTO and NULL Statements.</li> <li>Sequences: creating sequences, referencing, altering and dropping a sequence.</li> <li>Cursors: Concept of a cursor, types of cursors: implicit cursors, explicit cursor, Cursor for loops, Cursor</li> </ul>	Addition: Fundamentals of PL/SQL and Overview of Pl/SQL Control Structure is shifted from Unit II to Unit I for basic information about PL/SQL. Information about Cursor in PL/SQL		

	dropping and maintaining indexes.	variables, parameterized cursors,		
		nested cursors, FOR UPDATE		
		Clause and WHERE CURRENT		
				. ==
Unit	Fundamentals of PL/SOL:	Stored Procedures: Types and	Addition:	15L
11		benefits of stored procedures,		
	Defining variables and constants,	creating stored procedures,	Stored	
	PL/SQL expressions and	executing stored procedures.	Procedures,	
	comparisons: Logical Operators,	altering stored procedures viewing	Triggers and	
	Boolean Expressions, CASE	anering stored procedures, viewing	File	
	Expressions Handling Null Values	stored procedures.	Organization is	
	in Comparisons and Conditional	Triggers: Concept of triggers,	Organization is	
	in Comparisons and Conditional	implementing triggers – creating	shifted from	
	Statements, PL/SQL Datatypes:	triggers Insert delete and undate	Unit I to Unit II	
	Number Types, Character Types,	inggers, insert, delete, and update	for advance	
	Boolean Type, Date time and	triggers, nested triggers, viewing,	information	
	Interval Types	deleting and modifying triggers,	about PL/SOI	
		and enforcing data integrity	about I L/SQL.	
	Overview of PL/SQL Control	through triggers.		
	Structures: Conditional Control:	File Organization and Indexing:		
	IF and CASE Statements, IF-	Cluster, Primary and secondary		
	THEN Statement, IF-THEN-	indexing, Index data structure: hash		
	ELSE Statement, IF THEN-	and Tree based indexing,		
	ELSEIF Statement, CASE	Comparison of file organization:		
	Statement, Iterative Control:	cost model, Heap files, sorted files,		
	LOOP and EXIT Statements,	clustered files. Creating,		
	WHILE-LOOP, FOR-LOOP,	dropping and maintaining indexes.		
	Sequential Control: GOTO and			
	NULL Statements			

	Transaction Management: ACID	Transaction Management:	No Change	
	Properties, Serializability, Two-phase	ACID Properties,		
	Commit Protocol, Concurrency Control,	Serializability, Two-phase		
	Lock Management, Lost Update Problem,	Commit Protocol,		
Unit III	Inconsistent Read Problem, Read-Write	Concurrency Control, Lock	151	r
	Locks, Deadlocks Handling, Two Phase	Management, Lost Update	151	L
	Locking protocol.	Problem, Inconsistent Read		
	DCL Statements: Defining a transaction,	Problem, Read-Write Locks,		
	Making Changes Permanent with	Deadlocks Handling, Two		
	COMMIT, Undoing Changes with	Phase Locking protocol.		
	ROLLBACK, Undoing Partial Changes	DCL Statements: Defining a		
	with SAVEPOINT and ROLLBACK	transaction, Making Changes		
	Crash Recovery: ARIES algorithm. The	Permanent with COMMIT,		
	log based recovery, recovery related	Undoing Changes with		
	structures like transaction and dirty page	ROLLBACK, Undoing Partial		
	table, Write-ahead log protocol, check	Changes with SAVEPOINT		
	points, recovery from a system crash,	and ROLLBACK		
	Redo and Undo phases.	Crash Recovery: ARIES		
		algorithm. The log based		
		recovery, recovery related		
		structures like transaction and		
		dirty page table, Write-ahead		
		log protocol, check points,		
		recovery from a system crash,		
		Redo and Undo phases.		

- 1) Ramakrishnam, Gehrke, Database Management Systems, Bayross, McGraw-Hill,3<sup>rd</sup> Edition
- 2) Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, 6th Edition
- 3) Ivan Bayross, "SQL,PL/SQL -The Programming language of Oracle", B.P.B. Publications

#### **Additional Reference(s):**

- Ramez Elmasri & Shamkant B.Navathe, Fundamentals of Database Systems, Pearson Education
- 2) Robert Sheldon, Geoff Moes, Beginning MySQL, Wrox Press.
- 3) Joel Murach, Murach's MySQL, Murach

#### MOOC Courses:

1. https://onlinecourses.nptel.ac.in/noc21\_cs58/preview

Course: USCS305	Со	TOPICS (Credits : 02 Lectures/Week: 03) mbinatorics and Graph Theory			
Objectives	Objectives:				
To give the	To give the learner a broad exposure of combinatorial Mathematics through applications especially the				
Computer	Computer Science applications				
Ermosted					
Expected	Learning Outcomes:				
1.	Appreciate the beauty of combinat	torics and how combinatorial prob	lems natural	ly arise in	
	many settings.				
2.	Understand the combinatorial feat	ures in real world situations and C	omputer Sci	ence	
	applications.				
3	Apply combinatorial and graph the	eoretical concepts to understand C	omputer Sci	ence concents	
5.	reprise combinational and graph the	concepts to understand C	omputer ber	ence concepts	
	and apply them to solve problems				
Unit	Old Syllabus	New Syllabus	Justificati	on No. of	
	Introduction to Combinatorics	Introduction to Combinatorics		Lectures	
	Enumeration Combinatorics and	Enumeration Combinatorics and			
	Graph Theory/ Number	Graph Theory/ Number			
	Theory/Geometry and	Theory/Geometry and			
	Optimization, Sudoku Puzzles.	Optimization, Sudoku Puzzles.			
TT	Strings, Sets, and Binomial	Strings, Sets, and Binomial		1 77	
Unit I	Coefficients: Strings- A First	Coefficients: Strings- A First		15L	
	Look, Combinations,	Look, Combinations,			
	Combinatorial, The Ubiquitous	Combinatorial, The Ubiquitous			
	Nature of Binomial Coefficients,	Nature of Binomial Coefficients,			
	The Binomial, Multinomial	The Binomial, Multinomial			
	Coefficients.	Coefficients.			
	Induction: Introduction, The	Induction: Introduction, The			
	Positive Integers are Well	Positive Integers are Well			
	Ordered, The Meaning of	Ordered, The Meaning of			
	Statements, Binomial	Statements, Binomial			
	Coefficients Revisited, Solving	Coefficients Revisited, Solving			
	Combinatorial Problems	Combinatorial Problems			
	Recursively, Mathematical	Recursively, Mathematical			
	Induction, and	Induction, and			
	Inductive Definitions Proofs by	Inductive Definitions Proofs by			
	Induction. Strong Induction	Induction. Strong Induction			

	Granh Theory Basic Notation	Graph Theory Basic Notation	Addition	
	and Terminology Multigraphs:	and Terminology Multigraphs	Got a dotailad	
	Loops and Multiple Edges	Loops and Multiple Edges	ideo about	
	Eulerian and Hamiltonian	Eulerian and Hamiltonian		
Unit II	Graphs Graph Coloring Planar	Graphs Graph Coloring Planar	trees in graph	15L
	Counting Labeled Trees A	Counting Labeled Trees	theory.	
	Digression into Complexity			
	Theory, Applying Probability to	Trees: Minimum Spanning Tree.		
	Combinatorics. Small Ramsey	MST by Prims algorithm.		
	Numbers. Estimating Ramsey	Kruskal's algorithm and		
	Numbers, Applying Probability	Dijkstra's algorithm. Expression		
	to Ramsey Theory, Ramsey's	Tree : Writing Mathematical		
	Theorem The Probabilistic	expressions for a tree by		
	Method	different types of expression		
		formats: Prefix expression		
		Infix expression and Postfix		
		expression		
		expression		
		A Digression into Complexity		
		Theory. Applying Probability to		
		Combinatorics. Small Ramsey		
		Numbers, Estimating Ramsev		
		Numbers, Applying Probability		
		to Ramsey Theory, Ramsey's		
		Theorem The Probabilistic		
		Method		
	Network Flows: Basic Notation	Network Flows: Basic Notation		
Unit III	and Terminology, Flows and	and Terminology, Flows and		15L
	Cuts, Augmenting Paths, The	Cuts, Augmenting Paths, The		
	Ford-Fulkerson Labeling	Ford-Fulkerson Labeling		
	Algorithm, A Concrete Example,	Algorithm, A Concrete Example,		
	Integer Solutions of Linear	Integer Solutions of Linear		
	Programming Problems.	Programming Problems.		
	Combinatorial Applications of	Combinatorial Applications of		
	Network Flows: Introduction,	Network Flows: Introduction,		
	Matching in Bipartite Graphs,	Matching in Bipartite Graphs,		
	Chain partitioning, Pólya's	Chain partitioning, Pólya's		
	Enumeration Theorem: Coloring	Enumeration Theorem: Coloring		
	the Vertices of a Square.	the Vertices of a Square.		

 Applied Combinatorics, Mitchel T. Keller and William T. Trotter, 2016, http://www.rellek.net/appcomb.

#### **Additional Reference(s):**

- 1) Applied Combinatorics, sixth.edition, Alan Tucker, Wiley; (2016)
- Graph Theory and Combinatorics, Ralph P. Grimaldi, Pearson Education; Fifth edition (2012)
- 3) Combinatorics and Graph Theory, John Harris, Jeffry L. Hirst, Springer(2010).
- Graph Theory: Modeling, Applications and Algorithms, Agnarsson, Pearson Education India (2008).

Course:	TOPICS (Credits : 02 Lectures/Week:03)				
USCS306	Physical Computing and IoT Programming				
Objectives:					
To learn abou	t SoC architectures; Learn how Raspberry Pi. Learn to program Raspberry Pi.				
Implementatio	Implementation of the Internet of Things and Protocols.				
Expected Learning Outcomes:					
1. Enable	learners to understand System On Chip Architectures.				
2. Introdu	action and preparing Raspberry Pi with hardware and installation.				
3. Learn	physical interfaces and electronics of Raspberry Pi and program them using practical's				
4. Learn	how to make consumer grade IoT safe and secure with proper use of protocols.				

Sr No.	Old Syllabus	New Syllabus	justfication	total lecture
	SoC and Dagnhormy Di	SoC and Dagnhoung Di	No Changa	
	Soc and Kaspberry Pi System on Chip: What is	System on Chip: What is	No Change	
	System on chip? Structure of System on	System on chip? Structure of System on Chip.		
Unit I	Chip. SoC products: FPGA,	<b>SoC products:</b> FPGA, GPU, APU, Compute Units.		15L
	GPU, APU, Compute Units.	ARM 8 Architecture: SoC on		
	ARM 8 Architecture:	ARM 8. ARM 8 Architecture		
	SoC on ARM 8. ARM 8	Introduction Introduction to		
	Architecture Introduction	Raspberry Pi: Introduction to		
	Introduction to	Raspberry Pi, Raspberry Pi		
	Raspberry Pi:	Hardware, Preparing your		
	Introduction to Raspberry	raspberry Pi.		
	Pi, Raspberry Pi	<b>Raspberry Pi Boot:</b> Learn how		
	Hardware, Preparing your	BIOS.		
	raspberry Pi.	Configuring boot sequences and		
	<b>Raspberry Pi Boot:</b> Learn how this small SoC boots without BIOS.	hardware.		
	Configuring boot sequences and hardware.			
	Programming	Programming Raspberry Pi	No Change	
	Raspberry Pi	<b>Raspberry Pi and Linux:</b>		
	<b>Raspberry Pi and</b>	About Raspbian, Linux		
Unit II	Linux: About Raspbian,	Commands, Configuring		15L
	Linux Commands,	Raspberry Pi with Linux		
	Configuring Raspberry	Commands		
	Pi with Linux	Programming interfaces:		
	Commands	Introduction to Node.js, Python.		
	<b>Programming</b> <b>interfaces:</b> Introduction to Node.js, Python.	Raspberry Pi Interfaces: UART, GPIO, I2C, SPI Useful Implementations: Cross		
	Raspberry Pi Interfaces: UART, GPIO, I2C, SPI	Compilation, Pulse Width Modulation, SPI for Camera.		
	Useful			

	Implementations: Cross			
	Compilation, Pulse Width			
	Modulation, SPI for			
	Camera.			
	Introduction to IoT:	<b>Introduction to IoT:</b> What is	Added:- IOT	
	What is IoT? IoT	IoT? IoT examples. Simple IoT	Projects &	
	examples, Simple IoT	LED Program.	IOT	
	LED Program.	IoT and Protocols	Applications	1 57
Unit III	IoT and Protocols	IoT Security: HTTP. UPnp.		15L
	IoT Security: HTTP,	CoAP, MQTT, XMPP.	They should	
	UPnp, CoAP, MQTT, XMPP	IoT Service as a Platform:	have small	
	IoT Service as a	Clayster, Thinger.io, SenseIoT,	topics on it so they will	
	Distforme Clauston	carriots and Node RED.	connect real	
	<b>Flatiorin:</b> Clayster,	IoT Security and	world of IOT	
	Thinger.io, SenseIoT,	Interoperability: Risks, Modes		
	carriots and Node RED.	of Attacks, Tools for		
	<b>IoT Security and</b> <b>Interoperability:</b> Risks, Modes of Attacks, Tools	Security and Interoperability.		
	for	IOT Projects & IOT Applications		
	Security and Interoperability.			
Textbook	x(s):			
1) Le	earning Internet of Things, P	eter Waher, Packt Publishing(2015	5)	

2) Mastering the Raspberry Pi, Warren Gay, Apress(2014)

# **Additional Reference(s):**

1) Abusing the Internet of Things, Nitesh Dhanjani, O'Reilly

#### MOOC Courses:

1. https://onlinecourses.nptel.ac.in/noc21\_cs63/preview

Course: TOPICS (Credits : 02 Lectures/Week: 03)						
USCS30	7	Web Programming				
Objectiv	es:					
To provi	de insight into emerging technolog	ies to design and develop state of	f - the art web appl	lications		
using clie	ent-side scripting, server-side script	ing, and database connectivity.				
Expected	Expected Learning Outcomes:					
1. T	o design valid, well-formed, scalab	le, and meaningful pages using e	emerging technolog	gies.		
2. U	2. Understand the various platforms, devices, display resolutions, viewports, and browsers that					
re	ender websites					
3. T	o develop and implement client-sid	e and server-side scripting langu	age programs.			
4. T	o develop and implement Database	Driven Websites.				
5. D	esign and apply XML to create a m	harkup language for data and doc	ument centric app	lications.		
T Locid	Old Cullaburg	New Syllebus	Instification	No. of		
Unit	Old Syllabus	new Synabus	Justification	lectures		
Unit I	HTML5: Fundamental	HTML5: Fundamental	Addition:	15		
	Elements of HTML,	Elements of HTML,	Use of			
	Formatting Text in HTML,	Formatting Text in HTML,	and CSS			
	Organizing Text in HTML,	Organizing Text in HTML,	properties to work with			
	Links and URLs in HTML,	Using Marquee tag	tables for			
	Tables in HTML, Images on a	Links and URLs in HTML,	better understanding			
	Web Page, Image Formats,	Tables in HTML, Images on	of the basic			
	Image Maps, Colors, FORMs	a Web Page, Image	text display, basic table			
	in HTML, Interactive	Formats, Image Maps,	formatting			
	Elements, Working with	Colors, FORMs in HTML,				
	Multimedia - Audio and Video	Interactive Elements,				
	File Formats, HTML elements	Working with Multimedia -				
	for inserting Audio / Video on	Audio and Video File				
	a web page	Formats, HTML elements				
	CSS: Understanding the	for inserting Audio / Video				
	Syntax of CSS, CSS Selectors,	on a web page				
	Inserting CSS in an HTML	CSS: Understanding the				

	Document, CSS properties to work with background of a Page, CSS properties to work with Fonts and Text Styles, CSS properties for positioning an element	Syntax of CSS, CSS Selectors, Inserting CSS in an HTML Document, CSS properties to work with background of a Page, CSS properties to work with Fonts and Text Styles, CSS properties for positioning an element, CSS properties to work with tables		
Unit II	JavaScript: Using JavaScript in an HTML Document, Programming Fundamentals of JavaScript – Variables, Operators, Control Flow Statements, Popup Boxes, Functions – Defining and Invoking a Function, Defining Function arguments, Defining a Return Statement, Calling Functions with Timer, JavaScript Objects - String, RegExp, Math, Date, Browser Objects - Window, Navigator, History, Location, Document, Cookies, Document Object Model, Form Validation using JavaScript XML: Comparing XML with HTML, Advantages and Disadvantages of XML Structure of an XML Document, XML Entity References, DTD, XSLT:	JavaScript: Using JavaScript in an HTML Document, Programming Fundamentals of JavaScript – Variables, Operators, Control Flow Statements, Popup Boxes, Functions – Defining and Invoking a Function, Defining Function arguments, Defining a Return Statement, Calling Functions with Timer, JavaScript Objects - String, RegExp, Math, Date, Browser Objects - Window, Navigator, History, Location, Document, Cookies, Document Object Model,DOM Events, Form Validation using JavaScript	understanding of the basic event handling	15

	XSLT Elements and Attributes - xsl:template, xsl:apply- templates, xsl:import, xsl:call- template, xsl:include, xsl:element, xsl:attribute, e xsl:attribute-set, xsl:value-of	Document, XML Entity References, DTD, XSLT: XSLT Elements and Attributes - xsl:template, xsl:apply-templates, xsl:import, xsl:call- template, xsl:include, xsl:element, xsl:attribute,	
Unit III	AJAX: AJAX Web	AJAX: AJAX Web	
	Application Model, How	Application Model, How	
	AJAX Works,	AJAX Works,	
	XMLHttpRequest Object -	XMLHttpRequest Object –	
	Properties and Methods,	Properties and Methods,	
	Handling asynchronous	Handling asynchronous	
	requests using AJAX PHP:	requests using AJAX PHP:	
	Variables and Operators,	Variables and Operators,	
	Program Flow, Arrays,	Program Flow, Arrays,	
	Working with Files and	Working with Files and	
	Directories, Working with	Directories, Working with	
	Databases, Working with	Databases, Working with	
	Cookies, Sessions and Headers	Cookies, Sessions and	
	Introduction to jQuery:	Headers	
	Fundamentals, Selectors, methods to access HTML	Introduction to jQuery: Fundamentals, Selectors,	
	attributes, methods for traversing, manipulators, events, effects	methods to access HTML attributes, methods for traversing, manipulators, events, effects	

#### Text Book(s):

- HTML 5 Black Book, Covers CSS 3, JavaScript, XML, XHTML, AJAX, PHP and jQuery, 2ed, Dreamtech Press
- 2) Web Programming and Interactive Technologies, scriptDemics, StarEdu Solutions India.
- 3) PHP: A Beginners Guide, Vikram Vaswani, TMH

#### **Additional Reference(s):**

- 1) HTML, XHTML, and CSS Bible Fifth Edition, Steven M. Schafer, WILEY
- 2) Learn to Master HTML 5, scriptDemics, StarEdu Solutions Pvt Ltd.
- 3) Learning PHP, MySQL, JavaScript, CSS & HTML5, Robin Nixon, O'Reilly
- 4) PHP, MySQL, JavaScript & HTML5 All-in-one for Dummies, Steve Suehring, Janet Valade Wiley
# Suggested List of Practical- SEMESTER III

Course:	(Credits : 03 Lectures/Week: 09)		
USCSP301	USCS302+ USCS303+USCS304		
	USCS302: Core JAVA		
1. Acce	ept integer values for a, b and c which are coefficients of quadratic equations. Find	the	
solut	ion of the quadratic equation.		
2. Acce	ept two n x m matrices. Write a Java program to find addition of these matrices.		
3. Acce	pt n strings. Sort names in ascending order.		
4. Crea	te a package: Animals. In the package animals create interface Animal with		
suita	ble behaviors. Implement the interface Animal in the same package animals.		
5. Dem	onstrate Java inheritance using extends keyword.		
6. Dem	onstrate method overloading and method overriding in Java.		
7. Dem	onstrate creating your own exception in Java.		
8. Usin	g various swing components, design Java application to accept a student's resume.	(Desig	
form	)		
9. Writ	e a Java List example and demonstrate methods of Java List interface.		
10. Desi	gn simple calculator GUI application using Swing components.		
	USCS303: Operating System		
Prac	tical can be implemented either in JAVA or any other programming language.		
1. W	rite a Program to implement First Come First Serve(FCFS) Scheduling.		
2. W	rite a Program to implement Shortest Job First(SJF) Scheduling.		
3. W	rite a Program to implement Priority based Scheduling.		
4. W	rite a Program to implement Round Robin.		
5. W	rite a Program to FIFO page replacement algorithm.		
6. W	6. Write a Program to LRU Page replacement algorithm.		
7. W	rite a Program to implement an Optimal page replacement algorithm.		
8. W	8. Write a Program to implement Dinning Philosophers.		
9. W	9. Write a Program to implement DeadLock Detection.		
10. V	10. Write a Program to implement the Worst Fit Algorithm.		

#### **USCS304: Database Management Systems**

- 1. Writing PL/SQL Blocks with basic programming constructs of Sequential Statements:
  - a. CONSTANT
  - b. NOT NULL
  - c. DEFAULT
  - d. %TYPE and % ROWTYPE Attribute.
- 2. Writing PL/SQL Blocks with basic programming constructs by including following:
  - a. If...then...Else, IF...ELSIF...ELSE... END IF
  - b. Case Statement.
- 3. Writing PL/SQL Blocks with basic programming constructs for following Iterative Structure:
  - a. While-loop Statements
  - b. For-loop Statements.
  - c. Unconstrained loops
- 4. Writing PL/SQL Blocks with basic programming constructs by including a GoTO to jump out of a loop and NULL as a statement inside IF.
- 5. Creating simple Sequences with clauses like START WITH, INCREMENT BY, MAXVALUE, MINVALUE, CYCLE | NOCYCLE, CACHE | NOCACHE, ORDER | NOORECER.
- 6. Writing Procedures in PL/SQL Block.
  - a. Create an empty procedure, replace a procedure and call procedure.
  - b. Create a stored procedure and call it.
  - c. Define procedure to insert data.
  - d. A forward declaration of procedure.
- 7. Writing Functions in PL/SQL Block
  - a. Define and call a function
  - b. Define and use function in select clause,
  - c. Call function in dbms\_output.put\_line.
- 8. Creating and working with Insert/Update/Delete Trigger using Before/After clause.
- 9. Writing PL/SQL Block for Cursors
  - a. Cursor attributes: %ROWCOUNT, %FOUND, %NOTFOUND, %ISOPEN
  - b. Cursor with sub queries
  - c. Combination of PL/SQL, cursor and for loop
  - d. Parameterized cursors, Cursor Variables
- 10. Study of transactions and locks

Course:	(Credits : 03 Lectures/Week: 09)		
USCSP302	USCS305+ USCS306+USCS307		
	USCS305: Combinatorics and Graph Theory		
1. Solvin	ng problems on strings, sets and binomial coefficients.		
2. Solvin	ng problems using induction.		
3. Solvin	ng problems on Eulerian and Hamiltonian graphs.		
4. Solvin	ng problems on Chromatic number and coloring		
5. Solvin	ng problems using Kruskal's Algorithm		
6. Solvin	ng problems using Prim's Algorithm		
7. Solvin	ng problems using Dijkstra's Algorithm		
8. Solvin	ng problems of finding augmenting paths in network flows.		
9. Solvin	ng problems on network flows using Ford-Fulkerson Labeling Algorithm		
10. Solvin	ng problems on posets and their associated networks.		
	USCS306: Physical Computing and IoT Programming		
1. Prepar	ring Raspberry Pi: Hardware preparation and Installation		
2. Linux	2. Linux Commands: Exploring the Raspbian		
3. GPIO:	: Light the LED with Python		
4. GPIO:	: LED Grid Module: Program the 8X8 Grid with Different Formulas		
5. SPI: C	Camera Connection and capturing Images using SPI		
6. Real T	Time Clock display using PWM.		
7. Steppe	er Motor Control: PWM to manage stepper motor speed.		
8. Node	RED: Connect LED to Internet of Things		
9. Stack	of Raspberry Pi for better Computing and analysis		
10. Create	e a simple Web server using Raspberry Pi		
	USCS307: Web Programming		
1. De	esign a webpage that makes use of		
a 20	Document Structure Tags b. Various Text Formatting Tags		
c.	List Tags d. Image and Image Maps		
2. De	esign a webpage that makes use of		
a.	Table tagsb. Form Tags (forms with various form elements)		

- c. Navigation across multiple pages d. Embedded Multimedia elements
- 3. Design a webpage that make use of Cascading Style Sheets with
  - a. CSS properties to change the background of a Page
  - b. CSS properties to change Fonts and Text Styles
  - c. CSS properties for positioning an element
- 4. Write JavaScript code for
  - Performing various mathematical operations such as calculating factorial / finding Fibonacci Series / Displaying Prime Numbers in a given range / Evaluating Expressions

/ Calculating reverse of a number

- b. Validating the various Form Elements
- 5. Write JavaScript code for
  - a. Demonstrating different JavaScript Objects such as String, RegExp, Math, Date
  - b. Demonstrating different JavaScript Objects such as Window, Navigator, History,

Location, Document,

- c. Demonstrating basic mouse events
- d. Storing and Retrieving Cookies
- 6. Create a XML file with Internal / External DTD and display it using
  - a. CSS b. XSL
- 7. Design a webpage to handle asynchronous requests using AJAX on
  - a. Mouseover b. button click
- 8. Write PHP scripts for
  - a. Retrieving data from HTML forms
  - b. Performing certain mathematical operations such as calculating factorial / finding Fibonacci Series / Displaying Prime Numbers in a given range / Evaluating Expressions

/ Calculating reverse of a number

- c. Working with Arrays
- d. Working with Files (Reading / Writing)
- 9. Write PHP scripts for
  - a. Working with Databases (Storing Records / Reprieving Records and Display them)
  - b. Storing and Retrieving Cookies
  - c. Storing and Retrieving Sessions
- 10. Design a webpage with some jQuery animation effects.

#### SEMESTER IV

#### THEORY

# Course:TOPICS (Credits : 02 Lectures/Week:03)USCS401Fundamentals of Algorithms

#### **Objectives:**

- 1. To understand basic principles of algorithm design and why algorithm analysis is important
- 2. To understand how to implement algorithms in Python
- 3. To understand how to transform new problems into algorithmic problems with efficient solutions
- 4. To understand algorithm design techniques for solving different problems

#### **Expected Learning Outcomes:**

- 1. Understand the concepts of algorithms for designing good program
- 2. Implement algorithms using Python

Unit	Old Syllabus	New Syllabus	Justificatio n	Lect ures
Unit I	Introduction to algorithm, Why to analysis algorithm, Running time analysis, How to Compare Algorithms, Rate of Growth, Commonly Used Rates of Growth, Types of Analysis, Asymptotic Notation, Big-O Notation, Omega- $\Omega$ Notation, Theta- $\Theta$ Notation, Asymptotic Analysis, Properties of Notations, Commonly used Logarithms and Summations, Performance characteristics of algorithms, Master Theorem for Divide and Conquer, Divide and Conquer Master Theorem: Problems & Solutions, Master Theorem for Subtract and Conquer Recurrences, Method of Guessing and Confirming	Introduction to algorithm, Why to analysis algorithm, Running time analysis, How to Compare Algorithms, Rate of Growth, Commonly Used Rates of Growth, Types of Analysis, Asymptotic Notation, Big-O Notation, Omega- $\Omega$ Notation, Theta- $\Theta$ Notation, Asymptotic Analysis, Properties of Notations, Commonly used Logarithms and Summations, Performance characteristics of algorithms, Master Theorem for Divide and Conquer, Divide and Conquer Master Theorem: Problems & Solutions, Master Theorem for Subtract and Conquer Recurrences, Method of Guessing and Confirming	n No Changes	15L
	and Confirming	and Confirming		

	<b>Tree algorithms:</b> What is a Tree?	<b>Tree algorithms:</b> What is a Tree?		
	Glossary, Binary Trees, Types of	Glossary, Binary Trees, Types of		
	Binary Trees, Properties of Binary	Binary Trees, Properties of		
	Trees, Binary Tree Traversals,	Binary Trees, Binary Tree		
Unit II	Generic Trees (N-ary Trees),	Traversals, Generic Trees (N-ary	Deep	15L
	Threaded Binary Tree Traversals,	Trees), Threaded Binary Tree	knowledg	
	Expression Trees, Binary Search	Traversals, Expression Trees,	e about	
	Trees (BSTs), Balanced Binary	Binary Search Trees (BSTs),	Tree	
	Search Trees, AVL (Adelson-	Balanced Binary Search Trees,		
	Velskii and Landis) Trees	AVL (Adelson-Velskii and		
	Graph Algorithms: Introduction,	Landis) Trees and AVL Tree		
	Glossary, Applications of Graphs,	Rotations (LL,RR,LR,RL)		
	Graph Representation, Graph	Graph Algorithms:		
	Traversals, Topological Sort,	Introduction, Glossary,		
	Shortest Path Algorithms,	Applications of Graphs, Graph		
	Minimal Spanning Tree	Representation, Graph		
	Selection Algorithms: What are	Traversals, Topological Sort,		
	Selection Algorithms? Selection by	Shortest Path Algorithms,		
	Sorting, Partition-based Selection	Minimal Spanning Tree		
	Algorithm, Linear Selection	Selection Algorithms: What are		
	Algorithm - Median of Medians	Selection Algorithms? Selection by		
	Algorithm, Finding the K Smallest	Sorting, Partition-based Selection		
	Elements in Sorted Order	Algorithm, Linear Selection		
		Algorithm - Median of Medians		
		Algorithm, Finding the K Smallest		
		Elements in Sorted Order		
	Algorithms Design Techniques:	Algorithms Design Techniques:		15L
	Introduction, Classification,	Introduction, Classification,	No	
	Classification by Implementation	Classification by Implementation	Changes	
<b>T</b> T •4	Method, Classification by Design	Method, Classification by Design		
	Method	Method		
	Greedy Algorithms:	Greedy Algorithms:		
	Elements of Gready Algorithms	Elements of Gready Algorithms		
	Advantages and Disadvantages of	Adventages and Disadventages of		
	Greedy Method Greedy	Greedy Method Greedy		
	Applications Understanding	Applications Understanding		
	Greedy Technique	Greedy Technique		
	Divide and Conquer	Divide and Conquer		
	Algorithms: Introduction What	Algorithms: Introduction What		
	is Divide and Conquer Strategy?	is Divide and Conquer Strategy?		
1		and conquer Strategy.		

Divide and Conquer	Divide and Conquer
Visualization, Understanding	Visualization, Understanding
Divide and Conquer, Advantages	Divide and Conquer, Advantages
of Divide and Conquer,	of Divide and Conquer,
Disadvantages of Divide and	Disadvantages of Divide and
Conquer, Master Theorem, Divide	Conquer, Master Theorem, Divide
and Conquer Applications	and Conquer Applications
Dynamic Programming:	Dynamic Programming:
Introduction, What is Dynamic	Introduction, What is Dynamic
Programming Strategy? Properties	Programming Strategy?
of Dynamic Programming	Properties of Dynamic
Strategy, Problems which can be	Programming Strategy, Problems
solved using Dynamic	which can be solved using
Programming, Dynamic	Dynamic Programming, Dynamic
Programming Approaches,	Programming Approaches,
Examples of Dynamic	Examples of Dynamic
Programming Algorithms,	Programming Algorithms,
Understanding Dynamic	Understanding Dynamic
Programming, Longest Common	Programming, Longest Common
Subsequence	Subsequence

- Data Structure and Algorithmic Thinking with Python, Narasimha Karumanchi, CareerMonk Publications, 2016
- 2. Introduction to Algorithm, Thomas H Cormen, PHI

## **Additional References**(s):

- 1. Data Structures and Algorithms in Python, Michael T. Goodrich, Roberto Tamassia, Michael
  - H. Goldwasser, 2016, Wiley
- 2. Fundamentals of Computer Algorithms, Sartaj Sahni and Sanguthevar Rajasekaran Ellis Horowitz, Universities Press

Course:
USCS402

# TOPICS (Credits : 02 Lectures/Week: 03)

#### Advanced Java

#### **Objectives**:

Explore advanced topics of Java programming for solving problems.

#### **Expected Learning Outcomes:**

- 1) Understand the concepts related to Java Technology
- 2) Explore and understand use of Java Server Programming

Unit	Old Syllabus	New Syllabus	Justification	No.of Lecture s
	<b>Swing:</b> Need for swing components,	Swing:Needforswingcomponents,Difference	Addition:	
Unit I	Difference between AWT and swing, Components hierarchy, Panes, Swing components: Jlabel, JTextField and JPasswordField, JTextAres, JButton, JCheckBox, JRadioButton,	between AWT and swing, Components hierarchy, Panes, Swing components: Jlabel, JTextField and JPasswordField, JTextAres, JButton, JCheckBox, JRadioButton, JComboBox and JList Introduction to Event Handling: Basic Events and	Get Detail Information about Event Handling in java	15L
	JComboBox and JList	<b>JDBC:</b> Introduction, JDBC		
	JDBC: Introduction, JDBC Architecture, Types of Drivers, Statement, ResultSet, Read Only ResultSet, Updatable ResultSet, Forward Only ResultSet, Scrollable ResultSet,	Architecture,TypesofDrivers,Statement,ResultSet,ReadOnlyResultSet,UpdatableResultSet,ForwardOnlyResultSet,ScrollableResultSet,ScrollableResultSet,ScrollablePreparedStatement,Kodes,		

	PreparedStatement,	SavePoint, Batch Updations,		
	Connection Modes,	CallableStatement, BLOB &		
	SavePoint, Batch	CLOB		
	Updations,			
	CallableStatement,			
	BLOB & CLOB			
	Servlets: Introduction,	Servlets: Introduction, Web	No Change	
	Web application	application Architecture, Http		
	Architecture, Http	Protocol & Http Methods,		
Unit II	Protocol & Http	Web Server & Web		15L
	Methods, Web Server	Container, Servlet Interface,		
	& Web Container,	GenericServlet, HttpServlet,		
	Servlet Interface,	Servlet Life Cycle,		
	GenericServlet,	ServletConfig,		
	HttpServlet, Servlet	ServletContext, Servlet		
	Life Cycle,	Communication, Session		
	ServletConfig,	Tracking Mechanisms		
	ServletContext,			
	Servlet	<b>JSP:</b> Introduction, JSP Lifecycle ISP Implicit Objects		
	Communication,	& Scopes, JSP		
	Session Tracking	Directives, JSP Scripting		
	Mechanisms	Elements, JSP Actions: Standard actions and		
	<b>JSP:</b> Introduction, JSP Lifecycle, JSP Implicit Objects & Scopes, JSP	customized actions,		
	Directives, JSP Scripting Elements, JSP Actions: Standard actions and customized actions,			

		Addition:	
	Java Beans:	Java Beans: Introduction,	
	Introduction, JavaBeans	JavaBeans Properties, Get a detailed idea	
Unit III	Properties, Examples	Examples. about Object Relation	151
	Struts 2: Basic MVC	JSON: Overview, Syntax,	131
	Architecture, Struts 2	Datatypes, Objects, Schema, Comparison with XML, JSON	
	framework features,	with Java.	
	Struts 2 MVC pattern,	Hibernate: Introduction	
	Request life cycle,	Writing the application,	
	Examples,	application development	
	Configuration Files,	approach, creating database	
	Actions, Interceptors,	and tables in MySQL, creating	
	Results & Result	a web application,	
	Types, Value	Adding the required library	
	Stack/OGNL	files, creating a java bean class,	
	JSON: Overview,	creating hibernate	
	Syntax, DataTypes,	configuration and mapping file,	
	Objects, Schema,	adding a mapping resource, creating JSPs.	
	Comparison with		
	XML, JSON with Java	Struts 2: Basic MVC	
		Architecture, Struts 2	
		tramework features, Struts 2	
		MVC pattern, Request life	
		cycle, Examples,	
		Configuration Files, Actions,	
		Interceptors, Results &	
		Result Types, Value	
		Stack/OGNL	

- Cay S. Horstmann, Gary Cornell, Core Java<sup>™</sup> 2: Volume II–Advanced Features Prentice Hall PTR,9<sup>th</sup> Edition
- 2) Herbert Schildt, Java2: The Complete Reference, Tata McGraw-Hill,5<sup>th</sup> Edition
- Joe Wigglesworth and Paula McMillan, Java Programming: Advanced Topics, Thomson Course Technology (SPD) ,3<sup>rd</sup> Edition

#### **Additional Reference(s):**

- 1) Advanced Java Programming, Uttam K. Roy, Oxford University Press
- 2) The Java Tutorials: http://docs.oracle.com/javase/tutorial/)
- 3) The Java Tutorials of Sun Microsystems Inc

Course:	
USCS40	

3

# TOPICS (Credits :02 Lectures/Week:03) Computer Networks

#### **Objectives**:

In this era of Information, its computation and its exchange techniques, Learners should be able to conceptualize and understand the framework and working of communication networks. And on completion, will be able to have a firm grip over this very important segment of the Internet.

#### **Expected Learning Outcomes :**

- 1. Learners will be able to understand the concepts of networking, which are important for them to be known as '*networking professionals*'.
- 2. Useful to proceed with industrial requirements and International vendor certifications.

Unit	Old Syllabus	New Syllabus	Justification No. of Lectures
Unit I	Introduction Network Models: Introduction to data communication, Components, Data Representation, Data Flow, Networks, Network Criteria, Physical Structures, Network types, Local Area Network, Wide Area Network, Switching, The Internet, Accessing the Internet, standards and administration Internet Standards. Network Models, Protocol layering, Scenarios, Principles of Protocol Layering, Logical Connections, TCP/IP Protocol Suite, Layered Architecture, Layers in	IntroductionNetworksModels:itodataIntroductiontodatacommunication,DataComponents,DataRepresentation,DataFlow,Networks,NetworkCriteria,PhysicalStructures,Network types, LocalAreaNetwork,Switching,TheInternet, Accessing theInternet, standards andadministrationInternet	No change 15L

Network Models,
Protocol layering,
Scenarios, Principles of
Protocol Layering,
Logical Connections, TCP/IP Protocol Suite, Layered Architecture, Layers in

the TCP/IP Protocol Suite	the TCP/IP Protocol Suite	
Encongulation and Decongulation	Encongulation	
Encapsulation and Decapsulation,	Encapsulation and	
Addressing, Multiplexing and	Decapsulation,	
Demultiplexing. Detailed introduction	Addressing, Multiplexing	
to Physical Layer, Detailed	and Demultiplexing.	
introduction to Data-Link Layer,	Detailed introduction to	
Detailed introduction to Network	Physical Layer, Detailed	
Layer, Detailed introduction to	introduction to Data-Link	
Transport Layer, Detailed	Layer, Detailed	
introduction to Application Layer.	introduction to Network	
Data and Signals, Analog and Digital	Layer, Detailed	
Data, Analog and Digital Signals, Sine	introduction to Transport	
Wave Phase, Wavelength, Time and	Layer, Detailed	
Frequency Domains, Composite	introduction to	
Signals, Bandwidth, Digital Signal,	Application Layer.	
Bit Rate, Bit Length, Transmission of	Data and Signals, Analog	
Digital Signals, Transmission	and Digital Data, Analog	
Impairments, Attenuation, Distortion,	and Digital Signals, Sine	
Noise, Data Rate	Wave Phase, Wavelength,	
Limits, Performance, Bandwidth,	Time and Frequency	
Throughput, Latency (Delay)	Domains, Composite	
	Signals, Bandwidth,	
	Digital Signal, Bit Rate,	
	Bit Length, Transmission	
	of Digital Signals,	
	Transmission	

		Impairments, Attenuation,	
		Distortion, Noise, Data	
		Rate	
		Limits, Performance, Bandwidth, Throughput, Latency (Delay)	
	Introduction to Physical Layer and	Introduction to Physical No change	
	Data-Link Layer:	Layer and Data-Link	
	Digital Transmission digital-to-		
	digital conversion, Line Coding, Line		
	Coding Schemes, analog-to-digital	digital-to-digital	
	conversion, Pulse Code Modulation	conversion, Line Coding,	
	(PCM), Transmission Modes, Parallel	Line Coding Schemes,	
	Transmission, Serial Transmission.	analog-to-digital	
Unit II	Analog Transmission, digital-to-	conversion, Pulse Code	15L
	analog Conversion, Aspects of	Modulation (PCM),	
	Digital-to-Analog Conversion,	Transmission Modes,	
	Amplitude Shift Keying, Frequency	Parallel Transmission,	
	Shift Keying, Phase Shift Keying,	Serial Transmission.	
	analog-to-analog Conversion,	Analog Transmission,	
	Amplitude Modulation (AM),	digital-to-analog	
	Frequency Modulation (FM), Phase	Conversion, Aspects of	
	Modulation (PM), Multiplexing,	Digital-to-Analog	
	Frequency-Division Multiplexing,	Conversion, Amplitude	
	Wavelength-Division Multiplexing,	Shift Keying, Frequency	
	Time-Division Multiplexing.	Shift Keying, Phase Shift	
	Transmission Media, Guided Media,	Keying, analog-to-analog	
	Twisted-Pair Cable, Coaxial Cable,	Conversion, Amplitude	
	Fiber-Optic Cable. Switching, Three	Modulation (AM),	
	Methods of Switching , Circuit	Frequency Modulation	

	Switched Networks, Packet	(FM), Phase Modulation	
	Switching,	(PM), Multiplexing,	
	Introduction to Data-Link Layer,	Frequency-Division	
	Nodes and Links, Services, Two Sub-	Multiplexing,	
	layers, Three Types of addresses,	Wavelength-Division	
	Address Resolution Protocol (ARP).	Multiplexing, Time-	
	Error Detection and Correction,	Division Multiplexing.	
	introduction, Types of Errors,	Transmission Media,	
	Redundancy, Detection versus	Guided Media, Twisted-	
	Correction,	Pair Cable, Coaxial Cable,	
		Fiber-Optic Cable.	
		Switching, Three Methods	
		of Switching , Circuit	
		Switched Networks,	
		Packet Switching,	
		Introduction to Data-Link	
		Layer, Nodes and Links,	
		Services, Two Sub-layers,	
		Three Types of addresses,	
		Address Resolution	
		Protocol (ARP). Error	
		Detection and Correction,	
		introduction, Types of	
		Errors, Redundancy,	
		Detection versus	
	Network layer, Transport Layer	Network layer, TransportNo change	
	Media Access Control (MAC),	Layer	
Unit III	random access, CSMA, CSMA/CD,	Media Access Control	15L
	CSMA/CA, controlled access,	(MAC), random access,	
	Reservation, Polling, Token Passing,	CSMA, CSMA/CD,	
	channelization, FDMA, TDMA,	CSMA/CA, controlled	
	CDMA.	access, Reservation,	
	Connecting Devices and Virtual LANs, connecting devices, Hubs, Link-Layer	Polling, Token Passing,	

Switches, Routers,	Switches, Routers,
Introduction to Network Layer,	Introduction to
network layer services, Packetizing,	Network Layer,
Routing and Forwarding, Other	network layer
Services, IPv4 addresses, Address	services,
Space, Classful Addressing.	Packetizing, Routing
Unicast Routing, General Idea, Least-	and Forwarding,
Cost Routing, Routing Algorithms,	Other Services, IPv4
Distance-Vector Routing, Link-State	addresses, Address
Routing, Path-Vector Routing,	Space, Classful
Introduction to Transport Layer,	Addressing.
Transport-Layer Services,	Unicast Routing,
Connectionless and Connection-	General Idea, Least-
Oriented Protocols.	Cost Routing,
Transport-Layer Protocols, Service,	Routing Algorithms,
Port Numbers, User Datagram	Distance-Vector
Protocol, User Datagram, UDP	Routing, Link-State
Services, UDP Applications,	Routing, Path-
Transmission Control	Vector Routing,
Protocol, TCP Services, TCP Features	, Introduction to
Segment.	Transport Layer,
	Transport-Layer
	Services,
	Connectionless and
	Connection-Oriented
	Protocols.
	Transport-Layer
	Protocols, Service,
	Port Numbers, User
	Datagram Protocol,
	User Datagram, UDP
	Services, UDP
	Applications,

	Transmission
	Control
	Protocol, TCP Services, TCP Features, Segment.
Textbook(s):	

- 1) Data Communications and Networking, Behrouz A. Forouzan, Fifth Edition, TMH, 2013.
- 2) Computer Network, Andrew S. Tanenbaum, David J. Wetherall, Fifth Edition, Pearson Education, 2011.

#### Additional Reference(s):

- 1) Computer Network, Bhushan Trivedi, Oxford University Press
- 2) Data and Computer Communication, William Stallings, PHI

# **MOOC Courses:**

1. https://onlinecourses.swayam2.ac.in/cec21\_cs19/preview

Course:	TOPICS (Credits : 02	
USCS404	Lectures/Week: 03)	
	Software Engineering	

#### **Objectives:**

The objective of this paper is to provide an idea of using various process models in the software industry according to given circumstances.

To gain the knowledge of how Analysis, Design, Implementation, Testing and Maintenance processes are conducted in a software project.

#### **Expected Learning Outcomes**:

On completion of the course, student will be able to

- various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance.
- know various processes used in all the phases of the product.
- apply the knowledge, techniques, and skills in the development of a software product.

Unit	Old Syllabus		New Syllabus	Justification	No. of Lectures
	Introduction:	The Nature of	Introduction: Definition	Students will	
	Software, Softw	vare	of Software, The Nature of	understand basic term and process	
	Engineering, T	he Software	Software, Software	of Agile	
Unit I	Process, Genera	ic Process	Engineering, The Software	software development and	
	Model, The Wa	aterfall Model,	Process, Generic Process	it will help the	15L
	Incremental Pro	ocess Models,	Model, The Waterfall	students in software	
	Evolutionary P	rocess Models,	Model, Incremental	development	
	Concurrent Mo	dels,	Process Models,	phases	
	Component-Ba	sed	Evolutionary Process		
	Development,	The Unified	Models, Concurrent		
	Process Phases	, Agile	Models, Component-		
	Development-	Agility, Agile	Based Development, The		
	Process, Extrem	ne Programming	Unified Process Phases,		
	Requirement A	Analysis and	Introduction to Agile		
	System	Modeling:	software		
		Requirements	development:.Requireme		
	Engineering, E	liciting	nt Analysis and System		
	Requirements,	SRS	Modeling:		
	Validation, Co	mponents of	Requirem		

	ents Engineering, Eliciting Requirements, SRS Validation, Components of
SRS, Characteristics of SRS, Object-oriented design using the UML - Class diagram, Object diagram, Use case diagram, Sequence diagram, Collaboration diagram, State chart diagram, Activity diagram, Component diagram, Deployment diagram	SRS, Characteristics of SRS Object-oriented design using the UML - Class diagram, Object diagram, Use case diagram, Sequence diagram, Collaboration diagram, State chart diagram, Activity diagram,Component diagram, Deployment diagram

	System Design:	System Design:
	System/Software Design,	System/Software Design,
	Architectural Design, Low-	Architectural Design, Low-
	Level Design Coupling and	Level Design Coupling and
	Cohesion, Functional-Oriented	Cohesion, Functional-
	Versus The Object-Oriented	Oriented Versus The
	Approach, Design	Object-Oriented Approach,
Unit II	Specifications, Verification for	Design Specifications,
	Design, Monitoring and	Verification for Design, 15L
	Control for Design	Monitoring and Control for
	Software Measurement and	Design
	Metrics: Product Metrics –	Software Measurement
	Measures, Metrics, and	and Metrics: Product
	Indicators, Function-Based	Metrics – Measures,
	Metrics, Metrics for Object-	Metrics, and Indicators,
	Oriented Design, Operation-	Function-Based Metrics,
	Oriented Metrics, User	Metrics for Object-
	Interface Design Metrics,	Oriented Design,
	Metrics for Source Code,	Operation-Oriented
	Halstead Metrics Applied to	Metrics, User Interface
	Testing, Metrics for	Design Metrics, Metrics for
	Maintenance, Cyclomatic	Source Code, Halstead
	Complexity, Software	Metrics Applied to Testing,
	Measurement - Size-Oriented,	Metrics for Maintenance,
	Function-Oriented Metrics,	Cyclomatic Complexity,
	Metrics for Software Quality	Software Measurement -
	Software Project	Size-Oriented, Function-
	Management: Estimation in	Oriented Metrics, Metrics
	Software Coore And	for Software Quality
	-soltwate scope And Feasibility Passures	Software Project
	Feasibility, Resource	Management: Estimation
	Estimation Models	Softwara Soona And
	COCOMO II Estimation for	Fassibility Descuree
	COCOMO II, Esumation for	reasionity, Resource

	Agile Development, The	Estimation, Empirical	
	Make/Buy Decision, Project	Estimation Models –	
	Scheduling - Basic Principles,	COCOMO II, Estimation	
	Relationship Between People	for Agile Development,	
	and Effort, Effort Distribution,	The Make/Buy Decision,	
	Time-Line	Project Scheduling -	
	Charts	Basic Principles,	
		Relationship Between	
		People and Effort, Effort	
		Distribution, Time-Line	
		Charts. Case Study: - Library Management. Hotel	
		Management.	
		Hospital Management.	
		Railway	
		Ticket Booking.	
	Risk Management - Software	Risk Management -	
	<b>Risk Management</b> - Software Risks, Risk Identification, Risk	<b>Risk Management</b> - Software Risks, Risk	
	Risk Management - SoftwareRisks, Risk Identification, RiskProjectionandRisk	RiskManagement-SoftwareRisks,RiskIdentification,Risk	
	Risk Management - SoftwareRisks, Risk Identification, RiskProjectionandRiskRefinement, RMMM Plan	RiskManagement-SoftwareRisks,RiskIdentification,RiskProjectionandRisk	
	Risk Management - SoftwareRisks, Risk Identification, RiskProjectionandRiskRefinement, RMMM PlanSoftware Quality Assurance:	RiskManagement-SoftwareRisks,RiskIdentification,RiskProjectionandRiskRefinement, RMMM Plan	
Unit III	Risk Management - SoftwareRisks, Risk Identification, RiskProjectionandRiskRefinement, RMMM PlanSoftwareQualityAssurance:Elements of SQA, SQA Tasks,	Risk       Management       -         Software       Risks,       Risk         Identification       Risk       Risk         Projection       and       Risk         Refinement, RMMUT       Flant         Software       Quart       Software	151.
Unit III	Risk Management - SoftwareRisks, Risk Identification, RiskProjectionandRiskRefinement, RMMM PlanSoftwareQualityAssurance:Elements of SQA, SQA Tasks,Goals, andMetrics, Formal	RiskManagement-SoftwareRisks,RiskIdentificationRiskProjectionandRiskRefinement, RMMMFlamSoftwareQualityAssurance:Element, of	15L
Unit III	Risk Management - SoftwareRisks, Risk Identification, RiskProjection and RiskRefinement, RMMM PlanSoftware Quality Assurance:Elements of SQA, SQA Tasks,Goals, and Metrics, FormalApproaches to SQA, Six Sigma,	Risk       Management       -         Software       Risks,       Risk         Identification       Risk       Risk         Projection       and       Risk         Refinement, RMMM       Plan         Software       Quality         Assurance:       Elements, of         SQA, SQA       Tasks, coals	15L
Unit III	Risk Management - SoftwareRisks, Risk Identification, RiskProjection and RiskProjection RiskRefinement, RMMM PlanSoftware Quality Assurance:Elements of SQA, SQA Tasks,Goals, and Metrics, FormalApproaches to SQA, Six Sigma,Software Reliability, The ISO	Risk       Management       -         Software       Risks,       Risk         Identification       Risk       Risk         Projection       and       Risk         Refinement, RMMUT       Plant         Software       Quality         Assurance:       Elements         SQA, SQA       Tasks, Goald         and       Metrics, Formal	15L
Unit III	Risk Management - SoftwareRisks, Risk Identification, RiskProjection and RiskProjection RiskRefinement, RMMM PlanSoftware Quality Assurance:Elements of SQA, SQA Tasks,Goals, and Metrics, FormalApproaches to SQA, Six Sigma,Software Reliability, The ISO9000 Quality Standards,	Risk       Management       -         Software       Risks,       Risk         Identification       Risk       Risk         Projection       and       Risk         Refinement, RMMU       Plan         Software       Elements       of         Software       Elements       of         Software       Elements       of         Assurance:       Elements       of         SQA, SQA       Tasks, Goals       of         and       Metrics, Formal       Approaches	15L
Unit III	Risk Management - SoftwareRisks, Risk Identification, RiskProjectionandRiskRefinement, RMMM PlanSoftware Quality Assurance:Elements of SQA, SQA Tasks,Goals, and Metrics, FormalApproaches to SQA, Six Sigma,Software Reliability, The ISO9000QualityStandards,CapabilityMaturityModel	Risk       Management       -         Software       Risks,       Risk         Identification       Risk       Risk         Projection       and       Risk         Refinement, RMMU       Plan         Software       Elements       of         Software       Elements       of         Software       Elements       of         Assurance:       Elements       of         SQA, SQA       Tasks, Goals, so       of         Approaches       to SQA, Six       formation         Sigma,       Software       Software	15L
Unit III	Risk Management - SoftwareRisks, Risk Identification, RiskProjectionandRiskProjectionandRiskRefinement, RMMM PlanSoftware Quality Assurance:Elements of SQA, SQA Tasks,Goals, and Metrics, FormalApproaches to SQA, Six Sigma,Software Reliability, The ISO9000QualityStandards,CapabilityMaturityModelSoftwareTesting:	Risk       Management       -         Software       Risks,       Risk         Identification       Risk       Risk         Projection       and       Risk         Refinement, RMMM       Plan         Software       Quality         Assurance:       Elements         SQA, SQA       Tasks, Goals,         and       Metrics, Formal         Approaches       to SQA, Six         Sigma,       Software         Reliability, The ISO 9000	15L
Unit III	Risk Management - SoftwareRisks, Risk Identification, RiskProjectionandRiskProjectionandRiskRefinement, RMMM PlanSoftware Quality Assurance:Elements of SQA, SQA Tasks,Goals, and Metrics, FormalApproaches to SQA, Six Sigma,Software Reliability, The ISO9000QualityStandards,CapabilityMaturityModelSoftwareTestingVerificationandValidation,	Risk       Management       -         Software       Risks,       Risk         Identification       Risk       Risk         Projection       and       Risk         Refinement, RMMM       Plan         Software       Cuality         Software       Elements         Software       Elements         Software       Elements         Software       Elements         Assurance:       Elements         SQA, SQA       Tasks, Goals,         and       Metrics, Formal         Approaches       to SQA, Six         Sigma,       Software         Reliability, The ISO 9000         Quality       Standards,	15L
Unit III	Risk Management - SoftwareRisks, Risk Identification, RiskProjectionandRiskProjectionandRiskRefinement, RMMM PlanSoftware Quality Assurance:Elements of SQA, SQA Tasks,Goals, and Metrics, FormalApproaches to SQA, Six Sigma,Software Reliability, The ISO9000QualityStandards,CapabilityMaturityModelSoftwareTesting:VerificationandValidation,Introduction to Testing, Testing	Risk       Management       -         Software       Risks,       Risk         Identification       Risk       Risk         Projection       and       Risk         Refinement, RMMU       Plan         Software       Quality       Software         Software       Elements       Software         Software       Elements       Software         Assurance:       Elements       Software         SQA, SQA       Tasks, Goals, SQA       Software         Approaches       to SQA, Sigma, Sigma, Software       Software         Reliability, The ISO 9000       Quality       Stardards, Software         Quality       Stardards, Software       Software	15L
Unit III	Risk Management - SoftwareRisks, Risk Identification, RiskProjectionandRiskProjectionandRiskRefinement, RMMM PlanSoftware Quality Assurance:Elements of SQA, SQA Tasks,Goals, and Metrics, FormalApproaches to SQA, Six Sigma,Software Reliability, The ISO9000QualityStandards,CapabilityMaturityModelSoftwareTestingVerificationandValidation,Introduction to Testing, TestingPrinciples, Testing Objectives,	Risk       Management       -         Software       Risks,       Risk         Identification       and       Risk         Projection       and       Risk         Refinement, RMMU       Plan         Software       Elements       off         Suga, SQA, SQA       Tasks, Goals, SQA       off         Approaches       to SQA, SQA       sigma         Sigma,       Software       off         Quality       Standards, SQA         Quality       Standards, SQA         Software       Testing	15L

White-Box Testing/Structural	Validation, Introduction to	
Testing, Functional/Black-Box	Testing, Testing Principles,	
Testing, Test Plan, Test-Case	Testing Objectives, Test	
Design	Oracles, Levels of Testing,	
	White-Box	
	Testing/Structural Testing,	
	Functional/Black-Box	
	Testing, Test Plan, Test-	
	Case Design	

1) Software Engineering, A Practitioner's Approach, Roger S, Pressman.(2014)

#### **Additional Reference(s):**

Software Engineering, Ian Sommerville, Pearson Education

Software Engineering: Principles and Practices", Deepak Jain, OXFORD

University Press,

Fundamentals of Software Engineering, Fourth Edition, Rajib Mall, PHI

Software Engineering: Principles and Practices, Hans Van Vliet, John Wiley &

Sons

#### **MOOC Courses:**

1.https://onlinecourses.nptel.ac.in/noc21\_cs65/preview

Cour USCS40	Course:TOPICS (Credits: 02SCS405Lectures/Week: 03)				
000010	Linear Algebra using Python				
Object	tives:				
To offe	er the learner the relevant linear algebi	ra concepts through computer sc	eience applicatio	ns.	
Expect	ted Learning Outcomes:				
1.	Appreciate the relevance of linear alg	webra in the field of computer sc	ience.		
		· · · · · · · · · · · · · · · · · · ·			
2.	Understand the concepts through prog	gram implementation Instill a co	omputational thi	nking while	
	learning linear algebra.				
Unit	Old Syllabus	New Syllabus	Justification	No. of	
				Lectures	
	Field: Introduction to complex	Field: Introduction to complex	Addition:		
	numbers, numbers in Python,	numbers, numbers in Python,	Inner Product is	5	
	Abstracting over fields, Playing	Abstracting over fields,	shifted from		
	with GF(2),	Playing with GF(2),	Unit III to Unit	Ι	
			for continuation	n	
	Vector Space: Vectors are	Introduction to Vectors	with Vector		
I Init I	functions, Vector addition, Scalar-	Vector Space: Vectors are	Spaces.	151	
	vector multiplication, Combining	functions, Vector addition,	_	151	
	vector addition and scalar	Scalar-vector multiplication,	Deletion :		
	multiplication, Dictionary-based	Combining vector addition and	Solving of		
	representations of vectors, Dot-	scalar multiplication,	triangular		
	product,	Dictionary-based	system linear		
	Solving a triangular system of	representations of vectors,	equations is		
	linear equations. Linear	Dot-product. Cross Product	removed from		
	combination, Span, The geometry		Unit I and		
	of sets of vectors, Vector spaces,	Inner Product: The inner	Shifted to Unit		

	Linear systems, homogeneous and	product for vectors over the	II	
	otherwise	reals, Orthogonality,		
		Orthogonalization: Projection		
		orthogonal to multiple vectors,		
		projecting orthogonal to		
		mutually orthogonal vectors,		
		Building an orthogonal set of		
		generators, Orthogonal		
		complement		
		L		
		Solving a triangular system of		
		linear equations. Linear		
		combination, Linearly		
		dependent and independent		
		vectors, Linear Span		
	Matrix: Matrices as vectors,	Matrix: Matrices as vectors,		
	Transpose, Matrix-vector and	Transpose, Matrix-vector and		
	vector-matrix multiplication in	vector-matrix multiplication in		
	terms of linear combinations,	terms of linear combinations,		151
Unit II	Matrix-vector multiplication in	Matrix-vector multiplication in		15L
	terms of dot-products, Null space,	terms of dot-products, Null		
	Computing sparse matrix-vector	space, Computing sparse		
	product,	matrix-vector product,		
	Linear functions, Matrix-matrix	Linear functions, Matrix-		
	multiplication, Inner product and	matrix multiplication, Inner		
	outer product,	product and outer product,		
	From function inverse to matrix	From function inverse to		15L
	inverse	matrix inverse		
	Basis: Coordinate systems, Two	Solving a triangular system of		
	greedy algorithms for finding a set	linear equations. Linear		
	of generators, Minimum Spanning	combination, Linearly		
	Forest and GF(2), Linear	dependent and independent		
	dependence, Basis, Unique	vectors, Linear Span		
	representation, Change of basis,			
	first look, Computational problems			
	involving finding a basis			
	Dimension: Dimension and rank,			
	Direct sum, Dimension and linear			
	functions,			
Linit III	I ne annihilator	Caussian alimination.	Addition	
	form Gaussian elimination over	Gaussian emination: Echelon form Gaussian	The concepts	
	GE(2) Solving a matrix vector	elimination over GE(2)	related to Pank	
	$G_1(2)$ , $G_1(2)$ , $G_2(2)$ , $G_2(2)$	Solving a matrix-vector	are explained in	
	elimination Finding a basis for the	equation using Gaussian	detail	
	null space. Factoring integers	elimination		
	<b>Inner Product</b> . The inner product	Rank of the matrix Linear		
	for vectors over the reals	systems: Homogeneous and		
	Orthogonality. Orthogonalization	Non-homogeneous systems		
	Projection orthogonal to multiple	Consistency of Linear		

vectors, Projecting orthogonal to	equations. Solution of	
mutually orthogonal vectors,	Homogeneous and Non-	
Building an orthogonal set of	homogeneous equations.	
generators, Orthogonal		
complement,	Eigenvalues and Eigenvectors.	
Eigenvector: Modeling discrete	Diagonalization of the	
dynamic processes,	Fibonacci matrix, Coordinate	
Diagonalization of the Fibonacci	representation in terms of	
matrix, Eigenvalues and	eigenvectors,	
eigenvectors, Coordinate	Finding a basis for the null	
representation in terms of	space	
eigenvectors, The Internet worm,		
Existence of eigenvalues, Markov	Basis: Coordinate systems,	
chains, Modeling a web surfer:	Two greedy algorithms for	
PageRank.	finding a set of generators,	
	Minimum Spanning Forest and	
	GF(2), Unique representation,	
	Change of basis, first look,	
	Computational problems	
	involving finding a basis.	
	Modeling discrete dynamic	
	processes, The Internet worm,	
	Existence of eigenvalues,	
	Markov chains, Modeling a	
	web surfer: PageRank.	

 Coding the Matrix Linear Algebra through Applications to Computer Science Edition 1, PHILIP N. KLEIN, Newtonian Press (2013)

#### **Additional References:**

- Linear Algebra and Probability for Computer Science Applications, Ernest Davis, A K Peters/CRC Press (2012).
- 2) Linear Algebra and Its Applications, Gilbert Strang, Cengage Learning, 4<sup>th</sup> Edition (2007).
- 3) Linear Algebra and Its Applications, David C Lay, Pearson Education India; 3<sup>rd</sup> Edition (2002)

Course:	TOPICS (0	Credits : 02 Lectures/Week: 03)		
USCS40	6	.Net Technologies		
Objectiv	es:			
To explo	ore .NET technologies for designin	g and developing dynamic, interactiv	ve and respons	ive web
appli	cations.			
Expected	l Learning Outcomes:			
1. Un	derstand the .NET framework			
2. De	velop a proficiency in the C# prog	ramming language		
3. Pro	ficiently develop ASP.NET web a	pplications using C#		
4. Use	e ADO.NET for data persistence ir	a web application		
Unit	Old syllabus	New Syllabus	Justification	No. of
Init I			The density of d	15
Umt I	Ine .NET Framework:.NET	Ine .NET Framework:.NET	ing of basic	15
	Languages, Common	Languages, Common Language	HTML	
	Changuage Runume, INET	Runtime, INET Class Library	controls	
	Class Library	C# Language Basics:		
	C# Language Basics:	Turnes Variable Operations		
	Doto Types Variable	Types, variable Operations,		
	Operations Object Recod	Conditional		
	Manipulation Conditional	Logic Loops Methods		
	Logic Loops Methods	Classes Value Types and		
	Classes Value Types and	Reference Types Namespaces		
	Reference Types Namespaces	and Assemblies Inheritance		
	and Assemblies Inheritance	Static Members Casting		
	Static Members. Casting	Objects. Partial Classes		
	Objects, Partial Classes	<b>ASP.NET:</b> Creating Websites.		
	<b>ASP.NET:</b> Creating	Anatomy of a Web Form -		
	Websites, Anatomy of a Web	Page Directive, Doctype,		
	Form - Page Directive,	Writing Code - Code-Behind		
	Doctype, Writing Code -	Class, Adding Event Handlers,		
	Code-Behind Class, Adding	Anatomy of an ASP.NET		
	Event Handlers, Anatomy of	Application - ASP.NET File		

	an ASP.NET Application -	Types, ASP.NET Web Folders,	
	ASP.NET File Types,	HTML Server Controls -	
	ASP.NET Web Folders,	View State, HTML Control	
	HTML Server Controls -	Classes, HTML Control	
	View State, HTML Control	Events,	
	Classes, HTML Control	HtmlControHtmlInputControl	
	Events, HtmlControl	Clasl Base Class,	
	Base	HtmlContainerControl	
	Class,	Class, s, HTML Server	
	HtmlContainerCo	Controls, Page Class,	
	ntrol Class,	global.asax File, web.config	
	HtmlInputControl Class, Page	File	
	web.config File		
Unit II	Web Controls: Web Control	Web Controls: Web Control	Understand 15
	Classes, WebControl Base	Classes, WebControl Base	ing the basic
	Class, List Controls, Table	Class, List Controls, Table	requiremen
	Controls, Web Control Events	Controls, Web Control Events	t of login control
	and AutoPostBack, Page Life	and AutoPostBack, Page Life	
	Cycle	Cycle	
	State Management:	State Management:	
	ViewState, Cross-Page	ViewState, Cross-Page Posting,	
	Posting, Query String,	Query String, Cookies, Session	
	Cookies, Session State,	State, Configuring Session	
	Configuring Session State,	State, Application State	
	Application State	Validation: Validation	
	Validation: Validation	Controls, Server-Side	
	Controls, Server-Side	Validation, Client-Side	
	Validation, Client-Side	Validation, HTML5 Validation,	
	Validation, HTML5	Manual Validation, Validation	
	Validation, Manual	with Regular Expressions	
	Validation, Validation with	Login Control	
	Regular Expressions	<b>Rich Controls:</b> Calendar	
	Rich Controls: Calendar	Control, AdRotator Control,	

	Control, AdRotator Control, MultiView Control <b>Themes and Master Pages:</b> How Themes Work, Applying a Simple Theme, Handling Theme Conflicts, Simple Master Page and Content Page, Connecting Master pages and Content	MultiView Control <b>Themes and Master Pages:</b> How Themes Work, Applying a Simple Theme, Handling Theme Conflicts, Simple Master Page and Content Page, Connecting Master pages and Content Pages, Master Page with		
	<ul> <li>Multiple Content Regions,</li> <li>Master Pages and Relative</li> <li>Paths</li> <li>Website Navigation: Site</li> <li>Maps, URL Mapping and</li> <li>Routing, SiteMapPath</li> <li>Control, TreeView Control,</li> <li>Menu Control</li> </ul>	Multiple Content Regions, Master Pages and Relative Paths <b>Website Navigation:</b> Site Maps, URL Mapping and Routing, SiteMapPath Control, TreeView Control, Menu Control		
Unit III	<ul> <li>ADO.NET: Data Provider</li> <li>Model, Direct Data Access -</li> <li>Creating a Connection, Select</li> <li>Command, DataReader,</li> <li>Disconnected Data Access</li> <li>Data Binding: Introduction,</li> <li>Single-Value Data Binding,</li> <li>Repeated-Value Data</li> <li>Binding, Data Source</li> <li>Controls – SqlDataSource</li> <li>Data Controls: GridView, DetailsView, FormView</li> <li>Working with XML: XML Classes – XMLTextWriter, XMLTextReader</li> <li>Caching: When to Use Caching, Output Caching, Data</li> </ul>	<ul> <li>ADO.NET: Data Provider</li> <li>Model, Direct Data Access -</li> <li>Creating a Connection, Select</li> <li>Command, DataReader,</li> <li>Disconnected Data Access</li> <li>Data Binding: Introduction,</li> <li>Single-Value Data Binding,</li> <li>Repeated-Value Data Binding,</li> <li>Data Source Controls –</li> <li>SqlDataSource</li> <li>Data Controls: GridView, DetailsView, FormView</li> <li>Working with XML: XML Classes – XMLTextWriter, XMLTextReader</li> <li>Caching: When to Use Caching, Output Caching, Data Caching</li> </ul>	Understand ing of MVC framework	15

Caching LINQ: Understanding LINQ, LINQ Basics, ASP.NET AJAX: ScriptManager, Partial Refreshes, Progress Notification, Timed Refreshes	LINQ: Understanding LINQ, LINQ Basics, ASP.NET AJAX: ScriptManager, Partial Refreshes, Progress Notification, Timed Refreshes Introduction to MVC framework: MVC architecture and its features, MVC components, MVC folders	

1) Beginning ASP.NET 4.5 in C#, Matthew MacDonald, Apress(2012)

#### Additional Reference(s):

- 1) The Complete Reference ASP .NET, MacDonald, Tata McGraw Hill
- 2) Beginning ASP.NET 4 in C# and VB Imar Spanajaars, WROX

Course:	ТОР	ICS (Credits : 02 Lectures/We	ek: 03)		
USCS407	A	Android Developer Fundament	tals		
Objectiv	es:				
To prov	ide comprehensive insigh	t into developing applications r	unning on smart mobile	devices	
and dem	onstrate programming s	kills for managing tasks on m	obile. To provide a sy	stematic	
approach	approach for studying definition, methods and its applications for Mobile-App development.				
Expected	d Learning Outcomes:				
1) Understand the requirements of the Mobile programming environment.					
2) Lea	2) Learn about basic methods, tools and techniques for developing Apps				
3) Exp	3) Explore and practice App development on Android Platform				
4) De	4) Develop working prototypes of working systems for various uses in daily lives.				
<b>.</b>		N G N I	<b>T</b> (100 )		

Unit	Old Syllabus	New Syllabus	Justification	No.Of
				Lectures

	What is Android?	What is Android?	Addition:Information	
	Obtaining the	History of Android,	about History and	
	required tools,	Android – Architecture,	Android	
Unit I	creating first android	Obtaining the required tools,		15L
	app, understanding	creating first android app,		
	the components of	Android Debug Bridge		
	screen, adapting	(ADB),		
	display orientation,	understanding the		
	action bar, Activities	components of screen,		
	and Intents, Activity	adapting display orientation,		
	Lifecycle and Saving	action bar, Activities and		
	State, Basic Views:	Intents, Activity Lifecycle		
	TextView, Button,	and Saving State, Basic		
	ImageButton,	Views: TextView, Button,		
	EditText, CheckBox,	ImageButton, EditText,		
	ToggleButton,	CheckBox, ToggleButton,		
	RadioButton, and	RadioButton, and		
	RadioGroup Views,	RadioGroup Views,		
	ProgressBar View,	ProgressBar View,		
	AutoCompleteTextVi	AutoCompleteTextView,		
	ew, TimePicker	TimePicker View,		
	View, DatePicker	DatePicker View, ListView		
	View, ListView	View,		
	View,	Spinner View		
	Spinner View			
	User Input Controls,	User Input Controls, Menus,	Addition:Get	
Unit II	Menus, Screen	Screen Navigation,	detailed about	15L
	Navigation,	RecyclerView, Drawables,	JSON and XML	
	RecyclerView,	Themes and Styles, Material	parsing for data	
	Drawables, Themes	design, providing resources	processing	
	and Styles, Material	for adaptive layouts, JSON	P	
	design, providing	and XML Parser, AsyncTask	To Study Third	
	resources for adaptive	and AsyncTaskLoader,	party library to	
	layouts, AsyncTask	Volley, Retrofit,		

	and	Connecting to the Internet,	call API in	
	AsyncTaskLoader,	Broadcast	Android	
	Connecting to the	receivers, Services,		
	Internet, Broadcast	Notifications, Alarm		
	receivers, Services,	managers, Transferring data		
	managers, Transferring data efficiently	efficiently		
	Data - saving,	Data - saving, retrieving, and	No Change	
	retrieving, and	loading: Overview to storing		
Unit III	loading: Overview to	data, Shared preferences,		15L
	storing data, Shared	SQLite primer, store data		
	preferences, SQLite	using SQLite database,		
	primer, store data	ContentProviders, loaders to		
	using SQLite database,	load and display data,		
	ContentProviders,	Permissions, performance and		
	loaders to load and	security, Firebase and		
	display data,	AdMob, Publish your app		
	Permissions,			
	performance and			
	security, Firebase and			
	AdMob, Publish your			
	app			

1) "Beginning Android 4 Application Development", Wei-Meng Lee, March 2012, WROX.

#### **Additional Reference(s):**

- 1) https://developers.google.com/training/courses/android-fundamentals
- https://www.gitbook.com/book/google-developer-training/android-developer-fundamentals-c ourse-practicals/details

# Suggested List of Practical – SEMESTER IV

Course:	(Credits : 03 Lectures/Week:09)		
USCSP401	USCS401+ USCS402+USCS403		
	USCS401: Fundamentals of Algorithms		
1. Write	e a Python program to perform matrix multiplication. Discuss the complexity of		
algor	ithms used.		
2. Write	e a Python program to sort n names using Quick sort algorithm. Discuss the complexity		
of alg	gorithms used.		
3. Write	e a Python program to sort n numbers using Merge sort algorithm. Discuss the		
comp	plexity of algorithms used.		
4. Write	e a Python program for inserting an element into a binary tree.		
5. Write	e a Python program for deleting an element (assuming data is given) from a binary tree.		
6. Write	6. Write Python program for checking whether a given graph G has simple path from source s to		
desti	nation d. Assume the graph G is represented using adjacent matrix.		
7. Write	e a Python program for finding the smallest and largest elements in an array A of size n		
using	Selection algorithm. Discuss Time complexity.		
8. Write	e a Python program for finding the second largest element in an array A of size n using		
Tour	nament Method. Discuss Time complexity.		
9. Write	e a Python program for implementing Huffman Coding Algorithm. Discuss the		
comp	plexity of algorithms.		
10. Write	e a Python program for implementing Strassen's Matrix multiplication using Divide and		
Conc	uer method. Discuss the complexity of algorithms.		
	USCS402: Advanced JAVA		
1. Deve	lop the presentation layer of Library Management software applications with suitable		
menu	IS.		
2. Desig	gn suitable database for Library Management System.		
3. Deve	lop business logic layer for Library Management System.		
4. Deve datab	lop a Java application to store images in a database as well as retrieve images from the ase.		

- 5. Write a Java application to demonstrate servlet life cycle.
- 6. Design database for student administration. Develop servlet(s) to perform CRUD operations.
- 7. Create Employees table in EMP database. Perform select, insert, update, and delete operations on the Employee table using JSP.
- 8. Write a Student class with three properties. The useBean action declares a JavaBean for use in a JSP. Write a Java application to access JavaBeans Properties.
- 9. Design application using Struts2. Application must accept user name and greet user when command button is pressed.
- 10. Write a Java application to demonstrate hibernate .

#### **USCS403:** Computer Networks

- 1. Understanding the working of NIC cards, Ethernet/Fast Ethernet/Gigabit Ethernet.
- 2. Crimping of Twisted-Pair Cable with RJ45connector for Straight-Through, Cross-Over, Roll-Over.
- 3. To understand their respective role in networks/internet.
- 4. Problem solving with IPv4, which will include the concept of Classful addressing. (supportive Hint: use Cisco Binary Game)
- 5. Using linux-terminal or Windows-cmd, execute the following networking commands and note the output: *ping, traceroute, netstat, arp, ipconfig.*
- 6. Using **Packet Tracer**, create a basic network of two computers using appropriate network wire.
- 7. Using **Packet Tracer**, connect multiple (min.6) computers using layer 2 switch.
- 8. Using **Packet Tracer**, connect a network in triangular shape with three layer two switches and every switch will have four computers. Verify their connectivity with each other.
- 9. Using **Packet Tracer**, create a wireless network of multiple PCs using appropriate access points.
- 10. Using **Wireshark**, network analyzer, set the filter for ICMP, TCP, HTTP, UDP, FTP and perform respective protocol transactions to show/prove that the network analyzer is working.

Cours	(Credits : 03 Lectures/Week:09)	
SCSP	2 USCS405+ USCS406+ USCS407	
	USCS405: Linear Algebra using Python	
1. V	ite a program which demonstrates the following:	
	Addition of two complex numbers	
	• Displaying the conjugate of a complex number	
	• Plotting a set of complex numbers	
	• Creating a new plot by rotating the given number by a degree 90, 180, 270 degrees	s and
	also by scaling by a number $a=1/2$ , $a=1/3$ , $a=2$ etc.	
2. V	ite a program to do the following:	
	• Enter a vector u as a n-list	
	• Enter another vector v as a n-list	
	• Find the vector au+bv for different values of a and b	
	• Find the dot product of u and v	
3. V F	ite a program to do the following as a linear combination of u and v i.e. au+bv for a and	d b in
4. \	ite a program to do the following:	
	• Enter an r by c matrix M (r and c being positive integers)	
	• Display M in matrix format	
	• Display the rows and columns of the matrix M	
	• Find the scalar multiplication of M for a given scalar.	
	• Find the transpose of the matrix M.	
5. V	ite a program to do the following:	
	• Find the vector –matrix multiplication of a r by c matrix M with a c-vector u.	
	• Find the matrix-matrix product of M with a c by p matrix N.	
6. V	ite a program to enter a matrix and check if it is invertible. If the inverse exists, find the	e
i	erse.	
7. V	ite a program to convert a matrix into its row echelon form.	

- 8. Write a program to do the following:
  - Enter a positive number N and find numbers a and b such that  $a^2 b^2 = N$
  - Find the gcd of two numbers using Euclid's algorithm.
- 9. Write a program to do the following:
  - Enter a vector b and find the projection of b orthogonal to a given vector u.
  - Find the projection of b orthogonal to a set of given vectors
- 10. Write a program to enter a given matrix and an eigenvalue of the same. Find its eigenvector.

### **USCS406: .NET Technologies** 1. Write C# programs for understanding C# basics involving a. Variables and Data Types b. Object-Based Manipulation c. Conditional Logic d. Loops e. Methods 2. Write C# programs for Object oriented concepts of C# such as: a. Program using classes b. Constructor and Function Overloading c. Inheritance d. Namespaces 3. Design ASP.NET Pages with a. Server controls. b. Web controls and demonstrate the use of AutoPostBack c. Rich Controls (Calendar / Ad Rotator) 4. Design ASP.NET Pages for State Management using a. Cookies b. Session State c. Application State 5. Perform the following activities a. Design ASP.NET page and perform validation using various Validation Controls b. Design an APS.NET master web page and use it on other (at least 2-3) content pages. c. Design ASP.NET Pages with various Navigation Controls 6. Performing ADO.NET data access in ASP.NET for a. Simple Data Binding b. Repeated Value Data Binding 7. Design ASP.NET application for Interacting (Reading / Writing) with XML documents 8. Design ASP.NET Pages for Performance improvement using Caching 9. Design ASP.NET application to query a Database using LINQ 10. Design and use AJAX based ASP.NET pages.

#### **USCS407:Android Developer Fundamentals**

- 1. Install Android Studio and Run Hello World Program.
- 2. Create an android app with Interactive User Interface using Layouts.
- 3. Create an android app that demonstrates working with TextView Elements.
- 4. Create an android app that demonstrates Activity Lifecycle and Instance State.
- 5. Create an android app that demonstrates the use of Keyboards, Input Controls, Alerts, and Pickers.
- 6. Create an android app that demonstrates the use of an Options Menu.
- 7. Create an android app that demonstrates Screen Navigation Using the App Bar and Tabs.
- 8. Create an android app to Connect to the Internet and use BroadcastReceiver.
- 9. Create an android app to show Notifications and Alarm manager.
- 10. Create an android app to save user data in a database and use of different queries.
## **Evaluation Scheme**

### I. Internal Exam - 40 Marks

### (i) Test – 20 Marks

20 marks Test - Duration 40 mins

It will be conducted either using any open source learning management system like Moodle (Modular object-oriented dynamic learning environment)

R

A test based on an equivalent online course on the contents of the concerned course (subject) offered by or build using MOOC (Massive Open Online Course) platform.

### (ii) 5 Marks – Active participation in routine class instructional deliveries

Overall conduct as a responsible student, manners, skill in articulation, leadership qualities demonstrated through organizing co-curricular activities, etc.

#### II. External Exam- 60 Marks

#### III. Practical Exam – 50 Marks

- Each course carry 50 Marks : 40 marks + 05 marks (journal) + 05 marks (viva)
- Minimum 75 % practical from each paper are required to be completed and written in the journal.

## (Certified Journal is compulsory for appearing at the time of Practical

Exam)

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## Dombivli Shikshan Prasarak Mandal's K.V. Pendharkar College (Autonomous) of Arts, Science & Commerce, Dombivli (E) Minutes of the First Meeting of Board of Studies in Commerce held on 03<sup>rd</sup> May, 2021.

#### **Venue: Zoom Platform**

Time: 5.00 p.m.

#### **MEMBERS PRESENT:**

Mr. B.T.Shirsath (Chairman, Head of the Commerce Department)

Ms. Usha Gupta (Faculty member)

Ms. Vinita Punjabi (Faculty member)

Dr. Shobha Dedia (Subject Expert from S.N.D.T. University)

Dr. Kushagra Goel (Subject Expert from N.M.I.M.S. University)

Dr. Varsha Sonawane (Vice-Chancellor Nominee from H. Somani Bhavans College, Chowpatty)

Dr. Milind Dalvi (Dean, Timespro, Times Professional Learning) (Professional)

Ms. Surabhi Bafna (Alumni)

Mr. B.T. Shirsath, Chairman of the Meeting, extended a warm and hearty welcome to the members present at the Meeting.

#### Chairman's Speech:

The Chairman addressed the members and briefed them about the University Grants Commission has conferred autonomy upon the College, vide UGC Letter/No. F.22-1/2017 (AC), Dt.: 17/2/2021 and the University of Mumbai has conferred autonomous status upon the College, vide No. Aff./ICD/21-22/39, Dt.: 06/04/2021. He then explained the Proposed Changes in the syllabi of Commerce Papers at First Year B.Com and M.Com, which will be adopted in the coming academic year.

#### Agenda Items:

The meeting then took up for consideration the items on the Agenda:

#### Item No. 1: <u>To review the existing curriculum of Commerce Papers at B.Com & M.Com</u> <u>level.</u>

**RESOLUTION:** The Chairman briefed the members about the structure of existing curriculum of Commerce Papers at B.Com & M.Com level. Also, discussed about proposed changes in Commerce Papers at B.Com & M.Com level & proposed pedagogy. Chairman informed the members that syllabus of Commerce Papers at UG & PG level to be revised with 10%-15% change. Chairman explained the members about the existing evaluation scheme of Commerce Papers.

Chairman invited suggestions, inputs from the members for further improvisation in the proposed curriculum of Commerce Papers at B.Com & M.Com level.

Proposed by: Mr. B.T.Shirsath Seconded by: Dr. Shobha Dedia

First meeting of Board of Studies held on Monday, 03<sup>rd</sup> May, 2021 be and is hereby adjourned to be held on Monday, 10<sup>th</sup> May, 2021 on Zoom Platform at 5:00 p.m.

Cause of adjournment being the formation of Syllabus Framing Committee for providing suggestions and inputs for further improvisation in the proposed curriculum of Commerce Papers at B.Com & M.Com level be and is hereby noted and taken on record.

#### Structure of Syllabus Framing Committee;

Sr.	Composition	Name	
No.			
1.	Convener :	Mr. B.T.Shirsath	
2.	One or Two Teachers from Department.	Ms.Usha Gupta	
3.	One Student-Current Year	Ms.Rosmary Thomas	
		(T.Y.B.Com)	
4.	One Past Student-Rank Holder Past	Ms.Surabhi Bafna	
5.	One Subject Teacher of Autonomous	Mr. Sameer Velankar- Khalsa College,	
	College	Mumbai.	
6.	One member Mumbai University	Ms. Jayanthi Vaikunt	
7.	One from other University	Dr. Shobha Dedhia – SNDT University	
8.	One member from	Dr. Milind Dalvi-Dean Times pro	
	industry/Professional/Consultant	professional learning	
9.	One Member from foreign University	Prof. Andre Bonfrer, Head Department of	
		Marketing, Deakin University, Australia.	

#### Agenda Items discussed on Monday, 10th May, 2021 at 5:00 p.m.

#### Item No. 2: Revision of syllabi of Commerce Papers at First Year B.Com & M.Com

**RESOLVED THAT** the syllabi of Commerce Papers at First Year B.Com. & M.Com. has been revised with the suggestions given by the Members, Dr. Varsha Sonawane and Dr. Shobha Dedia.

**FURTHER RESOLVED THAT** 10% to 15% revision in syllabi of Commerce Papers at First Year B.Com & 05 to 15% revision in syllabi of Commerce Papers at M.Com part I has been adopted by the members for the coming academic year.

Proposed by: Mr. B.T.Shirsath Seconded by: Dr. Varsha Sonawane

#### Item No. 3: Tools for Continuous internal evaluation

**RESOLVED THAT** 40 marks has been assigned for Internal Assessment.

**FURTHER RESOLVED THAT** Continuous Internal Assessment of the students to be done through;

(A) Class Test: 20 Marks- (20 Multiple choice / Fill in the blanks/ True or False questions, each carrying one mark would be asked in a Class test.)

(B) Practical Project Based Assessment- (Corporate Case analysis/local survey/Making Advideo/Ad Copy) Document- 10 Marks

Viva/Presentation/Group Discussion- 10 Marks

Proposed by: Mr. B.T. Shirsath Seconded by: Dr. Shobha Dedia

#### Item No. 4: Pattern of Semester end examination

**RESOLVED THAT** 60 marks has been assigned for Semester end examination.

**FURTHER RESOLVED THAT** Brief Answer Questions to be asked on every module. Each brief answer question will carry 06 marks. Case Study based questions/ Application based questions to be asked with the option of short notes as a last question.

Proposed by: Dr. Varsha Sonawane Seconded by: Mr. B.T.Shirsath

#### Item No. 5: <u>To review the Proposed Certificate course</u>

**RESOLVED THAT** curriculum and evaluation scheme under Certificate Course in Digital Start up have been reviewed and approved.

Proposed by: Mr. B.T.Shirsath Seconded by: Ms. Usha Gupta

#### **Vote of Thanks:**

With all the items on the agenda being transacted, the chairman thanked the members for making it convenient to attend the Board of Studies Meeting and also thanked them for their active participation in the Board of Studies Meeting.

Thereafter, the Chairman declared the meeting as concluded. Meeting concluded at 06:30 p.m.

Place: Dombivli Date: 13/05/2021 B.T.Shirsath Chairman Academic Council dated 20th May, 2021 as per Item Number: 2.03



DOMBIVLI SHIKSHAN PRASARAK MANDAL'S, K.V. PENDHARKAR COLLEGE OF ARTS, SCIENCE AND COMMERCE, (AUTONOMOUS) DOMBIVLI (EAST), DIST. THANE (Affiliated to University of Mumbai)

# **Faculty of Commerce**

# **DEPARTMENT OF COMMERCE**

(Programme: Master of Commerce: M.Com.)

## SYLLABUS FOR

M.Com. Part-I: BUSINESS MANAGEMENT (Semester I and II) Choice Based Credit System (CBCS)

(with effect from the Academic Year: 2021-2022)

# PROPOSED SYLLABUS FOR M.Com. Part-I Semester-I

#### **SUB: STRATEGIC MANAGEMENT**

COURSE CODE: PPCCOI21-801

NO. OF LECTURES: 60

NO. OF CREDITS: 06

#### **Objectives of the course:**

1. To enable the learners to understand new forms of Strategic Management concepts and their use in business.

2. To provide information pertaining to Business, Corporate and Global Reforms.

3. To develop analytical skills of the learners required to deal with business issues.

Desired Outcome: Learner will be able to develop strategic solutions to business problems.

#### **SYLLABUS:**

Sr.No	Modules/ Units
1.	Introduction to Strategic Management(15 Lectures)
	• Concept of Strategic Management, Strategic Management Process, Vision, Mission and
	Goals, Benefits and Risks of Strategic Management.
	Business Environment: Components of Environment- Micro and Macro and Environmental
	Scanning.
	• Levels of Strategies: Corporate, Business and Operational Level Strategy.
	• Functional Strategies: Human Resource Strategy, Marketing Strategy, Financial Strategy,
	Operational Strategy.

2.	Strategy Formulation, Implementation and Evaluation(15 Lectures)	
	• Strategic Formulation: Stages and Importance, Formulation of Alternative Strategies:	
	Mergers, Acquisitions, Takeovers, Joint Ventures, Diversification, Turnaround, Divestment	
	and Liquidation.	
	• Strategic Analysis and Choice: Issues and Structures, Corporate Portfolio Analysis, BCG	
	Matrix, GE Nine Cell Matrix, , McKinsey's 7s Framework	
	Porter's Five Force model	
	• Strategic Implementation: Steps, Importance and Problems, Resource Allocation Importance	
	& Challenges	
	• Strategic Evaluation and Control: Importance, Limitations and Techniques, criteria for	
	evaluation and the evaluation process, strategic control process, types of internal &external	
	controls, Difference Between Strategic Control and Operational Control.	
	Budgetary Control: Advantages, Limitations	
3.	Business, Corporate and Global Strategies   (15 Lectures)	
	• Corporate Restructuring Strategies: Concept, Need and Forms, Corporate Renewal	
	Strategies: Concept, Internal and External factors and Causes.	
	• Strategic Alliance: Concept, Types, Importance, Problems of Indian Strategic Alliances and	
	International Businesses	
	• Public Private Participation: Importance, Problems and Governing Strategies of PPP Model.	
	• Information Technology Driven Strategies: Importance, Limitations and contribution of IT	
	sector in Indian Business.	
4.	Emerging Strategic Trends(15 Lectures)	
	• Business Process Outsourcing and Knowledge Process Outsourcing in India: Concept and	
	Strategies. Reasons for growing BPO and KPO businesses in India. • Reengineering Business	
	Processes- Business Reengineering, Process Reengineering and Operational Reengineering	
	• Disaster Management: Concept, Problems and Consequences of Disasters, Strategies for	
	Managing and Preventing disasters and Cope up Strategies.	
	• Start-up Business Strategies and Make in India Model: Process of business startups and its	
	Challenges, Growth Prospects and government initiatives in Make in India Model with	
	reference to National manufacturing, Contribution of Make in India Policy in overcoming	
	industrial sickness.	

#### **References:**

1. Strategic Management - Fred R. David, Published by Prentice Hall International.

2. Strategic Management - Bern Banerjee

3. Strategic Management - Thomas L. Wheelers & J David Hunger Addison, Wesley publishers.

4. Strategic Management - A Multi Perspective Approach, Edited by Mark Jenkins & Veroruque Ambrosini Palgrave.

#### SUB: BUSINESS ETHICS AND CORPORATE SOCIAL RESPONSIBILITY

#### **COURSE CODE: PPCCOI21-804**

#### NO. OF LECTURES: 60

#### NO. OF CREDITS: 06

#### **Objectives of the course:**

1. To familiarize the learners with the concept and relevance of Business Ethics in the modern era

2. To enable learners to understand the scope and complexity, Research, development. Evaluation and implementation of Corporate Social responsibility in the global and Indian context

#### **Desired Outcomes:**

Students will become more responsible towards Business ethics and Corporate Governance and will implement Corporate Social responsibility while working in the Corporate World.

Sr.No	Modules/ Units	
1.	Introduction to Business Ethics	(15 Lectures)
	• Business Ethics – Concept, Characteristics, Importance and Need	for business ethics. Indian
	Ethos, Ethics and Values, Work Ethos,	
	• Sources of Ethics, Concept of Corporate Ethics, code of Ethics-	Guidelines for developing
	code of ethics, Ethics Management Programme, Ethics Committee.	
	Organization Structure and Ethics	

	• Various approaches to Business Ethics – Theories of Ethics- Friedman's Economic theory,	
	Kant's Deontological theory, Mill & Bentham's Utilitarianism theory	
	• Gandhian Approach in Management and Trusteeship, Importance and relevance of	
	trusteeship principle in Modern Business, Gandhi's Doctrine of Satya and Ahimsa,	
	• Emergence of new values in Indian Industries after economic reforms of 1991	
2.	Indian Ethical Practices and Corporate Governance       (15 Lectures)	
	• Ethics in Marketing and Advertising, Human Resources Management, Finance and	
	Accounting, Production, Information Technology, Copyrights and Patents	
	• Corporate Governance: Concept, Importance, Evolution of Corporate Governance,	
	Principles of Corporate Governance	
	• Regulatory Framework of Corporate Governance in India, SEBI LODR Regulations 2015	
	with respect to Transparency and Corporate Governance. Audit Committee. Role of	
	Independent Directors, Protection of Stake Holders, Changing roles of corporate Boards.	
	• Elements of Good Corporate Governance. Failure of Corporate Governance and its	
	consequences.	
3.	Introduction to Corporate Social Responsibility (15 Lectures)	
	• Corporate Social Responsibility: Concept, Scope & Relevance and Importance of CSR in	
	Contemporary Society.	
	• Corporate philanthropy, Models for Implementation of CSR, Drivers of CSR, Prestigious	
	awards for CSR in India.	
	• CSR and Indian Corporations- Legal Provisions and Specification on CSR, A Score Card,	
	Future of CSR in India.	
	• Role of NGO's and International Agencies in CSR, Integrating CSR into Business	
4.	Areas of CSR and CSR Policy     (15 Lectures)	
	• CSR towards Stakeholders Shareholders, Creditors and Financial Institutions, Government,	
	Consumers, Employees and Workers, Local Community and Society.	
	• CSR and environmental concerns.	
	• Designing CSR Policy- Factors influencing CSR Policy, Role of HR Professionals in CSR	
	• Global Recognitions of CSR- ISO- 14000-SA 8000 – AA 1000 – Codes formulated by UN	

Global Compact – UNDP, Global Reporting Initiative; major codes on CSR.
CSR and Sustainable Development
CSR through Triple Bottom Line in Business

## **Recommended ICT Backup:**

https://books.google.co.in/books?id=al6zP7foCSEC&source=gbs\_similarbooks

https://books.google.co.in/books?id=UBMCxwii5vsC&printsec=

frontcover&source=gbs\_ge\_summary\_r&cad=0

**Recommended References Books:** 1. Business Ethics: An Indian Perspective by A.C. Fernando 2. Corporate Ethics, Governance, And Social Responsibility: Precepts And Practices by A.C. Fernando.

#### **SEMESTER II**

## SUB: RESEARCH METHODOLOGY FOR BUSINESS

COURSE CODE: PPCCOII21-701

NO. OF LECTURES: 60

NO. OF CREDITS: 06

## **Objectives of the course:**

1. To familiarize the learners with the concept of Research.

2. To enable learners to understand the scope and complexity, Research in academic & Business scenario.

3. To make the learners familiar with the basic statistical tools and techniques applicable for research.

4. To enable the learners in understanding and developing the most appropriate methodology for their research

5. To enable learners understand how to draft research report.

## **Desired Outcomes:**

- 1. Learners will get acquainted with the basics of research.
- 2. Learners will be able to frame hypothesis, research design and other technical aspects of Research.
- 3. Learners will get able to prepare research project report useful to society at large.

Sr. No.	Modules/Units	
1.	Introduction to Research	(15 Lectures)
	• Features and Importance of research in business, Objectives and Types of research-	
	Basic, Applied, Descriptive, Analytical and Empirical Research.	
	• Formulation of research problem, Research Design, significance of F	Review of Literature

	Hypothesis: Formulation, Sources, Importance and Types	
	Sampling: Significance, Methods, Factors determining sample size	
2.	Research Process(15 Lectures)	
	Stages in Research process	
	a Collection: Primary data: Observation, Experimentation, Interview, Schedules,	
	Survey,	
	Limitations of Primary data	
	Secondary data: Sources and Limitations,	
	• Factors affecting the choice of method of data collection	
	Questionnaire: Types, Steps in Questionnaire Designing, Essentials of a good	
	questionnaire	
3.	Data Processing and Statistical Analysis(15 Lectures)	
	• Data Processing: Significance in Research, Stages in Data Processing: Editing, Coding,	
	Classification, Tabulation, Graphic Presentation	
	• Statistical Analysis: Concept of reliability and validity Tools and Techniques, Measures	
	of Central Tendency, Measures of Dispersion, Correlation Analysis and Regression	
	Analysis	
	• Testing of Hypotheses –	
	Parametric Test-t test, f test, z test	
	Non-Parametric Test -Chi square test, ANOVA, Factor Analysis,	
	• Interpretation of data: significance and Precautions in data interpretation	
4.	Research Reporting and Modern Practices in Research(15 Lectures)	
	Research Report Writing: Importance, Essentials, Structure/ layout, Types	
	References and Citation Methods:	
	APA (American Psychological Association)	
	CMS (Chicago Manual Style)	
	MLA (Modern Language Association)	
	Footnotes and Bibliography	
	Modern Practices: Ethical norms in research, Plagiarism,	
	Role of Computers in Research	
	Scholarly publishing	

Learner's space: Contacting and interviewing Industry persons who can share their implemented practices or just give an overview of Research in Business

Recommended ICT Backup: https://www.cusb.ac.in/images/cusb-

<u>files/2020/el/cbs/MCCOM2003CO4%20</u> (Business%20Research%20Method) Research Methodology C.R.Kotharipdf

**Recommended References Books:** Plagiarism, the Internet, and Student Learning: Improving Academic Integrity by Wendy Sutherland smith

Research Methodology- C R Kothari

Marketing Research- Dr. Naresh Malhotra

#### **SUB: E-COMMERCE**

COURSE CODE: PPCCOII21-704

NO. OF LECTURES: 60

NO. OF CREDITS: 06

#### **Objectives of the course:**

- 1. To provide an analytical framework to understand the emerging world of ecommerce
- 2. To make the learners familiar with current challenges and issues in ecommerce
- 3. To develop the understanding of the learners towards various business models

4. To enable to understand the Web- based Commerce and equip the learners to assess e-commerce requirements of a business

5. To develop understanding of learners relating to Legal and Regulatory Environment and Security issues of e-commerce.

**Desired Outcome:** Learner will be able to apply his commercial knowledge effectively in the Web Based Commerce.

## SYLLABUS:

Sr. No	Modules/ Units	
1.	Introduction to Electronic Commerce – (15 Lectures)	
	Evolution and Models	
	• Evolution of E-Commerce-Introduction, History/Evolution of Electronic	
	Commerce, Roadmap of E-Commerce in India, Main activities, Functions and	
	Scope of Ecommerce. • Benefits and Challenges of E-Commerce, E-Commerce	
	Business Strategies for Marketing, Sales and Promotions.	
	• Business Models of E-Commerce- Characteristics of Business to	
	Business(B2B), Business to Consumers (B2C), Business to Government (B2G)	
	• Concepts of other models of E-commerce.	
	Business to Consumer E-Commerce process, Business to Business E-Commerce	
	Need and Importance, alternative models of B2B E-Commerce.	
	E-Commerce Sales Product Life Cycle (ESLC) Model	
	Emerging trends in E-commerce	
2.	World Wide Web and E-enterprise(15 Lectures)	
	• World Wide Web-Reasons for building own website, Benefits of Website,	
	Registering a Domain Name, Role of web site in B2C E-commerce; push and pull	
	approaches; Web site design principles.	
	• EDI and paperless trading; Pros & Cons of EDI; Related new technologies use	
	in Ecommerce.	
	• Applications of E-commerce and E-enterprise - Applications to Customer	
	Relationship Management- Types of E-CRM, Functional Components of E-	
	CRM.	
	• Managing the E-enterprise- Introduction, Managing the E-enterprise,	
	Comparison between Conventional	
	• E-organization, Organization of Business in an E-enterprise, Benefits and	
	Limitations of E- enterprise.	
3.	E-marketing and Electronic Payment System (15 Lectures)	
	• E-Marketing- Scope and Techniques of E-Marketing, Traditional web	

	promotion; Web counters; Web advertisements, Role of Social media.		
	• E-Commerce Customer Strategies for Purchasing and support activities,		
	Planning for Electronic Commerce and its initiates, The pros and cons of online		
	shopping, Justify an Internet business.		
	• Electronic Payment System-Characteristics of E-payment system, SET Protocol		
	for credit card payment, prepaid e-payment service, post-paid E-payment system,		
	Types of payment systems.		
	• Operational, credit and legal risks of E-payment system, Risk management		
	options for E-payment systems, Set standards / principles for E-payment.		
4.	Legal and Regulatory Environment and(15 Lectures)		
	Security issues of E-commerce		
	• Introduction to Cyber Laws-World Scenario, Cyber-crime& Laws in India and		
	their limitations, Hacking, Web Vandals, E-mail Abuse, Software Piracy and		
	Patents.		
	• Taxation Issues, Protection of Cyber Consumers in India and Importance of		
	Electronic Records as Evidence.		
	• Security Issues in E-Commerce- Risk management approach to Ecommerce		
	Security - Types and sources of threats, Protecting electronic commerce assets		
	and intellectual property.		
	• Security Tools, Client server network security, Electronic signature, Encryption		
	and concepts of public and private key infrastructure		

#### **Books for reference:**

- Laudon, Kenneth C. and Carol GuercioTraver (2002) E-commerce: business, technology, society. (New Delhi : Pearson Educatin)
- Bharat Bhasker, Electronic Commerce Frame work technologies and Applications, 3rd Edition-Tata McGrawHill Publications, 2008.
- KamleshK.Bajaj and Debjani Nag, Ecommerce- the cutting edge of Business, Tata McGrawHill Publications, 2008

- 4) Introduction to E-commerce (jeffrey) Tata- Mcgrawhill
- 5) E-Business and Commerce- Strategic Thinking and Practice (Brahm) biztantra
- 6) Web Technology : Ramesh Bangia

#### Pedagogy

At Master of Commerce (Business Management) program a learner gets an opportunity to explore different areas within the vast & dynamic field of Commerce. Different commerce papers provide the learner with comprehensive picture of modern business and the way to convert their innovative ideas into colorful startups. Commercial activity is omnipresent which makes commerce evidently the most employment potential course as well and therefore it is recommended that teachers must adopt a variety of methods and materials in order to impart a curriculum effectively.

This can be made successful by implementing teaching methods like the **survey based assignments for topic like retailing, banking operations, consumer behavior in e-commerce space.** Discovery learning can be undertaken by engaging learner in workshops to 'learn by doing' for topics like project report & feasibility study.

Use of ICT can be made prominent to act as mediating artifact, **real case studies of corporate world can be discussed in the classroom to help learner correlate theoretical concepts with the practical world, besides this asking students to solve cases will lead to application of knowledge**. Role play and group discussions will give deeper insights about the topics. Guest talks can be arranged so as to expose students to real life industrial scenarios thereby making learner understand theoretical concepts more clearly and productively.

## **EVALUATION SCHEME**

Evaluation of learner will be done in following manner:

Semester end exam: 60 marks

Internal assessment: 40 marks

## Semester end exam question paper pattern

Duration: 2 hours	Total marks: 60
Q.1. Answer any two of the following. (Based on 1 <sup>st</sup> Module)	(12M)
i) Brief answer question	
ii) Brief answer question	
iii) Brief answer question	
Q.2. Answer any two of the following. (Based on 2 <sup>nd</sup> Module)	(12M)
i) Brief answer question	
ii) Brief answer question	
iii) Brief answer question	
Q.3. Answer any two of the following. (Based on 3 <sup>rd</sup> Module)	(12M)
i) Brief answer question	
ii) Brief answer question	
iii) Brief answer question	

Q.4. Answer any two of the following. (Based on 4 <sup>th</sup> Module)	(12M)
i) Brief answer question	
ii) Brief answer question	
iii) Brief answer question	
Q.5 (A) Case Study	(06M)
(B) Case Study	(06M)
OR	

Q.5. Short Notes (Any 3 out of 5)	(12M)
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#### Continuous internal assessment: 40 marks

#### (A) Class test: 20 marks

20 Multiple choice / Fill in the blanks/ True or False questions, each carrying one mark would be asked in a Class test.

#### (B) Practical Project Based Assessment

(Corporate Case analysis/local survey/Making Ad-video/Ad Copy)

Document 10 Marks

Viva/Presentation/Group Discussion 10 Marks

✤ Passing Criteria:

To pass the course learner is expected to score minimum 40% marks in external as well as in internal evaluation; Internal and external both will have separate passing heads.

Academic Council dated 20th May, 2021 as per Item Number: 2.03



DOMBIVLI SHIKSHAN PRASARAK MANDAL'S, K.V. PENDHARKAR COLLEGE OF ARTS, SCIENCE AND COMMERCE, (AUTONOMOUS) DOMBIVLI (EAST), DIST. THANE (Affiliated to University of Mumbai)

# <u>Faculty of Commerce</u> DEPARTMENT OF COMMERCE

(Programme: Bachelor of Commerce: B.Com.)

# SYLLABUS FOR

F. Y. B.Com. – COMMERCE (Semester I and II) Choice Based Credit System (CBCS)

(with effect from the Academic Year: 2021-2022)

## **PROPOSED SYLLABUS FOR**

## **COMMERCE PAPER I & II at First Year B.COM**

Under Choice Based Credit, Grading & Semester System with effect from the Academic

Year 2021-22

## **SEMESTER-I**

## COMMERCE-I

Title of the Course: Introduction to Business

Course Code: PUCCOI21-121

Number of credits: 03

Lectures per week: 03

Total lectures required: 45

Course objective: To provide learner a comprehensive framework of modern business & entrepreneurial world.

Course Outcomes: on completion of course

- Learner will have understanding about the concepts, strategies, recent trends and factors associated with the business in modern era.
- ✤ Learner will become familiar the process & formalities of business unit promotion.
- ✤ Learner will get entrepreneurial mind set.

# **Syllabus**

Module 1: Business

**Introduction:** Concept, Features, Functions, Scope and Significance of business. Traditional and Modern Concept of business

(12 lectures)

(10 lectures)

(11 lectures)

(12 lectures)

**Objectives of Business:** Steps in setting business objectives, classification of Business objectives, Reconciliation of Economic and Social Objectives.

**New trends in business:** Strategy alternatives in the changing scenario, Restructuring and turnaround strategies

**Industry 4.0**: History of industrial revolution, Concept & Components of industry 4.0, Prospects & Challenges in industry 4.0

Module 2: Business Environment

Introduction: Concept and Importance of business environment, Inter- relationship between Business and Environment

**Constituents of business environment**: Internal and External Business Environment, International Trade: Present status of India's International trade, Import –Export procedure & Documentation

International Environment – Current Trends in the World, International Trading Environment – WTO and Trading Blocs and their impact on Indian Business.

**Module 3: Project Planning** 

Introduction: Business Planning Process; Concept and importance of Project

Planning; Project Report; feasibility Study types and its importance

Business Unit Promotion: Concept and Stages of Business Unit Promotion,

Location – Factors determining location, and Role of Government in Promotion.

**Statutory Requirements in Promoting Business Unit**: Licensing and Registration procedure, Filling returns and other documents, Other important legal provisions

#### **Module 4: Entrepreneurship**

Introduction: Concept and importance of entrepreneurship, factors Contributing to Growth of Entrepreneurship,

**The Entrepreneurs**: Types of Entrepreneurs, Competencies of an Entrepreneur, Entrepreneurship Training & development centers in India

Women Entrepreneurs: Problems and Promotion

Startups & Incubation: Concept of Startup & Proposed action plan under startup initiative,

Concept of Incubation, facilities under incubation & leading incubation centers in India and Accelerators Case studies on Contemporary role models in Indian start-ups: their values and business philosophy.

**Learners Space**: Enthusiastic Advanced learner can study following topics to enrich their knowledge & explore further in the topics covered under the syllabus.

- ✓ Present Status of Industry 4.0 in India
- ✓ Import-Export Policy of India
- ✓ National policy on Innovation & Startup Cell
- ✓ Concept of Startup accelerator

## **Recommended Reference Books:**

- Business Organisation Management Maheshwari, Rajendra P ,Mahajan, J.P.,International Book House
- Business Organisation, Maheshwari, Rajendra P, Mahajan, J.P., International Book House
- Introduction To Commerce, Vikram, Amit, Atlantic Pub
- A Course Book On Business Environment, Cherunilam, Francis, Himalaya Pub
- Business Environment, Cherunilam, Francis, Himalaya Pub
- Essentials Of Business Environment, Aswathappa, K., Himalaya Pub
- Essentials Of Business Environment, Aswathappa, Himalaya Pub
- Entrepreneurship, Hisrich, Robert D, McGraw Hill
- Entrepreneurship Development, Sharma, K.C., Reegal Book Depot

## List of reference books with respect to the new topics added to commerce syllabus:

Topic: INDUSTRY 4.0

- ✓ The fourth industrial revolution by Klaus Schwab -Portfolio penguin
- ✓ Industry 4.0: The industrial internet of things by Alasdair Gilchrist -Apress Topic: EXIM procedure and documentation
- ✓ Export import procedures and documentations by Dr. Dev Raj Rajat Publications
- ✓ Foreign Trade Theory, Procedures, Practices and Documentation" by Dr.Khushpat Jain-Himalaya Publication
  - Topic: STARTUP INCUBATION
- ✓ Innovation, Incubation and Entrepreneurship by B.V.Phani and Sameer Khandekar Springer
- ✓ Incubators ( A realist's guide to the world's new business accelerators) by Colin Barrow Wiley
- ✓ Journal of entrepreneurship and innovation in emerging economies

## **Recommended ICT Back-up:**

Topics	Links	
Industry 4.0: A brief History	https://youtu.be/JCswJldVoXk	
Industry 4.0: The Robotic revival of	https://youtu.be/ZqbvPza3lUl	
Manufacturing		
EXIM management	https://youtu.be/VHBrWPSRvwA	
Startup incubation and management	• <u>https://youtu.be/iSqnflYoXbY</u>	
	• <u>http://youtu.be/t6JvJjuOqFU</u>	
	• <u>https://youtu.be/DRJlqgqVbA</u>	
	<u>https://youtu.be/G2LYuOEZOSU</u>	
	• https://youtu.be/f0LH8ko3LM4	

## SEMESTER-II

## COMMERCE-II

Title of the Course: Service Sector

Course Code: PUCCOII21-221

Number of credits: 03

Lectures per week: 03

Total lectures required: 45

## <u>Syllabus</u>

Course objective: To enlighten learner with the Holistic view of Service sector.

Course Outcomes: on completion of course

- Learner will get familiar with the concepts, scope, strategies & regulatory authorities of Service business.
- ✤ Learner will be able to comprehend present scenario of prime services in India.
- ✤ Learner will be updated with recent technological trends in the service sector.

**Module 1: Concept of Services** 

**Introduction**: Meaning, Characteristics, Scope and Classification of Services – Importance of service sector in the Indian context.

#### (Lectures 12)

Service Strategies: Market research and Service de	velopment cycle, Managing demand and capacity,
opportunities and challenges in service sector.	
Regulatory Authorities of Service sector: Introduction	on & Role/functions of IRDA, RBI, TRAI, DGCA,
DGFT, FSSAI, NHAI	
Module 2: Retailing	(Lectures 12)
Introduction: Concept of organized and unorganized	retailing, Trends in retailing
growth of organized retailing in India, Survival strates	gies for unorganized Retailers
Retail Format: Store format, Non – Store format, Sto	ore Planning, design and layout.
Retail Scenario: Retail Scenario in India and Globa	l context - Prospects and Challenges in India. Mall
Management - Retail Franchising. Present status of	FDI in Retailing, Careers in Retailing, Technology
trends driving Retail 4.0	
Module 3: Recent Trends in Service Sector	(Lectures 10)
ITES Sector: Concept and scope of BPO, KPO, LPO	and ERP.
Banking and Insurance Sector: ATM, Debit & Cre	dit Cards, Internet Banking – FDI and its impact on
Banking and Insurance Sector in India.	
Application of Industry 4.0 in banking & insurance Se	ector, Career options in banking & insurance sector
Logistics: Networking – Importance – Challenges	
Module 4: E-Commerce	(Lectures 11)
Introduction: Meaning, Features, Functions and Sco	ope of E-Commerce-Importance and Limitations of
E-Commerce	
Types of E-Commerce: Basic ideas and Major activity	ties of B2C, B2B, C2C
Present status of E-Commerce in India: Transition	to E-Commerce in India, E-Transition Challenges
for Indian Corporates; on-line Marketing Research.	

### **Learners Space:**

- Learner can visit official websites of regulatory authorities of Indian service sector to get additional knowledge.
- E-Commerce Models & FDI Policy of Government
- Merchandise management in retailing.
- Mergers of Public Sector banks

## **Recommended Reference Books:**

- Service Marketing, Temani, V.K., Prism Pub
- Service Marketing, Temani, V.K., Prism Pub
- Management Of Service Sector, Bhatia, B S, V P Pub

- Introduction To E Commerce, Dhawan, Nidhi, International Book House
- Introduction To Retailing, Lusch, Robert F., Dunne, Patrick M., Carver, James R., Cengage Learning
- Retailing Management, Levy Michael., Weitz Barton A, TataMcgraw Hill

### List of reference books with respect to the new topics added to commerce syllabus:

- Indian service Sector: Present scenario & future perspective by Dr.Atulbansal&Dr.Piramalvyas-Mangalam Publishers And Distributors
- Legal and Regulatory Aspects of Banking by <u>N S Toor</u>, <u>Arun Deep Toor</u> (Author) Skylark Publications; Tenth edition (2015)

## **Recommended ICT Back-up:**

Regulatory bodies of Indian service sector: https://youtu.be/MkFVjAe\_Z9o Industry 4.0 in Retail: <u>https://youtu.be/iRvaWHk3A8k</u> <u>https://youtu.be/EVLN1tJsBkY</u> Industry 4.0 in banking: <u>https://youtu.be/QySt8rt2mPw</u> <u>https://youtu.be/5JbOc86Sru0</u> Industry 4.0 in Insurance: https://youtu.be/TdDm-ovbvcM

## PEDAGOGY

At first year of Bachelor of Commerce program a learner gets an opportunity to explore different areas within the vast & dynamic field of Commerce. The syllabus of Commerce-I &II provides the learner with comprehensive picture of modern business and the way to convert their innovative ideas into colorful startups. Commercial activity is omnipresent which makes commerce evidently the most employment potential course as well and therefore it is recommended that teachers must adopt a variety of methods and materials in order to impart a curriculum effectively.

This can be made successful by implementing teaching methods like the **survey based assignments for topic like retailing, banking operations, consumer behavior in e-commerce space.** Discovery learning can be undertaken by engaging learner in workshops to 'learn by doing' for topics like project report & feasibility study. **Industrial visit at place Khadi Village Commission will expose the learner to various small business options**.

Use of ICT can be made prominent to act as mediating artifact, **real case studies of corporate world can be discussed in the classroom to help learner correlate theoretical concepts with the practical world, besides this asking students to solve cases will lead to application of knowledge**. Role play and group discussions will give deeper insights about the topics. Guest talks can be arranged so as to expose students to real life industrial scenarios thereby making learner understand theoretical concepts more clearly and productively.

### **EVALUATION SCHEME**

Evaluation of learner will be done in following manner: SEMESTER END EXAM: 60 MARKS **INTERNAL ASSESSMENT: 40 MARKS** 

### SEMESTER END EXAM QUESTION PAPER PATTERN

DURATION: 2 hours	Total marks: 60
Q.1. Answer any two of the following. (Based on 1 <sup>st</sup> Module)	(12M)
i) Brief answer question	
ii) Brief answer question	
iii) Brief answer question	
Q.2. Answer any two of the following. (Based on 2 <sup>nd</sup> Module)	(12M)
i) Brief answer question	
ii) Brief answer question	
iii) Brief answer question	
Q.3. Answer any two of the following. (Based on 3 <sup>rd</sup> Module)	(12M)
i) Brief answer question	
ii) Brief answer question	
iii) Brief answer question	
Q.4. Answer any two of the following. (Based on 4 <sup>th</sup> Module)	(12M)
i) Brief answer question	
ii) Brief answer question	
iii) Brief answer question	
Q.5 (A) Case Study	(06M)
(B) Case Study	(06M)
OR	
Q.5. Short Notes (Any 3 out of 5)	(12M)

#### **CONTINUOUS INTERNAL ASSESSMENT: 40 MARKS**

### (A) Class Test: 20 MARKS

20 Multiple choice / Fill in the blanks/ True or False questions, each carrying one mark would be asked in a Class test.

(B) Practical Project Based Assessment

(Corporate Case analysis/local survey/Making Ad-video/Ad Copy) Document 10 Marks

Viva/Presentation/Group Discussion 10 Marks

## ✤ Passing Criteria:

To pass the course learner is expected to score minimum 40% marks in external as well as in internal evaluation; Internal and external both will have separate passing heads.

Academic Council dated 10<sup>th</sup> February, 2022 as per Item Number: 3.03



# DOMBIVLI SHIKSHAN PRASARAK MANDAL'S, K.V. PENDHARKAR COLLEGE OF ARTS, SCIENCE AND COMMERCE, (AUTONOMOUS) DOMBIVLI (EAST), DIST. THANE

(Affiliated to University of Mumbai)

# **Faculty of Science**

# **DEPARTMENT OF BIOTECHNOLOGY**

(Programme: Bachelor of Science, B.Sc.)

## **SYLLABUS FOR**

S. Y. B.Sc. – Biotechnology (Semester III and IV) Choice Based Credit System (CBCS)

(With effect from the Academic Year: 2022-2023)

## **SEMESTER- III**

Course code	Course type	<b>Course Title</b>	Credits	Lectures/ Week
PUSBTIII22-371	Core Subject	Biophysics	2	3
PUSBTIII22-372	Core subject	Applied Chemistry- I	2	3
PUSBTIII22-373	Core Subject	Immunology	2	3
PUSBTIII22-374	Core Subject	Cell Biology and Cytogenetics	2	3
PUSBTIII22-375	Core Subject	Molecular Biology	2	3
PUSBTIII22-376	Skill enhancement elective	Bioprocess Technology	2	3
PUSBTIII22-377	General Elective	Entrepreneurship development	2	3
PUSBTIII22-P1	Core subject Practical	Practical of <b>PUSBTIII22-371</b> and <b>PUSBTIII22-372</b>	2	6
PUSBTIII22-P2	Core subject Practical	Practical of <b>PUSBTIII22-373</b> and <b>PUSBTIII22-374</b>	2	6
PUSBTIII22-P3	Core Subject and Skill enhancement elective Practical	Practical of <b>PUSBTIII22-375</b> and <b>PUSBTIII22-376</b>	2	6
SEMESTER-IV				
Course code	Course type	<b>Course Title</b>	Credits	Lectures/ Week
PUSBTIV22-471	Core Subject	Biochemistry	2	3
PUSBTIV22-472	Core subject	Applied Chemistry- II	2	3
PUSBTIV22-473	Core Subject	Medical Microbiology	2	3
PUSBTIV22-474	Skill enhancement	Molecular Diagnostics	2	3

	elective			
PUSBTIV22-475	Core Subject	Biostatistics and Bioinformatics	2	3
PUSBTIV22-476	Core Subject	Environmental Biotechnology	2	3
PUSBTIV22-477	General Elective	Research methodology	2	3
PUSBTIV22-P1	Core subject Practical	Practical of <b>PUSBTIV22-471</b> and <b>PUSBTIV22-472</b>	2	6
PUSBTIV22-P2	Core Subject and Skill enhancement elective Practical	Practical of <b>PUSBTIV22-473</b> and <b>PUSBTIV22-474</b>	2	6
PUSBTIV22-P3	Core subject Practical	Practical of <b>PUSBTIV22-475</b> and <b>PUSBTIV22-476</b>	2	6

## **SEMESTER III**

Course Code	Title	Credits	No. of	
	BLODINGLOG		Lectures	
PUSBT11122-3/1	BIOPHYSICS	2		
Course objectives:-		. 1 1	1	
The objective of this of the objective o	course is to have a firm foundation in the fundam	entals and a	pplications of	
Learning outcomes:-	By the end of the course the student will:			
<ul> <li>Develop an und</li> </ul>	derstanding of the different aspects of classical phy	vsics.		
• Be able to relat	e principles of physics to applications and technique	ues in the fie	ld of biology	
such as micros	copy, spectroscopy and electrophoresis.			
UNIT I	Introduction to Optics and Lasers:		15	
Optics and	Optics:			
Electromagnetic	Properties of Light - Reflection, Refraction,			
Radiations	Dispersion, Interference.			
	Lasers:			
	Properties of Lasers, Stimulated Emissions, Laser Action; Applications of Laser.			
	Electromagnetic Radiations:			
	Introduction to Electromagnetic Radiation.			
	Spectroscopy:			
	Types and Properties of Spectra; Basic Laws of Light Absorption.			
	Spectrophotometer:-Principle, Instrumentation and Applications; UV-Vis Spectrophotometer, Single and Dual Beam Spectrophotometer.			
	Microscopy:			
	Types of Microscopy; Electron Optics; Electron Microscopy- Preparation of Specimen, SEM, TEM and Immuno-Electron Microscopy.			
	Fluorescence Microscopy.			

<b></b>		
UNIT II	Heat: Concept of Temperature; Modes of Heat	15
Heat, Sound,	Transfer; Measuring Temperature; Platinum	
Magnetism and	Resistance Thermometer; Thermocouple and	
Fluid Dynamics	Thermistors.	
	Sound: Types of Sound Waves - Audible,	
	Ultrasonic and Infrasonic Waves; Doppler	
	Effect; Applications of Ultrasonic Waves.	
	Magnetism: Magnetic Field; Magnetism of	
	Earth; Paramagnetism, Diamagnetism,	
	Ferromagnetism.	
	Nuclear Magnetism and Biomagnetism.	
	Fluid Dynamics :	
	Viscosity:	
	Definition Flow of Liquids through	
	Capillaries; Stokes' Law; Terminal Velocity.	
	Determination of 'η' by Falling Sphere	
	Method; Viscosity Estimation by Oswald's	
	Viscometer.	
	Surface Tension:	
	Definition - Surface Tension and Surface	
	Energy; Capillary Action; Angle of Contact;	
	Wettability; Temperature Dependence of	
	Surface Tension.	
	Applications in Biology.	
UNIT III	Electrophoresis:	15
Electrophoretic	Introduction, Principle of Electrophoresis	
Techniques	Migration of Ions in an applied electric field;	
-	Factors affecting Electrophoretic Mobility;	
	Types & Techniques of electrophoresis:	
	Free Electrophoresis: Moving Boundary	
	Electrophoresis;	
	Zone Electrophoresis : Supporting Matrix	
	Paper electrophoresis: AGE: Native and SDS	
	PAGE (reducing and non-reducing,	
	continuous and discontinuous);	
	Specialized Electrophoretic techniques:	
	Discontinuous Gel Electrophoresis. Isoelectric	
	focusing and 2D PAGE. Staining and	
	Detection methods: Gel-Documentation.	
	Applications in Biology	
	Applications in Diology.	
Applications of Optics in Medical field/Space Science, etc. Use of Electrophoresis in Advance Molecular Biological techniques like PCR/RAPD/RFLP/AFLP etc.

# MOOC:

- 1. https://www.classcentral.com/course/swayam-fundamentals-of-optical-and-scanning-electron-microscopy-5334
- 2. https://www.classcentral.com/course/swayam-experimental-biotechnology-19863

**Pedagogy:** Group discussion, Models, Animated YouTube Videos, Online worksheets, Virtual Labs.

#### **Reference books:**

- 1. Essential Biophysics, Narayanan, New Age Publications
- 2. Handbook of Molecular Biophysics (Methods & Application), 2009, HG Bohr, Wiley
- 3. Biophysical Chemistry: Principles & Techniques by Upadhyay, Upadhyay,Nath. (Himalaya Publishing House)
- 4. Principles and Techniques of Biochemistry and Molecular Biology, Keith Wilson and John Walker, Cambridge University Press
- 5. Fundamentals of Optics, H.R. Gulati and D.R. Khanna, 1991, R. Chand Publications

- 1. https://www.britannica.com/technology/laser
- 2. https://www.va.gov/DIAGNOSTICEM/What\_Is\_Electron\_Microscopy\_and\_How\_D oes\_It\_Work.asp
- 3. http://epgp.inflibnet.ac.in/epgpdata/uploads/epgp\_content/S000002BI/P001354/M021 523/ET/1501757741ET.pdf
- 4. http://www.dspmuranchi.ac.in/pdf/Blog/electrophoresis.pdf
- 5. https://ncert.nic.in/ncerts/l/iesc112.pdf
- 6. https://ncert.nic.in/textbook/pdf/leph105.pdf

<b>Course Code</b>	Title	Credits	No. of Lectures
PUSBTIII22-372	APPLIED CHEMISTRY – I	2	
<b>Course objectives:-</b> The objective of this organic and green che	course is to have a firm foundation in the fu	Indamentals	and applications o
<ul> <li>Learning outcomes:-</li> <li>Develop an un chemistry.</li> </ul>	By the end of the course the student will be a nderstanding of the different aspects of or	able to: ganic and	green
<ul><li>Discuss the rol compounds.</li><li>Discuss the rol</li></ul>	e of green chemistry and its application in ind	thesis of or dustry.	ganic
UNIT I	Introduction to Types of Organic		15
Organic Chemistry	Reactions: Addition, Elimination and Substitution Reactions. Rearrangement reactions		
	Metal Coordination in Biological Systems: Essential and Non-essential Elements in Biological Systems. Role of Metal Ions in Biological Systems Enzymes, Apoenzymes and Coenzymes. Biological Role of Metalloenzymes with respect to Myoglobin, Haemoglobin. Biological Role of Carboyypentidases		
	Catalases and Peroxidases.		
	Structure and Function: Dioxygen Binding, Transfer and Utilization; Metal Complexes in Medicines.		
UNIT II Synthesis of Organic	Synthesis of Organic Compounds : Criteria for Ideal Synthesis; Selectivity and Yield.		15
Compounds	Linear and Convergent Synthesis and Multicomponent Reactions.		
	Microwave Assisted Organic Synthesis, Ultrasound in Synthesis and Polymer supported Synthesis.		
	Retrosynthesis.		

UNIT III	Introduction to Green Chemistry; Need	15
Green Chemistry	and Relevance of Green Chemistry;	
and Synthesis	Goals of Green Chemistry. Limitations/	
	Obstacles in the pursuit of the goals of	
	Green Chemistry.	
	Principles of Green Chemistry.	
	Green Synthesis in Industry: Green	
	Materials, Green Reagents, Green	
	Solvents and Green Catalysts.	
	Future Trends in Green Chemistry:	
	Green chemistry in sustainable	
	development.	

Biological role of different enzymes, isoenzymes and coenzymes, organic synthesis of active pharmaceutical compounds and the significance of green chemistry for sustainable development can be studied.

#### MOOC:

**Enzymology -** https://onlinecourses.swayam2.ac.in/cec20\_bt20/preview Swayam, Credit point - 4, Duration - 12 weeks, UG level

**Pedagogy:** Animated Videos, Group discussion, Models, Google classrooms. **Reference books:** 

- 1. Organic Chemistry, R.T. Morrison, R.N. Boyd and S.K. Bhatacharjee, 7th Edition, Pearson Education (2011).
- 2. Organic Chemistry, T.W.G. Solomon and C.B. Fryhle, 9th Edition, John Wiley & Sons, (2008)
- 3. A guide to mechanism in Organic Chemistry, 6th Edition, Peter Sykes, Pearson Education
- 4. Fundamentals of Organic Chemistry, G. Marc Loudon, 4th Edition Oxford
- 5. Biochemistry Satyanarayan and Chakrapani 4th edition
- 6. Lehninger, Principles of Biochemistry. 5th Edition (2008), David Nelson & Michael Cox, W.H. Freeman and company, NY.
- 7. V.K. Ahluwalia & M.R. Kidwai: New Trends in Green Chemistry, Anamalaya Publishers (2005).
- 8. M.C. Cann& M.E. Connely: Real-World cases in Green Chemistry, American Chemical Society, Washington (2000).

- 1. https://www.rgpv.ac.in/campus/PY/enzymes\_ppt.pdf
- 2. https://www.vedantu.com/chemistry/types-of-organic-reactions
- 3. https://www2.chemistry.msu.edu/faculty/reusch/virttxtjml/synth2.htm
- 4. https://www.iqvia.com/blogs/2019/11/importance-and-impact-of-organic-synthesisand-retrosynthesis-in-the-field-of-chemistry
- 5. https://www.epa.gov/greenchemistry/basics-green-chemistry

<b>Course Code</b>	Title	Credits	No. of lectures	
PUSBTIII22-373	IMMUNOLOGY	2		
Course objectives:- The objective of this courvarious immunotechniqu Learning outcomes:- By Understand the receptors involved Understand the pr	rse is to familiarize students with the immune es. y the end of the course the student will be able role of complements in immune response d in immune reaction. rinciples underlying various immunotechniqu	e effector n e to: and diffe es.	nechanisms and rent immune ce	
UNIT I Effectors of Immune Response	Complement System- Classical, Alternate and Lectin pathways; Regulation and Biological Effects of Complement System; Deficiencies of Complement System MHC Classes - General Organization and Inheritance; Structures and Peptide Interactions; Class I and II Diversity and Polymorphism; Antigen Presentation through Endocytic and Exocytic Pathways; MHC Restriction.		15	
UNIT II Cell Receptors	T-cell Receptor Complex: Structure and Activation. B-cell Receptor: Structure, Maturation and Activation Toll like receptors B-T cell interaction (B-T cell cooperation) Cell cytotoxic responses as the effector mechanism.		15	
UNIT III Immuno Techniques	<ul> <li>Precipitation Reactions : Immunoprecipitation, Immunoelectrophoresis, CIEP, Rocket Electrophoresis and 2-D Immunoelectrophoresis</li> <li>Agglutination Reactions : Passive, Reverse Passive, Agglutination Inhibition. Coomb's Test; Complement Fixation Tests, RIA, ELISA, ELISPOT,</li> </ul>		15	

Chemiluminescence, Western Blot, Immunofluorescence, Flow Cytometry.	
Alternatives to Antigen-Antibody Reactions.	

Application of immunology concepts and techniques in commercial kits used to diagnose the infections.

# MOOC:

- Fundamentals of Immunology: Innate Immunity and B-Cell Function https://www.coursera.org/learn/immunologyfundamentalsimmunitybcells?specializati on=immunology, Coursera, Duration - 12 weeks, UG level
- 2. Immunology Course (swayam2.ac.in) Swayam, Credit point 4, Duration 12 weeks, UG level.

**Pedagogy:** YouTube videos, PPT, Group discussion, Models, Practical techniques, Animated videos, Virtual labs.

#### **Reference books:**

- 1. Immunology, Richard Goldsby, Thomas Kindt, Barbara Osborne, JenisKuby; 5th edition.
- 2. Textbook of basic and clinical immunology, 1st edition (2013), Sudha Gangal and ShubhangiSontakke, University Press, India
- 3. Immunology, 7th edition (2006), David Male, Jonathan Brostoff, David Roth, Ivan Roitt, Mosby, USA.
- 4. Introduction to Immunology- C V Rao- Narosa Publishing House

- 1. https://www.physio-pedia.com/Complement\_System
- 2. https://courses.lumenlearning.com/microbiology/chapter/major-histocompatibility-complexes-and-antigen-presenting-cells/
- 3. https://youtu.be/3W67OH3v2lU
- 4. https://youtu.be/RRbuz3VQ100

<b>Course Code</b>	Title	Credits	No. of lectures
PUSBTIII22-374	CELL BIOLOGY AND CYTOGENETICS	2	
Course objectives:-			
The objective of this	course is to have a firm foundation in the fun	damentals of	of cell biology and
cytogenetics.			
Learning outcomes:-	By the end of the course the student will be ab	le to:	
<ul> <li>Develop an u membranes.</li> <li>Discuss the str mapping.</li> </ul>	nderstanding of the cytoskeleton and trans ucture of chromosomes and types of chromos	sport mech	anism across ce ations, linkage an
UNIT I	Overview of the Major Functions of		15
Cytoskeleton	Cytoskeleton.		
	Microtubules: Structure and		
	Composition, MAPs, Functions of		
	Microtubules.		
	Motor Proteins: Kinesin, Dynein		
	MTOCs, Dynamic Properties of		
	Microtubules		
	Microtubules in Cilia and Flagella		
	Intermediate Filaments:		
	Structure and Composition		
	Assembly and Disassembly		
	Types and Functions		
	Composition Assembly and Disassembly		
	Motor Protein: Mussin		
	Role of Microfilaments in Muscle		
	Contractility		
	Actin Binding Proteins		
	Examples of Nonmuscle Motility and Contractility		

UNIT II Cellular Transport and Cellular Interactions	Concept of Cell Permeability Uptake of Nutrients by cells <b>Principles of Membrane Transport</b> - Transporters and Channels Active Transport, Passive Transport <b>Types of Transporters:</b> ATP Driven Pumps - Na+ K+ Pump, Ca2+ pump <b>Cell Junctions and its Classification,</b> Microvilli <b>Cell Adhesion:</b> Role of cadherins and integrins <b>Extracellular Matrix</b> Cell Coat and Cell Recognition. Cellular Interactions.	15
UNIT III Cytogenetics	Genome organization in Viruses, Prokaryotes and Eukaryotes Extrachromosomal Inheritance Mitochondrial DNA, Chloroplast DNA Kappa particles in Paramoecium Structural organization and Significance of Polytene chromosome, Lampbrush Chromosome Variation in Chromosomal Structure and Number : Deletion, Duplication, Inversion, Translocation, Aneuploidy, Euploidy and Polyploidy and Syndromes- Klinefelter, Turner, Cri-du-Chat, Trisomy 21, Trisomy 18 and Trisomy 13. Karyotyping and its importance Genetic Linkage, Crossing Over and Chromosomal Mapping : Two-point Cross; Three point Cross Pedigree Analysis.	15

Insight into Cytoskeletal Abnormalities, cellular processes like Endocytosis and Literature search of human genetic disorders through OMIM.

#### MOOC:

- 1. Essential Human Biology: Cells and Tissues: Duration: 5 weeks (2–3 hours per week) Self-paced, Free (Optional upgrade available)https://www.edx.org/course/essentialhuman-biology-cells-and-tissues.
- 2. General Biology II: The World of the Cellhttps://www.udemy.com/course/generalbiology-ii-the-world-of-the-cell/
- 3. https://www.classcentral.com/course/swayam-human-molecular-genetics-5803

**Pedagogy:** Posters, PowerPoint presentation, animated videos, Models, Case study (Genetic counselling), Preparing pedigree charts for inheritance of some human traits, Flipped classroom.

#### **Reference books:**

- 1. Cell and Molecular Biology- Concepts and Experiments, 6th edition (2010)—Gerald Karp Wiley International
- 2. Molecular Biology of the Cell, 5th Edition (2007) Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, Peter Walter. Garland Science, USA
- 3. Cell and Molecular Biology De Robertis- Lippincott Williams & Wilkins
- Prescott, Harley and Klein's Microbiology, McGraw Hill Higher Education, Joanne M. Willey, Linda Sherwood, Lansing M.Prescott, Christopher J. Woolverton 7th edition 2008
- 5. Gardner, E.J., Simmons, M.J., Snustad, D.P. (2006). Principles of Genetics. VIII Edition John Wiley & Sons
- 6. Russell, P. J. (2009). Genetics- A Molecular Approach. III Edition. Benjamin Cummings
- 7. Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B. IX Edition. Introduction to Genetic Analysis, W. H. Freeman & Co
- 8. Fundamentals of Genetics. B.D Singh
- 9. Textbook of Cell Biology, Genetics, molecular biology, Ecology and Evolution.: P.S. Verma and V.K Agarwal (2001)

- 1. https://www.cureffi.org/2013/03/30/cell-biology-07-microtubules-and-cell-division/
- 2. https://organismalbio.biosci.gatech.edu/chemical-and-electrical-signals/effectors-and-movement/
- 3. http://www.vivo.colostate.edu/hbooks/pathphys/topics/sodium\_pump.html
- 4. https://www.khanacademy.org/science/ap-biology/cell-communication-and-cell-cycle/cell-communication/a/cell-cell-junctions
- 5. http://www2.csudh.edu/nsturm/CHEMXL153/GenomeOrganization.htm
- 6. https://www.lecturio.com/magazine/human-genetics-chromosomal-aberrations/
- 7. https://www2.kumc.edu/genetics/lab/

<b>Course Code</b>	Title	Credits	No. of Lectures
PUSBTIII22-375	MOLECULAR BIOLOGY	2	Lectures
Course objectives:-			
The objective of this regulation.	s course is to have an insight into the mechani	sm of gene	expression an
Learning outcomes:	- By the end of the course the student will be able	to:	
• Examine the s	teps involved in the transcription of Prokaryotes	& Eukaryote	es.
• Discuss the m	echanisms associated with gene expression at the	level of tran	nslation.
• Discuss the m	echanisms associated with regulation of gene exp	ression in p	rokaryotes and
eukaryotes.			
UNIT I	Gene Expression- an Overview.		15
Gene	<b>Transcription Process in Prokaryotes:</b>		
Expression-	RNA Synthesis; Promoters and Enhancers;		
Transcription	Initiation of Transcription at Promoters;		
	Elongation and Termination of an RNA		
	Chain.		
	Transcription in Eukaryotes:		
	Eukaryotic RNA Polymerases; Eukaryotic		
	Promoters; Transcription of Protein Coding		
	Genes by RNA Polymerase; Eukaryotic		
	mRNA's; Transcription of other genes;		
	Spliceosomes, RNA editing		
UNIT II	Nature of Genetic Code (Deciphering the		15
Gene	genetic code, Characteristics, Wobble		
<b>Expression-</b>	Hypothesis)		
Translation	Translation in Prokaryotes and Eukaryotes		
	Charging of t-RNA, Process of Protein		
	Synthesis (Initiation, Elongation,		
	Translocation, Termination)		
	Post Translational Modifications.		
	Glycosylation, Acetylation, Methylation		
	Protein sorting		

UNIT III	In Prokaryotes:	15
<b>Regulation of</b>	In Bacteria: lac Operon of E.coli; trp	
Gene	Operon of <i>E.coli</i> .	
Expression	In Eukaryotes :	
	Operons in Eukaryotes; Control of Transcriptional Initiation; Gene Silencing and Genomic Imprinting; Post- Transcriptional Control; RNA Interference.	

Role of Antibiotics in Bacterial Transcription & Translation Inhibition. Use of Gene Silencing in Therapeutics & its challenges.

#### MOOC:

- 1. https://www.my-mooc.com/en/mooc/molecular-biology-part-2-transcription-mitx-7-28-2x-0/
- 2. https://www.edx.org/course/molecular-biology-part-3-rna-processing-and-transl?index=product&queryID=74a7f9fda239d84108dff3daf5d1e6cf&position=6
- 3. https://www.classcentral.com/course/epigenetics-486.

**Pedagogy:** Google Classroom, YouTube animated Videos, Concept Mapping, Group Discussion, Worksheet & Flow Sheet Preparation & Power point presentation.

#### **Reference books:-**

- 1. iGenetics(Molecular Approach), 3rd edition- Peter Russell -Pearson Education
- 2. Microbial Genetics- Freifelder Narosa Publishing House
- 3. Genes XI, 11th edition (2012), Benjamin Lewin, Publisher Jones and Barlett
- Nelson, D. L., Lehninger, A. L., & Cox, M. M. (2005). Lehninger principles of biochemistry 4<sup>th</sup>edn. Macmillan. W.H. Freeman and Company, New York.

- 1. https://www.youtube.com/watch?v=nXj2Hmd51l4
- 2. https://www.youtube.com/watch?v=CxxQ5i97YB0
- 3. https://www.youtube.com/watch?v=G8RYhV569xg
- 4. https://www.khanacademy.org/science/biology/gene-regulation

<b>Course Code</b>	Title	Credits	No. of
PUSBTIII22-376	<b>BIOPROCESS TECHNOLOGY</b>	2	Lectures
Course objectives:- The objective of this c and build a foundation Learning outcomes:- Develop an und Develop skills a Understand prin	ourse is to understand the basic skills applied if for more advanced studies in bioprocess technol By the end of the course the student will be able lerstanding of the various aspects of bioprocess associated with screening of industrially importanciples underlying design of fermenter and ferm	in fermentat logy. to: technology. int strains. entation pro-	ion technology cess.
UNIT I Microorganisms in Industrial Processes	Types of Microorganisms used in Industrial Processes:Bacteria, Actinomycetes, Fungi and Algae.Screening and maintenance of strains:Primary Screening and Secondary Screening.Culture Collection centres.Strain improvement of microorganismsPreservation of Industrially Important Microbial Strains - Stab culture, Soil stock method, Lyophilisation & Cryopreservation		15
UNIT II Fermenter and Fermentation Processes	<ul> <li>Design of a fermenter: Stirred Tank Fermenter- Basic Design; Parts of a Typical Industrial Fermenter.</li> <li>Fermentation Media: Components; Design and Optimization.</li> <li>Sterilization: Sterilization of Fermenter and Fermentation Media.</li> <li>Process Parameters: pH, Temperature, Aeration, Agitation, Foam, etc.</li> <li>Types of Fermentation: Surface and Submerged; Batch and Continuous, Aerobic and Anaerobic.</li> <li>Product Isolation and Purification.</li> <li>Study of representative fermentation processes: Outline of Penicillin and Ethanol Production by fermentation along with a flow-diagram.</li> </ul>		15

UNIT III	Assay of Industrial Products:	15
In-vivo and In-vitro	In vivo Animal assays - Pyrogen and	
Assay of	Endotoxin testing	
Industrial	Chemical and Biological; Types and	
Products	Subtypes; Kinetics.	
	Advantages and Disadvantages.	
	Bioavailability and Bioequivalence Studies	

To explore manufacturing details of various industrial products produced by microorganisms.

#### MOOC:

- 1. Phase- I Online Certificate Course on Fermentation Technology Atal Bihari Vajpayee Vishwavidyalaya (e-atalgyansangum.ac.in).
- 2. Microbial fermentation processes and bioreactor design Biochemical and Bioprocess Engineering | Coursera

**Pedagogy:** Google classroom & making crossword puzzle & group discussions, Production flow-sheet preparation, Industrial visits.

#### **Reference books:**

- 1. Food Microbiology- Frazier
- 2. Industrial Microbiology- A. H. Patel
- 3. Industrial Microbiology- L. E. Casida- John Wiley & Sons
- 4. Prescott & Dunn's Industrial Microbiology by Presscott, Samuel cate 1872-1962, Fourth edition, Western cott publication.

- 1. https://youtu.be/xbdJUuHUXOE
- 2. Screening of Microorganisms: Primary and Secondary Techniques | Industrial Biotechnology (biotechnologynotes.com)
- 3. https://youtu.be/hASoAZ\_QCHk
- 4. Pharmaceutical Bioavailability and Bioequivalence: Pharmaceutical Guidelines (pharmaguideline.com)

<b>Course Code</b>	Title	Credits	No. of
PUSBTIII22-377	ENTREPRENEURSHIP DEVELOPMENT	2	Lectures
Course objectives:- To develop and sy identification and cre Learning outcomes: • Develop an u idea. • Design strateg • Learn potentia	ystematically apply an entrepreneurial way of ation of business opportunities. -By the end of the course the student will be able to inderstanding of the systematic process and to se gies for successful implementation of ideas. al opportunities and ideas and career choices availa	thinking to: elect and scr ble to the en	hat will allo <sup>,</sup> reen a busines trepreneur.
UNIT I Introduction to Entrepreneurship Development	Concept of Entrepreneur & Entrepreneurship; Need and Importance; Factors Influencing Entrepreneurship; Essentials of a Successful Entrepreneur. Ethics & Social Responsibility of Entrepreneurs, Opportunities & Scope of Entrepreneurs, Entrepreneurs in India & Abroad; Woman as an Entrepreneur.		15
UNIT II Setting-up of an Enterprise and Planning	Location of Enterprise; Real Estate and Human Resource Planning, Financial Planning; Role of Government and Financial Institutions in Entrepreneurship Development; Raising Money from Venture Capitalists, Government Grants, Product Selection and Ideas; Project Planning and Formulation; Project Feasibility Assessment; Regulatory Affairs, Corporate Laws, Innovation, IPR generation and Protection, Preparation of a Business Plan, Characteristics and Importance of Planning		15
UNIT III Marketing, Research and Opportunities in Biotechnology	Marketing Plan for an Entrepreneur; Strategic Alliances, Marketing strategy, Advertising and Sales Promotion Market Assessment and Market Research, Need for International Market Research, Domestic vs. International Market Research, Cost and Methodology of Market Research, Desk and Field Research Entrepreneurship Opportunities in Biotechnology		15

Learn mentorship programs in collaboration with government organizations, incubation centres, educational institutions and private organizations.

#### MOOC:

- 1. https://www.startupindia.gov.in/content/dam/investindia/Templates/public/Action\_Plan.pdf
- 2. The Science and Business of Biotechnology: Duration: 16 weeks (10–12 hours per week), Self-paced, Free (Optional upgrade available)
- 3. https://www.edx.org/course/the-science-and-business-of-biotechnology

**Pedagogy:** YouTube videos, Case studies, Group Discussion, Seminars, Case studies, Flipped Classroom.

#### **Reference books:**

- 1. Entrepreneurship Kurup
- 2. Handbook of Entrepreneurship development Basotia and Sharma
- 3. Jose Paul and Kumar Ajith N, "Entrepreneurship Development and Management", Himalaya Publishers, New Delhi, 2000.
- 4. Dollinger, "Entrepreneurship Strategies and Resources", Pearson Education, 2003.
- 5. Holt David H, "Entrepreneurship: New Venture Creation", Prentice Hall of India, 2000

- 1. https://www.businessmanagementideas.com/entrepreneurship-2/womenentrepreneurs/21046
- 2. https://youtu.be/ol\_VZfjgkME
- 3. https://youtu.be/YxfJPCXHAwA
- 4. https://www.labiotech.eu/expert-advice/beginners-guide-biotech-life-science-marketing/
- 5. https://www.process.st/business-plan-vs-business-proposal/

# PRACTICAL

	SEMESTER III	
Course code	Title	Credits
PUSBTIII22-P1 (PRACTICAL based on PUSBTIII22-371 and PUSBTIII22- 372)	<ol> <li>Verification of Beer-Lambert's Law.</li> <li>Study of Absorption Spectra of any one coloured compound (CuSO<sub>4</sub> /CoCl<sub>2</sub>/ KMnO<sub>4</sub>).</li> <li>Plasmid Biology         <ul> <li>a) Extraction of Plasmid DNA and quantification using UV Spectrophotometry.</li> <li>b) Separation of plasmid DNA by Agarose Gel Electrophoresis.</li> </ul> </li> <li>Electrophoresis of Proteins by native PAGE and SDS- PAGE.</li> <li>Electron Microscope, Fluorescence Microscope (Lab Visit).</li> <li>Purification of any TWO Organic Compounds by Recrystallization Selecting Suitable Solvent.</li> <li>Organic Estimations: Acetone, Amide, Benzoic Acid.</li> <li>Organic Preparations:         <ul> <li>a) Acetylation of Primary Amine (Preparation of Acetanilide)</li> </ul> </li> </ol>	2
Course code	Title	Credits
PUSBTIII22-P2 (PRACTICAL based on PUSBTIII22-373 and PUSBTIII22- 374)	<ol> <li>Passive Agglutination- RA Factor Test.</li> <li>Immunoelectrophoresis</li> <li>ELISA (Kit-based) - HEPALISA.</li> <li>DOT-ELISA.</li> <li>Western Blotting - Demonstration.</li> <li>Flow Cytometry - Lab Visit.</li> <li>Study of Human chromosomal disorders - Trisomy 21 Trisomy 13 Trisomy 18, Klinefelter and Turner, Cri-du- Chat.(Preferably using online software)</li> <li>Study of Polytene Chromosomes.</li> <li>Mapping based on Three Point Cross.(Problems)</li> <li>Pedigree Analysis- Autosomal and Sex-Linked. (Problems)</li> <li>Karyotyping: Video demonstration</li> </ol>	2

Course code	Title	Credits
PUSBTIII22-P3 (PRACTICAL based on PUSBTIII22-375 and PUSBTIII22- 376)	<ol> <li>Study of <i>E.coli</i> Diauxic Growth Curve- (Lactose and Glucose).</li> <li>Study of <i>lac</i> Gene Expression using Blue-White Selection.</li> <li>Expression of β-galactosidase and Measurement of Activity.</li> <li>Screening for an Antibiotic Producing Strain of Microorganism.</li> <li>Lab Scale Production of Penicillin (Static and shaker).</li> <li>Purification of Penicillin from Broth Culture of <i>Penicillium</i> <i>spp</i>. by Solvent Extraction.</li> <li>Estimation of Penicillin from Recovered Broth by Chemical (Iodometric) Method.</li> <li>Estimation of Penicillin from Recovered Broth by</li> </ol>	2
	Biological (Bioassay) Method.	

# **SEMESTER-IV**

Course Code	Title	Credits	No. of
PUSBTIV22-471	BIOCHEMISTRY	2	Lectures
Course objectives:- The objective of this of catabolism of carbohyd Learning outcomes:- I • Understand the nucleotides. • Explain the role	course is to gain an insight into the metabolic proc rates, amino acids, lipids and nucleotides. By the end of the course the student will be able to catabolic pathways of carbohydrates, amino acid of energy rich molecules in metabolism.	cesses asso ls, lipids	ociated with
UNIT I Carbohydrate Metabolism, ETS and Energy Rich Compounds	Carbohydrate Metabolism: Glycolytic Pathway (Homolactic Fermentation; Alcoholic Fermentation) Citric Acid Cycle and its Regulation; Gluconeogenesis; Pentose Phosphate Pathway; Glyoxylate Pathway; Reductive TCA. (Sequence of Reactions, Regulation, Energy Yield and Metabolic Disorders of the above pathways) Electron Transport System: Electron Transport and Oxidative Phosphorylation, Inhibitors of ETS. Energy Rich Compounds: ATP as Energy Currency, Structure of ATP, Hydrolysis, Other Energy Rich Compounds other than ATP like PEP, Creatine Phosphate, etc.		15
UNIT II Amino Acid Metabolism	<ul> <li>Protein digestion and absorption <ul> <li>Overview of Amino acid biosynthesis</li> </ul> </li> <li>Amino Acid Catabolism: <ul> <li>Metabolic fate of amino groups:</li> <li>Transamination, Deamination, Fate of Ammonia, Urea Cycle</li> <li>Metabolic fate of carbon chain of amino acids: Breakdown of Glucogenic and Ketogenic Amino Acids.</li> </ul> </li> <li>Amino Acids as Biosynthetic Precursors: <ul> <li>Biosynthesis of Epinephrine, Dopamine, Serotonin, GABA, Histamine, Glutathione, Creatine, Indoleacetic acid and Cinnamate</li> </ul> </li> </ul>		15

UNIT III	Lipid Metabolism:	15
Lipid and	Digestion, Mobilization & Transport of Fatty	
Nucleotide	Acids.	
Metabolism	Beta oxidation of Saturated Fatty Acids; Oxidation of Unsaturated Fatty Acids; Oxidation of Odd Chain Fatty Acids.	
	Alpha and Omega Oxidation of Fatty acids. Ketone Body synthesis and breakdown.	
	(Sequence of Reactions, Regulation, Energy Yield and Metabolic Disorders of the above pathways)	
	Nucleotide Metabolism:	
	Degradation of Purines and Pyrimidines.	

Anabolic pathways and Human genetic disorders affecting carbohydrates, amino acid, lipids and nucleotide metabolism can be studied.

MOOC: Biochemistry: The Molecules of Life, Duration: 3

weekshttps://www.futurelearn.com/courses/biochemistry.

**Pedagogy:** Flow-sheet preparation, metabolic pathway poster preparation, animated videos, Flipped classroom, Case study, Google classroom for E-notes.

#### **Reference books:**

- 1. Nelson, D. L., Lehninger, A. L., & Cox, M. M. (2005). Lehninger principles of biochemistry 4<sup>th</sup> edition. Macmillan. W.H. Freeman and Company, New York.
- 2. Biochemistry, 5th Edition by U Satyanarayana, U Chakrapani Elsevier Health Sciences, 25-Jun-2020
- 3. Fundamentals of Biochemistry. 3rd Edition (2008), Donald Voet& Judith Voet , John Wiley and Sons, I. USA
- 4. Biochemistry: 7th Edition, (2012), Jeremy Berg, LubertStryer, W.H.Freeman and company, NY

- 1. https://courses.lumenlearning.com/suny-ap2/chapter/carbohydrate-metabolism-nocontent/
- 2. https://www.youtube.com/watch?v=ppqpUVaasNc
- 3. https://www.khanacademy.org/test-prep/mcat/biomolecules/fat-and-proteinmetabolism/v/digestion-mobilization-and-transport-of-fats-part-i
- 4. https://www.sciencedirect.com/topics/biochemistry-genetics-and-molecularbiology/urea-cycle
- 5. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6331359/
- 6. https://www.ncbi.nlm.nih.gov/books/NBK513323/
- 7. https://www.lecturio.com/magazine/metabolism-amino-acids/#transamination-of-amino-acids

<b>Course Code</b>	Title	Credits	No. of Lectures
PUSBTIV22-472	APPLIED CHEMISTRY –II	2	-
<b>Course objectives:-</b>	course is to have a firm foundation in the fund	lamentals a	nd applications of
current chemical theor	ies for the physical world	aumentais a	nd apprications of
Learning outcomes:-	By the end of the course the student will:		
<ul> <li>Develop an und</li> </ul>	derstanding of the different aspects of analytica	l chemistry	
<ul> <li>Gain knowledge</li> </ul>	be of natural product chemistry and related acqu	ired skills.	
• Gain an unde	erstanding of basic concents in polymer c	hemistry a	nd
Nanomaterials.	istancing of ousie concepts in polymer e	nonnstry u	
	Sampling		15
Sampling and	Importance of Sampling and Sampling		15
Sampling and	Techniques		
Tochniquos	Turnes of Semuling Doudom and Non		
rechniques	Types of Sampling - Random and Non-		
	Cases		
	Cases.		
	Turner of Concention Techniques		
	Eiltration Zong rafining Distillation		
	Vacuum Distillation		
	Solvent Extraction - Partition Coefficient		
	Efficiency Separation Easter Pole of		
	Complexing Agents Chelation Ion pair		
	Formation Solvation and Sovulation		
	Contribution, Bosic principles		
	centrilugation - Basic principles of		
UNIT II	Natural Product Chemistry:		15
Natural	Primary and Secondary Metabolites.		
Product	Distribution and biogenetic origin of		
Chemistry	natural products		
	Natural products from Microorganisms		
	and Fungi: Antibiotics, non-antibiotic		
	drugs from fungal and other microbial		
	sources, microbial phytotoxins		
	Natural products from plants:		
	Glycosides & Saponins, Alkaloids,		
	Steroids & triterpenoids, Flavonoids,		
	Coumarins & Lignans, Essential oils		

	Chromatographic Separation of Natural Products:Separation Techniques:Planar chromatography: HPTLC Column chromatography: HPLC, GC	
UNIT III Polymers and Nanomaterials	Polymers:Introduction to Polymers.Types of Polymers - Monomer, Polymer,Homopolymer, Copolymer,Thermoplastics and Thermosets, Additionand Condensation Polymers (Examplesand Uses) Stereochemistry of Polymers.Biodegradable Polymers.Biodegradable Polymers.Nanomaterials:Introduction to Nanomaterials.Forms of Nanomaterials: Nanoparticles,Nanofilms and NanotubesSynthesis and Characterization ofNanomaterials.	15

Industrial applications of Sampling and Separation techniques, Structure elucidation of Natural products, Examples of nanomaterial products.

Pedagogy: PPTs, Preparation of charts, Video based lectures

#### **References books:**

- 1. Chemistry of Natural Products, O. P. Agarwal, Goel Publishing House
- 2. Trease and Evans Pharmacognosy, William C. Evans, 16th edition
- 3. Principles and Techniques of Biochemistry and Molecular Biology, Keith Wilson and John Walker, Cambridge University Press
- 4. Organic Chemistry, R.T. Morrison, R.N. Boyd and S.K. Bhatacharjee, 7th Edition, Pearson Education (2011).
- 5. Organic Chemistry, T.W.G. Solomon and C.B. Fryhle, 9th Edition, John Wiley & Sons, (2008)
- 6. A guide to mechanism in Organic Chemistry, 6th Edition, Peter Sykes, Pearson Education
- 7. Fundamentals of Organic Chemistry, G. Marc Loudon, 4th Edition Oxford
- 8. Organic Chemistry, L.G. Wade Jr and M.S. Singh, 6th Edition,2008 7. Organic Chemistry, Paula Y. Bruice, Pearson Education, 2008
- 9. Vogel's Textbook of Quantitative Chemical Analysis, 6th Edition

- 10. Textbook of T.Y.B.Sc Analytical Chemistry Revised syllabus
- 11. Unit Operation of Chemical Engineering, 6th edition by Warren Mccabe
- 12. S.Y.B.Sc Analytical Chemistry Textbook- Sheth Publishers
- 13. Basic Concepts of Analytical Chemistry-S.M. Khopkar
- 14. Bioanalytical Techniques, M.L. Srivastava
- 15. Polymers-Textbook of Organic Chemistry, T.Y.B.Sc Himalaya Publishing House
- 16. Polymer Science-V.R. Gowariker, Viswanathan
- 17. Nanomaterials: B. Viswanathan

- https://www.researchgate.net/profile/Br-Rajeswara-Rao/post/What-is-the-mostefficient-method-for-extraction-of-phytochemicals-fromplants/attachment/59d6460ec49f478072eae357/AS%3A273831233556481%4014422 97861959/download/Natural+Products+Chemistry-Cooper%2C+Nicola.pdf
- 2. https://www.intechopen.com/books/secondary-metabolites-sources-and-applications/an-introductory-chapter-secondary-metabolites
- 3. https://www.frontiersin.org/articles/10.3389/fmicb.2019.00914/full

Course Code PUSBTIV22-473	Title	Credits	No. of
	MEDICAL MICROBIOLOGY	2	lectures
Course objectives:- The objective of this caused by microorganis Learning outcomes:- List the factors Discuss the var and prophylaxis	course is to gain insight into disease factors sms. By the end of the course the student will be able playing a role in causing a disease gain. ious aspects of systemic infections including c s.	and proces to: causative a	sses and disease gents, symptoms
UNIT I Infectious Diseases	<ul> <li>Host Parasite Relationship: Normal Flora; Factors Affecting the Course of Infection and Disease; Mechanisms of Infection and Virulence Factors.</li> <li>Infection: Patterns of Infection; Types of Infections; Signs and Symptoms; Epidemiology and Epidemiological Markers.</li> <li>Diseases: Origin of Pathogens; Vectors; Acquisition</li> </ul>		15
UNIT II Medical microbiology- Causative Organisms- I	of Infection; Koch's Postulates. <b>Skin:</b> <i>S. aureus, S. pyogenes.</i> <b>Respiratory Tract Infections:</b> <i>M.tuberculosis, S.pneumoniae</i> (Characteristics Transmission, Course of Infection, Lab Diagnosis, Management of TB, Prevention and Control, Immuno and Chemoprophylaxis, DOTS and MDR). <b>Urinary Tract Infections:</b> <i>E.coli</i> : Characteristics, Virulence, Clinical disease, and <i>E.coli</i> Infections. <i>Proteus.</i>		15
UNIT III Medical microbiology - Causative Organisms- II	GI Tract Infections: Salmonella and Shigella spp. (Characteristics, Virulence- Pathogenesis and Immunity, Clinical Disease, Carriers Lab Diagnosis, Phage Typing Prophylaxis		15

and Treatment).	
Sexually Transmitted Diseases:	
Syphilis and Gonorrhoea.	
Nosocomial Infections:	
Pseudomonas aeruginosa	
Collection & processing of Clinical	
samples	

To learn biochemical identification of other microorganisms of related infections using Bergey's Manual.

# MOOC:

- 1. https://www.coursera.org/learn/epidemics#about
- 2. https://www.lecturio.com/medical-courses/respiratory-tract-infectionsintroduction.lecture
- 3. Bacteria and Chronic Infections | Coursera.

**Pedagogy:** Google classroom & making crossword puzzle & group discussions on examples, Practical techniques, PowerPoint presentation with pictures, E- journals, Virtual labs.

#### **Reference Books:**

- 1. Microbiology–6th Edition (2006), Pelczar M.J., Chan E.C.S., Krieg N.R., The McGraw Hill Companies Inc. N.Y Presscott's Microbiology, 8th edition (2010), Joanne M Willey, Joanne Willey, Linda
- 2. Sherwood, Linda M Sherwood, Christopher J Woolverton, Chris Woolverton, McGrawHil Science Enginering, USA.
- 3. Text book of Medical Microbiology, Anantnarayan 7th Edition
- 4. Microbiology- Frobisher, 9th Edition
- 5. Microbiology, an introduction by Gerad Tortora, Berdell Funke & Christine Case, 9th Edition 2008, Pearson Education.

- 1. https://www.mayoclinic.org/diseases-conditions/infectious-diseases/symptomscauses/syc-20351173
- 2. https://www.healthline.com/health/klebsiella-oxytoca#symptoms
- 3. https://www.medicalnewstoday.com/articles/161858#medical-signs
- 4. Lesson-10.pmd (nios.ac.in) Isolation & identification of Organisms
- 5. https://youtu.be/3T7TpyCOpCo
- 6. Bacterial Infections of the Respiratory Tract | Microbiology: Health and Disease (lumenlearning.com)

<b>Course Code</b>	Title	Credits	No. of
PUSBTIV22-474	MOLECULAR DIAGNOSTICS	2	Lectures
Course objectives:- The objective of this contechniques in diagnosis. Learning outcomes:- E Gain an understa Gain critical thir Apply the know diagnostic kits.	urse is learning and understanding molecular te By the end of the course the student will be able anding of the basic principles used in molecular thing and analytical skills to understand new di ledge and skills gained in the course to be abl	echniques ar e to: r diagnosis. agnostic me le to use in	d utilizing thes ethods. developing nev
UNIT I Basics of Molecular Diagnostics	<ul> <li>Introduction to Molecular Diagnostics:</li> <li>Overview of Molecular Diagnostics;</li> <li>History of Molecular Diagnostics;</li> <li>Molecular Diagnostics in post genomic era;</li> <li>Areas used in Molecular Diagnostics;</li> <li>Future prospects - Commercialising</li> <li>Molecular Diagnostics, personalized</li> <li>medicine, Theranostics.</li> <li>Characterisation and analysis of Nucleic acids and Proteins:</li> <li>Extraction, Isolation and Detection of DNA,</li> <li>RNA and Proteins; Restriction</li> <li>Endonucleases and restriction enzyme mapping, RFLP.</li> <li>Hybridisation techniques:</li> <li>Southern, Northern, Western and FISH;</li> <li>Markers, probes and its Clinical applications.</li> </ul>		15
UNIT II Nucleic acid amplification Method	<b>Target amplification:</b> PCR - General Principle; Components of a Typical PCR reaction; Experimental Design; Primer Designing; Control of PCR Contamination and Mispriming; PCR Product Clean-up and Detection. <b>PCR Types:</b> Reverse Transcriptase PCR, Real Time PCR, Multiplex PCR, Nested PCR Applications of PCR		15

UNIT III	Disease identification and Genetic tests	15
Molecular	for following disorders- Thalassemia,	
<b>Biology based</b>	Sickle Cell anaemia, Alzheimer's disease.	
Diagnostics	Molecular Diagnostics for infectious	
	diseases: Molecular testing for Neisseria,	
	Molecular diagnosis for HIV-1;	
	Genetic Counselling and Molecular	
	Diagnosis	
	Genetic testing- Need and uses; genetic	
	counselling.	
	Case studies- Diagnostic testing for Cystic	
	fibrosis; Fragile X diagnostic and Carrier	
	testing.	
	Ethical, Social and legal issues to	
	molecular genetic testing	

Collect information about molecular therapeutics. Applications of PCR other than medical field.

#### MOOC:

- 1. https://onlinecourses.nptel.ac.in/noc21\_bt36/preview.
- 2. https://www.mooc-list.com/tags/molecular-diagnosis
- 3. https://www.futurelearn.com/courses/molecular-techniques

Pedagogy: Activity, Videos, Virtual labs.

#### **Reference books:**

- 1. Applications Genomics, Proteomics. Rastogi 3rd edition and Drug discovery
- 2. Molecular diagnostics- Fundamentals, methods and clinical applications Buckingham and Flaws F.A. Davis Company Philadelphia.
- 3. Molecular diagnostics for the clinical laboratorian by Coleman and Tsongalis, Humana Press publication

- 1. https://www.khanacademy.org/science/ap-biology/gene-expression-and-regulation/biotechnology/a/polymerase-chain-reaction-pcr
- 2. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3768498/
- 3. https://academic.oup.com/femsre/article/43/1/88/5173038
- 4. https://www.aasv.org/jshap/issues/v7n3/v7n3p125.pdf

<b>Course Code</b>	Title	Credits	No. of
PUSBTIV22-475	BIOINFORMATICS and BIOSTATISTICS	2	Lectures
<b>Course objectives:-</b> The objective of this objectives.	course is learning and understanding basic cor	acepts of B	ioinformatics a
Learning outcomes:-	By the end of the course the student will be able	to:	
<ul><li>Gain an underst</li><li>Understand the</li><li>Apply the vario</li></ul>	anding of the basic concepts of Bioinformatics tools used in bioinformatics. us statistical tools for analysis of biological data	and Biostati 	stics.
UNIT I Introduction to Computers and Biological Databases	Computer Basics: Organization of a Computer; I/O Units; Computer Memory; Processor; Operating System.MS Word, Power point, Excel Internet Basics: Connecting to the Internet, E-mail, FTP, www, Difference between www and Internet. Biological Databases: Classification of Databases – General Introduction of Biological Databases; Nucleic acid databases (NCBI, DDBJ, and EMBL). Protein databases (Primary, Composite (KEGG), and Secondary (PIR). Structure databases (CATH & SCOP)		15
UNIT II Sequence Alignments &Visualization	Local alignment and Global alignment Pairwise alignment (BLAST and FASTA Algorithm) <b>BLAST and Sequence Alignment:</b> BLAST and its Types; Retrieving Sequence using BLAST. <b>Multiple Sequence Alignment:</b> Progressive Alignment Algorithm (ClustalW), Application of multiple sequence alignment. <b>Protein Structure Visualization Software</b> (RasMol). <b>Phylogenetic analysis:</b> Definition and		15

	of genetic sequences of organisms, Phylogenetic analysis tools.	
UNIT III Biostatistics	Theory and Problems based on- Coefficient of Correlation and Regression Analysis; Steps in Testing Statistical Hypothesis; Parametric Tests:- Z Test – Single Mean and Two Means, t- Test – Single Mean, Paired and Unpaired; Chi square Test.	15

Use of bioinformatics tools in genomics and Proteomics. Application of Biostatistics in Pharmaceutical industry, Research & Development, Education & Commercial Industries.

#### MOOC:

1. https://www.my-mooc.com/en/mooc/bioinformatics-introduction-and-methods-sheng-wu-xin-xi-xue-dao-lun-yu-fang-fa/

2. https://www.coursera.org/learn/bioinformatics-methods-1

3. https://www.coursera.org/learn/introduction-to-computers-and-office-productivity-software.

**Pedagogy:** Google classroom, online bioinformatics software, YouTube videos, Online Worksheets.

#### **Reference books:-**

1. Bioinformatics- methods and Applications S.C.Rastogi, N. Mendiratta, Prentice Hall India Learning Private Limited

- 2. Introduction to Bioinformatics by Attwood & Parry-Smith
- 3. Biostatistics by Malhan & Arora
- 4. Biostatistics by B.K.Mahajan, 6th edition
- 5. Biostatistics by Veer Bala Rastogi

- 1. https://www.ncbi.nlm.nih.gov/
- 2. https://www.ebi.ac.uk/
- 3. https://www.rcsb.org/
- 4. https://www.uniprot.org/
- 5. https://scope-international.online/biostatistics/
- 6. https://study.com/articles/How\_to\_Become\_a\_Research\_and\_Development\_Biostatist ician.html

Course Code PUSBTIV22-476	Title	Credits	No. of
	ENVIRONMENTAL BIOTECHNOLOCY	2	Lectures
	DIOTECHNOLOGI		
Course objectives:-			
The course is an introdu	iction to environmental biotechnology and focu	ises on the ut	ilization of
Learning outcomes.	waste and water treatment. By the end of the course the student will be able	e to:	
• Understand the	application of available energy sources.		
• Understand the	current applications of biotechnology to enviro	onmental qua	lity evaluation
monitoring and	remediation of contaminated environments.	1	5
Unit I	<b>Energy sources renewable</b> – Solar		15
<b>Renewable sources</b>	energy, wind power, geothermal energy		
of Energy	and hydropower, Biomass energy,		
	Biogas technology- biogas plant & types,		
	Bio digester.		
	Biogas- composition, production		
	and factors affecting production, uses.		
	<b>Biofuels</b> – ethanol production.		
	Microbial hydrogen production		
	Biodiesel, Petrocrops.		
Unit II	Biological processes for industrial		15
Industrial effluent	effluent treatment - Aerobic biological		
treatment	treatment, Activated sludge process,		
	CASP, Advanced activated sludge		
	processes (any two) Biological filters,		
	RBC, FBR		
	Anaerobic biological treatment- Contact		
	digesters, Packed bed reactors, Anaerobic		
	Solid weste treatment		
	Pollution indicators & biosensors -		
	Biodegradation of xenobiotics-		
	persistent compounds, chemical		
	properties influencing biodegradability,		
	microorganisms in biodegradation.		
	Use of immobilized enzymes or		
	microbial cells for treatment.		

Unit III	Wastewater treatment: Introduction,	15
Waste water	Biological treatment, impact of pollutants	
treatment	on bio treatment, use of packaged	
	organisms and genetically engineered	
	organisms in waste treatment.	
	Heavy metal pollution: Sources,	
	microbial systems for heavy metal	
	accumulation, techniques used for heavy	
	metal removal.	
	Bioremediation: Biosorption by bacteria,	
	fungi and algae, factors affecting	
	biosorption limitations of biosorption.	

Learn production of zero carbon (or carbon negative) renewable fuels; Artificial Photosynthesis. Commercial application of use of consortia of microorganisms in Bioremediation.

#### MOOC:

- 1. Wastewater Treatment and Recycling Course (nptel.ac.in), Duration 12 weeks, Credit points 3.
- 2. Environmental Biotechnology Course (nptel.ac.in)

**Pedagogy**: Animated videos, Google classroom for E- Notes, Presentations, Group Discussion, YouTube videos, Case study of examples, E- Journals.

#### **Reference books:**

- 1. Environmental Biotechnology Allan Scragg Oxford University press
- 2. Environmental Biotechnology Indu Shekhar Thakur IK International (Basic concepts and applications).
- 3. Environmental Biotechnology by M. H. Fulekar
- 4. Environmental Biotechnology (Industrial pollution management) S. N. Jogdand, Himalaya Publishing house.
- 5. Environmental Chemistry A. K. De

- 1. https://www.youtube.com/watch?v=3UafRz3QeO8
- 2. https://www.csir.res.in/achivement/csir-pride/energy
- 3. https://youtu.be/QERmaMtEtY8
- 4. https://youtu.be/67BvwMofkMU
- 5. https://youtu.be/uAyVcR17COs

<b>Course Code</b>	Title	Credits	No. of
PUSBTIV22-477	RESEARCH METHODOLOGY	2	Lectures
Course objectives:- The objective of this c Learning outcomes:- • Understand bas • Understand a g • Identify the ov	ourse is to develop research aptitude, logical th By the end of the course the student will be ab sic principles of research methodology and iden general definition of research design. erall process of designing a research study from	inking and r le to: ntify a resear n its inceptio	easoning. rch problem. on to its report.
UNIT I Introduction to Research Methodology and Research Problem	Meaning of Research; Objectives of Research; Motivation in Research; Types of Research; Research Approaches; Significance of Research; Research Methods versus Methodology; Research Process; Criteria of Good Research; Problems Encountered by Researchers in India; What is a Research Problem? Selecting the Problem; Necessity of Defining the Problem; Technique Involved in Defining a Problem		15
UNIT II Research Design and Data Collection	Meaning of Research Design; Need for Research Design; Features of a Good Design; Important Concepts Relating to Research Design; Different Research Designs; Basic Principles of Experimental Designs; Developing a Research Plan- Collection of Primary Data; Observation Method; Interview Method; Collection of Data through Questionnaires; Collection of Data through Schedules; Other Methods of Data Collection, Collection of Secondary Data, Selection of Appropriate Method for Data Collection Case Study Method		15

UNIT III	Meaning of Interpretation, Technique of	15
Interpretation and	Interpretation, Precaution in Interpretation -	
Report	paraphrasing, Significance of Report	
Writing	Writing,	
	Different Steps in Writing Report, Layout	
	of the Research Report, Types of Reports,	
	Oral Presentation, Mechanics of Writing a	
	Research Report, Precautions for Writing	
	Research Reports	
	Bibliography (APA and MLA)	
	Presenting Research: Oral and Poster	
	Publication, Impact factor of Journals, H-	
	Index, Plagiarism	
	Research Organizations in Biological	
	Sciences in India: DBT, DST, CCMB, NIV	
	1	

Use of data collection methods in Semester VI projects, conducting survey-based research project, Exploring online software's for statistical analysis of data

#### MOOC:

- 1. https://www.coursera.org/learn/research-methods,
- 2. https://www.coursera.org/specializations/data-collection
- 3. https://www.classcentral.com/course/swayam-academic-and-research-report-writing-20220

Pedagogy: Google classroom, E-journals, Discussion, PPTs

#### **Reference books:**

- 1. Research Methodology: Methods and Techniques, C. R. Kothari, New Age International Publishers
- 2. Research Methods for the Biosciences. Holmes, Moody & Dine. Oxford University Press

- 1. https://gradcoach.com/what-is-research-methodology/
- https://www.cusb.ac.in/images/cusbfiles/2020/el/cbs/MCCOM2003C04%20(Business%20Research%20Methods)Researc h\_Methodology\_C\_R\_Kothari.pdf
- 3. https://eduvoice.in/types-research-methodology/
- 4. ttps://www.researchgate.net/publication/325546150\_WRITING\_RESEARCH\_REPO RT
- 5. https://eduvoice.in/types-research-report-writing/
- 6. https://www.ox.ac.uk/students/academic/guidance/skills/plagiarism#:~:text=Plagiaris m%20is%20presenting%20someone%20else's,is%20covered%20under%20this%20d efinition.

# PRACTICAL

	SEMESTER IV		
Course code	Title	Credits	
PUSBTIV22-P1 (PRACTICAL	1. Determination of Lactate Dehydrogenase (LDH) Activity in Blood Serum.	2	
based on PUSBTIV22-471 and PUSBTIV22-	2. Organ Function Tests: Liver (SGPT, SGOT); Kidney (Urea from Serum).		
472)	3. Estimation of Uric acid and Creatinine in Urine.		
	4. Qualitative Detection of Ketone Body in Urine.		
	5. Isolation of Mitochondria and Demonstration of ETC using a Marker Enzyme.		
	<ul><li>6. Separation of Inorganic Binary (Solid-Solid) Mixture (Min 4 mixtures containing 2 cations and 2 anions).</li></ul>		
	<ol> <li>Identification of Organic Compounds of Known Chemical Type (Min 4 Compounds).</li> </ol>		
	8. Instrumentation - GC, HPLC, HPTLC analysis (Lab visit)		
	9. Qualitative detection of Secondary metabolites		
	10. Separation of any one secondary metabolite by TLC		
	11. Chemical and Biological Synthesis of Silver Nanoparticles		
	and its characterisation by 0 v - vis Spectrophotometer.		
Course code	Title	Credits	
PUSBTIV22-P2 (PRACTICAL	1. Identification of <i>S. aureus</i> -Isolation, Catalase, Coagulase Test.	2	
based on PUSBTIV22-473 and	2. Identification of <i>E. coli</i> -Isolation, Sugar Fermentations, IMViC.		
PUSBTIV22-474)	3. Identification of <i>Salmonella</i> - Isolation, Sugar Fermentations, TSI Slant.		
	4. Identification of <i>Pseudomonas</i> - Isolation, Urease test, Oxidase Test, TSI Slant.		
	5. RPR Test (Kit Based).		
	6. Permanent Slide- Mycobacterium.		
	<ol> <li>Isolation, Quantitative Analysis and AGE of Genomic DNA from Yeast.</li> </ol>		
	8. Isolation and Quantification of RNA from Yeast.		
	9. Restriction Mapping Problems.		
	10. RFLP- Kit Based.		
	11. DNA Amplification – PCR.		

Course code	Title	Credits
PUSBTIV22-P3 (PRACTICAL based on PUSBTIV22-475 and PUSBTIV22-476)	<ol> <li>MS Power point, MS Excel</li> <li>Familiarization with NCBI, EMBL, DDBJ, PIR, KEGG Databases.</li> <li>Use of NCBI BLAST Tool.</li> <li>Pairwise and Multiple Sequence Alignment and Phylogeny.</li> <li>Classification of Proteins using CATH/SCOP.</li> <li>Visualization PDB Molecules using Rasmol/Raswin.</li> </ol>	2
	<ol> <li>Determination of Total solids from an effluent sample.</li> <li>Study of physico-chemical parameters (pH, colour, turbidity, BOD, COD) of an industrial effluent sample.</li> <li>Most Probable Number (MPN) – Presumptive, Confirmed and Completed tests.</li> <li>Bioremediation of metal.</li> <li>Visit to STP / CETP</li> </ol>	

#### **Summer Training:**

- 1. This should be taken up in the summer over a period of one month preferably in an immunology / veterinary / virology institute or a laboratory using recombinant DNA methods.
- 2. The students could also be assigned to assist a clinic (in a hospital), a fermentation plant, brewery or bakery and watch the various stages in brewing and baking and post-fermentation processing. Prior arrangement must be made on the mode of interaction of the educational institute with the clinic and the industry.

# Evaluation pattern S.Y Biotechnology (Autonomous) 2022 -2023

1. Core Courses: The College will conduct all the Semester examinations of 100 marks per Theory Paper in the prescribed pattern of 40 marks of internal assessment/Project work and 60 marks for Semester end examination. The student will have to secure a minimum of 40% marks in Internal assessment as well as Semester end examination per theory paper.

2. In each semester, the student will have to submit a Project/Assignment/Journal for theory papers in the College before appearing for the Semester End Examination.

3. The Project work will be carried out by the student with the guidance of the concerned Faculty Member who will be allotted to the student as the Guide for the Project.

4. The College will conduct all the Semester examinations of 100 marks per Practical Paper at the end of each semester. The student will have to secure a minimum of 40% marks in the examination per practical paper.

1.	INTERNAL ASSESSMENT		40 Marks
1.1 1.2	One class test (Objectives/ Multiple Choice) Assignment/ Project/ Presentation/Book or Research paper review report/Business proposal presentation/Case-study		20 Marks 15 Marks
1.3	Active Pa	05 Marks	
2.	EXTER	60 Marks	
	N.B. 1. 4 2. 4		
	Q.1.	<b>Based on Unit-I, II &amp; III</b> Multiple choice questions/Fill in the blanks /Match the column/Give one word/Name the following/Give an example/Explain the term/Define/Give significance/State the role of	12
	Q.2.	Unit-I Long Answer Question Short Answer Question	<b>12</b> 12/08/06 04/02
	Q.3.	Unit-II Long Answer Question Short Answer Question	<b>12</b> 12/08/06 04/02

# **Evaluation Pattern For S.Y.B.Sc. Biotechnology (Theory)**

Q.4.	Unit-III Long Answer Question Short Answer Question	<b>12</b> 12/08/06 04/02
Q.5. six)	Short Notes based on Unit I, II and III (Solve any three out of	12

# Practical

EXTERNAL ASSESSMENT (Practical)	100 Marks
Experiment - 1(Major technique)	25
Experiment - 2 (Major technique)	25
Experiment - 3 (Minor technique)	15
Experiment - 4 (Minor technique)	15
Viva/Identification/Spots	10
Journal	10
TOTAL MARKS	100

# DSPM'S K. V. PENDHARKAR COLLEGE, ARTS, SCIENCE AND COMMERCE DOMBIVLI- (E) (AUTONOMOUS) (Affiliated to University of Mumbai)

Faculty of Commerce Department of Accountancy

**Proposed Syllabus & Question Paper Pattern** 

Of Course of B.Com & M.Com(Advanced Accountancy) Programme

F.Y.B.Com. and M.Com (Advanced Accountancy)

First Year : Semester I and II

(Under Choice Based Credit, Grading and Semester System to be Implemented from Academic Year 2021-20222)
# B.Com. & M.Com. Programme

# Under Choice Based Credit, Grading and Semester System

# **Course Structure**

# F.Y.B.Com.

# (To be implemented from Academic Year 2021-2022)

<b>Course Code</b>	Semester I	Credits	<b>Course Code</b>	Semester II	Credits
PUCACI21-111	Accountancy and	03	PUCACII21-211	Accountancy and	03
	Financial Management – I			Financial Management - II	

# M.Com. – I (Advanced Accountancy)

# (To be implemented from Academic Year 2021-2022)

Course Code	Semester I	Credits	<b>Course Code</b>	Semester II	Credits
PPCACI21-803	Cost and Management Accounting	06	<b>PPCACI21-703</b>	<b>Corporate Finance</b>	06

#### **PROPOSED SYLLABUS(UG)**

#### F.Y.B.COM : SEM – I ACCOUNTANCY & FINANCIAL MANAGEMENT - I

#### **OBJECTIVES :**

- To enhance the abilities of learners to incorporate the concept of Accounting Standards.
- To enable the learners to understand, develop and apply the basic banking transactions practically.
- To enable the learners in understanding, preparing and presenting the financial statements of Departmental Accounts.
- To impart the knowledge of Hire Purchase Transactions.

#### SEMESTER – I

#### ACCOUNTANCY AND FINANCIAL MANAGEMENT-I (PUCACI21-111)

Sr.No.	Current Syllabus	Under Autonomy	No. of
			Lectures
1.	Accounting Standards issued	Accounting Standards issued	15
	by ICAI and Inventory	by ICAI and Inventory	
	Valuation	Valuation	
2.	Final Accounts of	<b>Basic Banking Transactions</b>	<mark>15</mark>
	Manufacturing Concern		
3.	Departmental Accounts	Departmental Accounts	15
4.	Accounting for Hire Purchase	Accounting for Hire Purchase	15

#### (Credit Points : 3)

Justification :

Old Module : The format of Final Account used under this topic for the manufacturing concern has became outdated and not so useful in practical life. Replaced Module : The Learner will get the knowledge of digital banking transactions which is practically useful for them in today's accounting system.

### CONTENTS OF THE SYLLABUS UNDER AUTONOMY : FYBCOM SEM – I

Sr. No.	Modules	No. of lectures
1.	Module 1: Accounting Standards issued by ICAI and Inventory Valuation	15
	Accounting Standards:	
	Concepts, Benefits, Procedures for Issue of Accounting Standards	
	Various AS:	
	AS-1: Disclosure of Accounting Policies	
	(a) Purpose (b) Areas of Policies (c) Disclosure of Policies (d) Disclosure of Change in Policies ( e ) Illustrations	
	AS-2: Valuation of Inventories (Stock)	
	(a) Meaning, Definition (b) Applicability (c) Measurement of Inventory (d) Disclosure in Final Account (e ) Explanation with Illustrations	
	AS-9: Revenue Recognition	
	<ul> <li>(a) Meaning and Scope (b) Transactions excluded (c) Sale of Goods (d) Rendering of Services (e) Effects of Uncertainties (f) Disclosure (g) Illustrations</li> </ul>	
	• Inventory Valuation:	
	Meaning of Inventories	
	Cost of Inventory Valuation	
	Inventory Systems: Periodic Inventory System and Perpetual Inventory System	
	Valuation: Meaning and importance	
	Methods of Stock Valuation as per As-2: FIFO and Weighted Average Method	

Computation of Valuation Inventory as on balance sheet date: If	
inventory is taken on a date after the balance sheet or before the	
balance sheet.	
	1

2.	Module 2: Basic of Banking Transactions	15
	<ul> <li>Preparing of Cheques, Demand Draft ,Pay-in-Slip and Withdrawal Slip</li> <li>Filling KYC forms – Account Opening Form – Physically and Online</li> <li>Preparation of Bank Reconciliation Statement</li> <li>Types of Accounts : Saving, Fixed Deposit, Recurring Deposit and Loans</li> <li><u>Introduction to e-payment:</u> <ul> <li>Types of e-payment : Google Pay, UPI, Amazon Pay,</li> <li>Paypal</li> <li>Modes of e-payment : IMPS, NEFT and RTGS</li> <li>Cyber Security in net-banking</li> </ul> </li> </ul>	
3.	Module 3: Departmental Accounts	15
	<ul> <li>Meaning</li> <li>Basis of Allocation of Expenses and Incomes/Receipts</li> <li>Inter Departmental Transfer: At Cost Price and Invoice Price</li> <li>Stock reserve</li> <li>Practical Problems on Departmental Final Accounts (Trading and Profit &amp; loss Account and Balance Sheet)</li> </ul>	
4.	Module4: Accounting for Hire Purchase	15
	<ul> <li>Meaning</li> <li>Calculation of Interest</li> <li>Accounting for hire purchase transactions by asset purchase method based on full cash price</li> <li>Practical Problems on Journal Entries, Ledger Accounts and Disclosure in balance sheet for hirer and vendor</li> <li>(Excluding default, repossession and calculation of cash price)</li> </ul>	

# **TOPIC-WISE OUTCOMES (SEM – I)**

Sr.No.	Topics	Outcomes
1.	Accounting Standards issued by ICAI and Inventory Valuation	Students will impart the knowledge of Accounting standards. Applicability of Accounting Standards Objectives of Inventory valuation, its systems and methods with reference to AS2.
2.	Basic of Banking Transactions	Students will understand how to fill up the bank vouchers It will make the students aware about the Bank Reconciliation Statements Students can understand types of accounts To make students aware about mode of e-payment through banks To impart the students with the threats in internet banking.
3.	Departmental Accounts	It help students to know the allocation of expenses and income among the departments, to analyse individual profit made by the departments, to find out unprofitable departments and take corrective measures for the same.

4.	Accounting for Hire Purchase	Students will come to know how
		to calculate hire purchase price,
		cash price, instalment, interest
		etc. and its applicability in
		practical life.

#### F.Y.B.COM : SEM – II ACCOUNTANCY & FINANCIAL MANAGEMENT - II ECTIVES :

#### **OBJECTIVES :**

- To enhance the abilities of learners to prepare the final accounts from incomplete records maintained in the business.
- To enable the learners to understand the concept of Mutual Funds and it's applicability for selection of mutual fund schemes.
- To incorporate the skills of preparing and presenting the accounts of branch under dependent method.
- To make them aware about basics of insurance and able to carry out the fire insurance claims.

#### **SEMESTER – II**

#### ACCOUNTANCY AND FINANCIAL MANAGEMENT-II (PUCACI121-211)

Sr.No.	Current	Under Autonomy	No. of Lectures
1.	Accounting from	Accounting from	15
	<b>Incomplete Records</b>	Incomplete Records	
2.	Consignment	<b>Basic of Mutual Fund</b>	<mark>15</mark>
	Accounts	<b>Transactions</b>	
3.	<b>Branch Accounts</b>	Branch Accounts	15
4.	Fire Insurance Claim	Introduction to Insurance	<mark>15</mark>
		and Fire Insurance Claim	

#### (Credit Points : 3)

#### **Justification :**

Old Module : Consignment Accounts is old concept and now it is not applicable in the practical accounting system. Replaced Module :

- Basic of Mutual Fund Transactions is the need of the todays' investment scenario. It creates employability to the learners.
- Introduction to Insurance will give the knowledge regarding basic insurance concepts to the learners which can be useful for them for their advanced learning.

Sr. No.	Modules	No. Of lectures
1.	Module 1: Accounting from Incomplete Records	15
	Introduction of Single Entry System	
	Distinguish Between Single Entry System and Double Entry System	
	Journal Entries and Ledgers	
	Short Practical Problems on preparation of Debtors A/c/ Creditors A/c/ Bills Receivable A/c/ Bills Payable A/c	
	Problems on preparation of final accounts of proprietary Trading Concern ( Conversion Method)	
2.	Module2: Basic of Mutual Fund Transactions	15

#### CONTENTS OF THE SYLLABUS UNDER AUTONOMY : FYBCOM SEM – II

Introduction to Mutual funds (History, Concepts, Structure of	
MF ,Types of Mutual Fund Schemes)	
SIP and Repurchase of mutual fund units	
<b>Role of Mutual Fund Distributors/Advisor</b>	
Preparation of Financial Statement of MFs	
Evaluation of Mutual Fund Schemes: NAV ,Asset Under	
Management, Returns of the scheme, Standard Deviation,	
Sharpe Ratio and Treynor Ratio	
(Practical Contents : Investment in Mutual Funds Schemes through	
Mobile App, Online KYC on investment in Mutual Funds and	
Calculation of NAV and Evaluation of Mutual Funds Schemes)	

3.	Module3: Branch Accounts	15
	Meaning and Classification of Branch Accounting for Dependent Branch as per : (Practical	
	Problems)	
	(a) Debtors method (Goods sent at Cost Price Method and Goods sent at Invoice Price Method)	
	(b) Stock and Debtors Method (Goods sent at Cost Price Method and Goods sent at Invoice Price Method)	
4.	Module 4: Introduction to Insurance and Fire Insurance Claim	15

Introduction to Insurance	
Types of Insurance : Life Insurance and General Insurance (Fire Insurance)	
Practical Problems on :	
(a) Computation of Loss of stock by fire	
(b) Ascertainment of fire insurance claim as per the Insurance policy	
Exclude: Loss of Profit and Consequential Loss	

# **TOPIC-WISE OUTCOMES (SEM – II)**

Sr.No.	Topics	Outcomes

1.	Accounting from Incomplete Records	Students will be able to identify the difference between Single Entry and Double Entry System. Able to know the applicability of Single Entry and reason to convert into Double Entry. Will acquaint with conversion method.
2.	Basic of Mutual Fund Transactions	Students get knowledge about the basic concept of mutual funds. It make them aware about the practical approach and employable.
3.	Branch Accounts	It imparts the students with the knowledge regarding the method for maintaining accounts in Branch, ascertain profit/loss made by Branch and take corrective measures against unprofitable branches.
4.	Introduction to Insurance and Fire Insurance Claim	It makes students aware about the life insurance and general insurance products. Students will familiarize with the necessity of insurance, procedure for determination of insurance claim. Treatment of abnormal items and application of average clause. Calculation of insurance claim to be lodge with the Insurance Company.

#### PAPER PATTERN (60:40) INTERNAL & PRACTICAL EXAMINATION (UG)

#### **INTERNAL EXAMINATION PATTERN : 40 MARKS**

#### (A) CLASS TEST : 10 MARKS (Online Mode)

Multiple Choice Questions : (Any 10 out of 12) – 1 mark each

#### (B) PRACTICAL WORK : 10 MARKS (Online/Offline Mode)

(C) Preparation of Expenditure Budget of Home/ Sole Proprietary Firm/ Co-operative Housing Societies : 10 MARKS (Online Mode)

(D) Power Point Presentation/Group Discussion : 10 MARKS

#### **SEMESTER END EXAMINATION (UG)**

#### **SEMESTER END EXAMINATION PATTERN : 60 MARKS**

#### **DURATION : 2 hours**

Questions	Marks
Q.1 Multiple Choice Questions: (any 15 out of 18)	[15M]
Q.2 Practical Problem.	[15M]
OR	
Q.2 Practical Problem.	
Q.3 Practical Problem.	[15M]
OR	
Q.3 Practical Problem.	
Q.4 Practical Problem.	[15M]
OR	
Q.4 Write Short Notes on: (any 3 out of 5) (5 marks each)	

% of Marks	Grade Point	Grade	Performance
Obtained			
80.00 and above	10	0	Outstanding
70 - 79	9	A+	Excellent
60 - 69	8	A	Very Good
55 - 59	7	B+	Good
50- 54	6	В	Above Average
45 - 49	5	C	Average
40 - 44	4	D	Pass
Less than 40	0	F	Fail

#### **GRADE PATTERN : (10 POINTS)**

#### **REFERENCE BOOKS FOR ACCOUNTANCY AND FINANCIAL MANAGEMENT PAPER I & PAPER II :**

- Introduction to Accountancy by T. S. Grewal, S. Chand and Company (P) Ltd., New Delhi Advance Accounts by Shukla & Grewal, S. Chand and Company (P) Ltd., New Delhi
- Advanced Accountancy by R. L Gupta and M Radhaswamy, S. Chand and Company (P) Ltd., New Delhi
- Modern Accountancy by Mukherjee and Hanif, Tata Mc. Grow Hill & Co. Ltd., Mumbai Financial Accounting by LesileChandwichk, Pentice Hall of India Adin Bakley (P) Ltd.
- Financial Accounting for Management by Dr. Dinesh Harsalekar, Multi-Tech. Publishing Co. Ltd., Mumbai.
- Financial Accounting by P. C. Tulsian, Pearson Publications, New Delhi Accounting Principles by Anthony, R.N. and Reece J.S., Richard Irwin Inc.
- Financial Accounting by Monga, J.R. Ahuja, GirishAhujaandShehgal Ashok, Mayur Paper Back
- Compendium of Statement & Standard of Accounting, ICAI.
- Indian Accounting Standards, Ashish Bhattacharya, Tata Mc. Grow Hill & Co. Ltd., Mumbai Financial Accounting by Williams, Tata Mc. Grow Hill & Co. Ltd., Mumbai
- Company Accounting Standards by ShrinivasanAnand, Taxman. Financial Accounting by V. Rajasekaran, Pearson Publications, New Delhi. Introduction to Financial Accounting by Horngren, Pearson Publications.

• Financial Accounting by M. Mukherjee.M. Hanif. Tata McGraw Hill Education Private Ltd; New Delhi

#### PROPOSED SYLLABUS (PG)

#### M.COM (ADVANCED ACCOUNTANCY) : SEM - I

#### **OBJECTIVES :**

- To enhance the skills of learners to develop the concept of cost and management accounting and its significance in the business.
- To facilitate the learners to recognize, build up and apply the techniques of costing in the decision making in the business corporates.
- To enable the learners in understand and inculcate the skills of preparing and presenting the financial report in the business corporates.

#### SEMESTER – I

#### COST AND MANAGEMENT ACCOUNTING (PPCACI21-803)

#### (Credit Points : 6)

Sr.No.	Current Syllabus	Under Autonomy	No. of
			Lectures
1.	Marginal Costing,	Marginal Costing, Absorption Costing	15
	Absorption Costing and	and Management Decisions	
	<b>Management Decisions</b>		
2.	Standard Costing	Standard Costing	15
3.	<b>Budgetary Control</b>	Budgetary Control	<mark>15</mark>
		(Excluding sales budget)	
4.	<b>Operating Costing</b>	Service Costing (Excluding Transport	<mark>15</mark>
		Costing)	

**Justification :** 

Old Modules : As the concept of Sales Budget and Transport Costing is already included in the T.Y.B.Com Syllabus so these concepts are being removed from the syllabus.

Replaced Modules : The Modules are the same as in the current syllabus, only the concept which is included in the T.Y.B.Com. Syllabus has been omitted from the proposed syllabus.

#### **CONTENTS OF THE SYLLABUS UNDER AUTONOMY : M.COM SEM – I**

Sr. No.	Modules	No. of lectures
1.	Module 1 : Marginal Costing, Absorption Costing and Management Decisions	15
	<ul> <li>Meaning of Absorption Costing – Distinction between Absorption Costing and Marginal Costing – Problems on Breakeven Analysis – Cost Volume Profit Analysis – Breakeven Charts – Contribution Margin and Various Decision Making Problems.</li> <li>Managerial Decisions through Cost Accounting such as Pricing Accepting Special Offer – Profit Planning – Make or Buy Decisions – Determining Key Factors – Determining Sales Mix – Determining Optimum Activity Level – Performance Evaluation – Alternative Methods of Production, Cost Reduction and Cost Control.</li> </ul>	
2.	Module 2 : Standard Costing	15
	• Standard Costing as an Instrument of Cost Control and Cost Reduction – Fixation of Standards – Theory and Problems based on Analysis of Variance of Materials, Labour, Overheads and sales including sub-variances.	
3.	Module 3 : Budgetary Control( Excluding sales budget)	15
	<ul> <li>Meaning of Budget and Budgetary Control</li> <li>Types of Budgets : Zero Based Budget – Performance Budgets – Functional Budgets Leading to the Preparation of Master Budgets – Capital Expenditure Budget – Fixed and Flexible Budgets</li> <li>Practical Problems on preparation of above mentioned budgets. (Excluding Sales Budget)</li> </ul>	
4.	Module 4 : Service Costing (Excluding Transport Costing)	15

Meaning of Service Costing	
Determination of Per Unit Cost	
Collection of Costing Data	
Practical Problems based on Costing of Hospital, Hotels, Canteens,	
Street Light and Road Maintenance	

#### **TOPIC-WISE OUTCOMES**

Sr.No.	Topics	Outcomes
1.	Marginal Costing, Absorption Costing and Management Decisions	Students will be able to determine profitability at different level of production and sale.
		Able to know the recognition of all costs involved in production and profit can be tracked during an accounting period.
		Students can understand the causes of market failures and economic role of government.
2.	Standard Costing	Students can learn the computation of all cost and revenue variances.
		It enables to understand the causes for variances and fix responsibilities.
3.	Budgetary Control (Excluding sales budget)	Students will be able to know the effective way of controlling cost and eliminating wastage.
		It imparts the skill of effective planning, communication and decision making.

4.	Service Costing (Excluding Transport Costing)	Students comes to know how to determine the per unit cost.
		Students can learn how to collect the costing data.
		It imparts the practical knowledge of determining the cost of hotels, hospitals, canteens, street lights and road maintenance.

#### M.COM (ADVANCED ACCOUNTANCY) : SEM – II CORPORATE FINANCE

#### **OBJECTIVES :**

- To enlarge the abilities of learners to know the objectives of Financial Management.
- To enable the learners to understand and apply the techniques of investment in the financial decision making in the business corporates.
- To enhance the abilities of learners to analyse the financial statements.

#### **SEMESTER – II**

#### **CORPORATE FINANCE (PPCACI21-703)**

#### (Credit Points : 6)

Sr.No.	Current Syllabus	Under Autonomy	No. of
			Lectures
1.	Introduction to Financial	Introduction to Financial	05
	Management	Management	
2.	Time Value of Money	Time Value of Money	05

3.	Financial Analysis	Ratio Analysis including Reverse	<mark>15</mark>
		<b>Ratios &amp; Interpretation</b>	
4.	Cost of Capital	Cost of Capital	15
5.	Capital Structure Theories	Capital Structure Theories	10
6.	<b>Business Risk and Financial</b>	Business Risk and Financial Risk	10
	Risk		

#### **Justification :**

Additional Concept : No module has been omitted from the syllabus instead an additional concept of interpretation is introduced in the topic of Ratio Analysis including Reverse Ratios.

Sr. No.	Modules	No. of lectures
1.	Module 1 : Introduction to Financial Management	05
	• Introduction, Meaning, Importance, Scope, Objectives, Profit v/s Value Maximisation.	
2.	Module 2 : Time Value of Money	05
	• Concept, Present Value, Annuity, Techniques of Discounting, Techniques of Compounding, Bond Valuation and YTM.	
3.	Module 3 : Ratio Analysis including Reverse Ratios& Interpretation	15

#### CONTENTS OF THE SYLLABUS UNDER AUTONOMY : M.COM SEM - II

	Financial Performance Analysis and it's Interpretation:	
	• Profitability Ratios : Gross Profit Ratio, Operating Profit Ratio and Return on Capital Employed.	
	• Efficiency Ratios : Sales to Capital Employed, Sales to Fixed Assets, Profit to Fixed Assets, Stock Turnover Ratio, Debtors Turnover Ratio and Creditors Turnover Ratio.	
	• Liquidity Ratios : Current Ratio and Quick Ratio	
	• Stability Ratios : Capital Gearing Ratio and Interest Coverage Ratio	
	• Investor's Analysis: Earning Per Share, P/E Ratio and Dividend Yield.	
4.	Module 4 : Cost of Capital	15
	• Introduction and Definition of Cost of Capital,	
	• Classification of Cost : Explicit, Implicit, Average and Marginal	
	• Measurement of Cost of Capital - Cost of Debt, Cost of Preference Shares, Cost of Equity (Dividend Approach, Earning Price Approach, Dividend + Growth Approach, Earning Price + Growth Approach , Cost of Retained Earnings	
	• WACC	
	Marginal Cost of Capital	
5.	Module 5 : Capital Structure Theories	10
	Meaning : Capital and Capitalisation	
	• Over Capitalisation and Under Capitalisation	
	Choice of Capital Structure	
	• Importance and Optimal Capital Structure	
	• EBIT-EPS Analysis	
	• Indifference Point	
	• Capital Structure Theories – Net Income Approach, Net Operating Income Approach, Traditional Approach, Modigliani Miller Approach	
	<ul> <li>Dividend Decision Theories – Walter's Model, Gordon's Growth Model, MM Model</li> </ul>	

6.	Module 6 : Business Risk and Financial Risk	10
	Introduction	
	• Debt v/s Equity Financing	
	Types of Leverages	
	Investment Objective	
	• Criteria for Individual	
	Non-Business Purpose	

#### **TOPIC-WISE OUTCOMES**

Sr. No.	Topics	Outcomes
1.	Introduction to Financial Management	Students will be able to demonstrate an understanding of the overall role and importance of the finance function. It imparts them with the knowledge of effective
		communication using standard business terminology.
2.	Time Value of Money	It enables them to know that the cash you have today has a higher value than cash that you are anticipating in the future.
		It helps them to know how money available today can be used to make an investment and earn interest.

3.	Ratio Analysis including Reverse Ratios & Interpretation	The students will be able to take an informed and intelligent decision on their investment by applying the ratios on the financial statements of the Companies.
4.	Cost of Capital	Students can be made aware about how to determine the necessary return a company must generate before moving forward on a capital project. Students will be able to calculate the cost of capital on various funds and an average cost of capital.
5.	Capital Structure Theories	Students comes to know about the types of money and their sources that are funding the business. It imparts them with the knowledge of return a company earns for its shareholders as well as whether or not a firm survives in a recession or depression.
6.	Business Risk and Financial Risk	It makes students aware about the possible business and financial risk in the market. It helps students to forecast about the possible losses and negative outcomes associated with the money invested.

#### PAPER PATTERN (60:40)

#### **INTERNAL EXAMINATION (PG)**

#### **INTERNAL EXAMINATION PATTERN : 40 MARKS**

(A) CLASS TEST : 20 MARKS (Online Mode)

- Multiple Choice Questions : (10 questions : 1mark each) [10M]
- Short Practical Problems (MCQ) : (05 questions 2 marks each) [10M]
- (B) Power Point Presentation/Group Discussion : 10 Marks

#### (C) Research Paper (hand written)/Case Study (hand written) : 10 Marks

# SEMESTER END EXAMINATION (PG)

#### **SEMESTER END EXAMINATION PATTERN : 60 MARKS**

#### **DURATION : 2 hours**

Questions	Marks
Q.1 Multiple Choice Questions: (any 15 out of 18)	[15M]
Q.2 Practical Problem.	[15M]
OR	
Q.2 Practical Problem.	
Q.3 Practical Problem.	[15M]
OR	
Q.3 Practical Problem.	
Q.4 Practical Problem.	[15M]
OR	[15M]
Q.4 Write Short Notes on: (any 3 out of 5) (5 marks each)	

#### **GRADE PATTERN : (10 POINTS)**

% of Marks	Grade Point	Grade	Performance
Obtained			
80.00 and above	10	О	Outstanding
70 - 79	9	A+	Excellent
60 - 69	8	А	Very Good

55 - 59	7	B+	Good
50- 54	6	В	Above Average
45 - 49	5	С	Average
40 - 44	4	D	Pass
Less than 40	0	F	Fail

# **REFERENCE BOOKS FOR COST & MANAGEMENT ACCOUNTING AND CORPORATE FINANCE :**

- Cost Accounting, R.S.N. Pillai& Bhagavati, S.Chand.
- Studies in Cost Management, S.N. Maheshwari, Sultan Chand & Sons.
- Management Accounting, M.E. Thukaram Rao, New Age International.
- Cost and Management Accounting, M.E. Thukaram Rao, New Age International.
- Advanced Cost & Management Accounting , Saxena, Vashist, C. Sultan Chand & sons.
- Cost & Management Accounting, Inamdar S.M. (Satish Inamdar)
- Cost & Management Accounting, Kishore R.M., Taxman Allied Services
- Management Accounting, Khan, M.Y.Jain, P.K. Tata McGraw Hill
- Management & Cost Accounting , Dury, Colin, Thompson Books
  - Corporate Finance: Theory and Practice Pierre Vernimmen, Pascal Quiry, Maurizio Dallochio, Yann Le Fur, and Antonio Salvi
  - Corporate Finance: The Basics Terence C.M. Tse
- Fundamentals of Corporate Finance Richard A. Brealey, Stewart C. Myers, and Alan J. Marcus
  - Essentials of Corporate Finance Stephen Ross, Randolph Westerfield, and Bradford

Jordan

#### SKILL ENHANCING TOPICS

- Basic Banking Transactions
- Basic Mutual Fund Transactions
- Interpretation of Ledger Accounts

- Ratio Analysis including Reverse Ratios & Interpretation
- Computation of Income and Tax of Individual, Firm and Company (Excluding MAT) and Provisions for Filing Return of Income, Assessment Procedure
- Final Accounts & Statutory Requirements of Banking Companies
- Accounting and Statutory Requirements of Insurance Companies

#### SELF-EMPLOYMENT AND JOB ORIENTED TOPICS

- Tally Accounting Software
- Provisions related to filing of returns
- Accounting for Limited Liability Partnership
- Contract Costing
- Process Costing (Excluding equivalent provisions)
- Operating Costing
- Registration under GST Law
- Accounting of Co-operative Housing Societies

#### **PEDAGOGY**

Analysis of "<u>Annual Reports of the Companies</u>" at UG(T.Y.B.Com.) and PG level.

Videos can be shown on Process Accounting in order to enhance practical knowledge regarding the manufacturing process that takes place in the respective concerns.

<u>Visit to Banks</u> so as to impart the knowledge regarding how to carry out the basic transactions related to banking.

<u>Visit to Stock Markets</u> (NSE and BSE) to impart the knowledge of shares and securities and to understand how stock trading operates.

Students can be asked to <u>prepare expenditure budget</u> of home, small proprietorship business, co-operative housing society, etc. in order to know the process of recording the transactions in the books of accounts.

To built habit of reading the <u>business newspapers</u> among the students to understand emerging concepts of the business.

Use of <u>power point presentation</u> for teaching various accounting topics.

#### SKILL DEVELOPMENT CERTIFICATE COURSE

#### CERTIFICATE PROGRAMME IN BASIC OF INVESTMENT PORTFOLIO MANAGEMENT (LEVEL-I)

#### (PCCACI21-01)

#### (Credit Points : 3)

# Course Co-ordinator : Ms. Pramila YadavEligibility: XII Pass (Any Stream)Duration of the Course : 60 HoursIntake Capacity: 40 Students

#### About the Course:

Portfolio management is the art of managing investment in a way to get high return at low risk level within stipulated period of time. It refers to handling individual's investment in the form of stocks, bonds, mutual funds, cash etc. Portfolio management means managing money of an individual under the expert guidance of portfolio managers. In layman language, the art of managing individual's investment is called as Portfolio management.

The course would help learners to distinguish between Capital market, Money market, Currency market and Commodity market. Apart from this they could take lead to advise best alternate options of investment to their clients.

#### **Course Objectives:**

- 1. To provide fundamental knowledge exposure to the concept of investment management.
- 2. To familiarize students with the component of market's investment avenues.

#### Learning Outcomes of the Course:

- 1. The student would come to know the investment options available in the market.
- 2. Students will gain knowledge of financial education & selection of best investment options .
- 3. Enable students to take decision as regards the trading of investments.
- 4. Motivate students for further advanced courses related to investments.
- 5. The course will assist the students to opt career (self-employed) in the shares and securities market.

#### NAME OF THE TEACHING FACULTIES FOR THE COURSE

Ms. Pramila Yadav	-	<b>Course Co-ordinator</b>
Ms. Tejashree Gawde	-	<b>Teaching Faculty</b>
Dr. Bharti Walechha	-	<b>Teaching Faculty</b>

#### SCHEDULE OF LECTURES

FRIDAY : 1:00 p.m. to 2:00 p.m.

#### SATURDAY : 1:00 p.m. to 3:00 p.m.

### **CONTENTS OF THE COURSE**

Sr. No.	Modules	No. of lectures
1.	A. Investment: Meaning, Features, Components, Types of Investments,	03
	Factors affecting selection of investment.	
	B. Management: Meaning, Features, Importance.	
2.	A. Portfolio: Meaning, Components, Types of Portfolio.	03
	B. Meaning of Investor, Types of Investors, Types of Investing, factors	
	affecting Investments.	
3.	A. Portfolio Management: Definition, importance, and types of portfolio	05
	management.	
	B. Essential elements of portfolio management and steps to build a	
	complete investment portfolio	
4.	SEBI and its structure and role of SEBI in safeguarding the interest of	03
	investors.	
5.	Stock market: Features of Stock Market, Primary and Secondary	06
	Market.	
6.	Mutual Fund: Concept, Objectives, Regulatory framework of Mutual	04
	Funds, Different types of mutual fund schemes.	07
7.	Money Market: Introduction, Features, Role of RBI in regulating	07
0	money market, Different instruments available in the money market.	0.5
ð.	Commodity Market: Introduction, Regulatory framework of Commodity	05
0	Currency Market: Introduction Degulatory framework of Currency	05
9.	Market and fundamental analysis of Currency Market	03
10	Practical on how to purchase of equities	10
10.	Practical on now to purchase of equities	10
11.	Investment in life insurance and pension plans	03
	1 1	
12.	Investment and tax planning	03
13.	Group PPT presentation of students on contents of this course.	03
	Total Lectures	60

#### COST OF RUNNING THE COURSE

Year	2021-22	
Particulars	Amount (Rs.)	Amount (Rs.)
Fixed Cost:		
Remuneration to Course Co-ordinator	2,000	
Remuneration to Teaching Faculty (60hours x Rs.350)	21,000	
Question Paper Setting	400	
Cost for usage of Infrastructure (Rent, Electricity, Water and Internet Charges)	10000	
Supervision Charges	200	
Total Fixed Cost		33600
Printing & Stationery Notes (40 students x Rs.100)	4,000	
Cost of Question Papers & Answer Sheets (40 x Rs.60)	2,400	
Mark-Sheet/Certificate (40 students x Rs.50)	2,000	
Remuneration to Examiner (40 papers x Rs.16)	640	
Total Variable Cost		9,040
		42640
Add: Contingencies (10%)		4264
Total Cost		46904
Add: Surplus		13096
Total Collection		60000
Fee Chargeable per student = 60,000/40		1500

Break-Even at 80% intake capacity = 46904/1500 = 32Students

#### **EVALUATION PATTERN**

Particulars	Marks
Power Point Presentation	10
Viva	10
Multiple Choice Questions(Online)	20
Theory Questions (Conceptual)	60
(20 Marks Practical Questions + 40 Marks Theory Questions)	
Total	100

#### PAPER PATTERN :CERTIFICATE COURSE EXAMINATION: 60 MARKS

#### **DURATION : 2 hours**

Questions	Marks
Q.1 Multiple Choice Questions: (any 15 out of 18)	[15M]
Q.2 Practical Problem.	[20M]
OR	
Q.2 Practical Problem.	
Q.3 Theory Questions .	[15M]
OR	
Q.3 Theory Questions .	
Q.4 Theory Questions .	[10M]
OR	
Q.4 Write Short Notes on: (any 3 out of 5) (5 marks each)	

Note : Practical Problem of 20Marks may be divided into two sub questions of 10 Marks each.

% of Marks	Grade Point	Grade	Performance
Obtained			
80.00 and above	10	0	Outstanding
70 - 79	9	A+	Excellent
60 - 69	8	А	Very Good
55 - 59	7	B+	Good
50- 54	6	В	Above Average
45 - 49	5	С	Average
40 - 44	4	D	Pass
Less than 40	0	F	Fail

#### **GRADE PATTERN : (10 POINTS)**

#### **REFERENCES FOR CERTIFICATE COURSE :**

- Pioneering Portfolio Management: An Unconventional Approach to Institutional Investment Hardcover, David F. Swensen, Harper Collins Pub. (UK)
- Active Portfolio Management: A Quantitative Approach for Producing Superior Returns and Controlling Risk, Richard Grinold, Ronald Kahn, McGraw-Hill Education.
- Advances in Active Portfolio Management: New Developments in Quantitative Investing, Richard Grinold, Ronald Kahn, McGraw-Hill Education.
- Quantitative Equity Portfolio Management: Modern Techniques and Applications, Edwan E.Qian, Ronald H.Hua, and Eric H.Sorensen Chapman and Hall/CRC Financial Mathematics Series
- Foundations of Investment Management: Mastering Financial Markets, Asset Classes, and Investment Strategies, David E.Linton, CFA, J.ROSS Publishing

- The Intelligent Investor: The Definitive Book on Value Investing, Benjamin Graham, Harper BusinessEssentials, A HarperBusiness BookAn Imprint of HarperCollinsPublishers
- The Little Book of Common Sense Investing: The Only Way to Guarantee Your Fair Share of Stock Market Returns, John C.Bogle, Wiley.
- A Beginner's Guide to the Stock Market, Matthew R.Krratter, Trader University.
- Governance of Portfolios, Programs, and Projects: A Practice Guide, Project Management Institute, Global Management.
- Portfolio Management: A Strategic Approach, Dr.Ginger Levin, PMP,PgMP,John Wyzalek, PfMP, CRC Press.
- Strategic Project Portfolio Management: Enabling a Productive Organization, Simon Moore, JohnWiley & Sons.

# CURRENT SYLLABUS (UG) S.Y.B.COM SEMESTER – III

# ACCOUNTANCY AND FINANCIAL MANAGEMENT-III

Sr.No.	Topics
1.	Partnership Final Accounts
2.	Piecemeal Distribution of Cash
3.	Amalgamation of Partnership Firm
4.	Conversion of Partnership firm into a Limited
	Company

# FINANCIAL ACCOUNTING AND AUDITING-V: INTRODUCTION TO MANAGEMENT ACCOUNTING

Sr.No.	Topics
1.	Introduction to Management Accounting
2.	Analysis & Interpretation of Financial Statements
3.	Ratio Analysis
4.	Working Capital
5.	Capital Budgeting

# SEMESTER – IV

## ACCOUNTANCY AND FINANCIAL MANAGEMENT-IV

Sr.No.	Topics
1.	Introduction to Company Accounts

2.	<b>Redemption of Preference Shares</b>
3.	<b>Redemption of Debentures</b>
4.	Profit Prior to Incorporation

#### FINANCIAL ACCOUNTING AND AUDITING-VI: AUDITING

Sr.No.	Topics
1.	Introduction to Auditing
2.	Audit Planning, Procedure & Documentation
3.	Audit Techniques & Internal Audit
4.	Audit Techniques: Vouching
5.	Audit Techniques: Verification

# <u>CURRENT SYLLABUS (UG)</u> T.Y.B.COM SEMESTER - V FINANCIAL ACCOUNTING & AUDITING VII : FINANCIAL

# ACCOUNTING

Sr.No.	Topics
1.	Preparation of Final Account of Companies
2.	Internal Reconstruction
3.	Buyback of Shares
4.	Investment Accounting (AS-13)

# FINANCIAL ACCOUNTING & AUDITING VIII : COST ACCOUNTING

Sr.No.	Topics
1.	Introduction to Cost Accounting
2.	Material Cost
3.	Labour Cost
4.	Overheads
5.	<b>Classification of Costs and Cost sheet</b>
6.	<b>Reconciliation of Cost and Financial Accounts</b>

# **DIRECT & INDIRECT TAXATION PAPER I**

Sr.No.	Topics
1.	Basic Terms
2.	Residential Status and Scope of Total Income
3.	Exemptions u/s 10 related to each head of Income
4.	Heads of Income and Computation of headwise income: a)Salary Income b)House Property Income c)Profits and gains of business or profession d)Capital gains e)Income from other sources
5.	Deduction under chapter VI A
6.	Computation of total income of individuals

## CURRENT SYLLABUS (UG) T.Y.B.COM SEMESTER – VI

# FINANCIAL ACCOUNTING & AUDITING IX: FINANCIAL ACCOUNTING

Sr.No.	Topics
1.	Accounting of Transactions of Foreign Currency
2.	Liquidation of Companies
3.	Underwriting of Shares& Debentures
4.	Accounting for Limited Liability Partnership
5.	

# FINANCIAL ACCOUNTING & AUDITING X : COST ACCOUNTING

Sr.No.	Topics
1.	Cost Control Accounts
2.	Contract Costing

3.	Process Costing
4.	Introduction to Marginal Costing
5	Introduction to Standard Costing
6	Some Emerging Concepts of Cost Accounting

# DIRECT & INDIRECT TAXATION PAPER II (GOODS AND SERVICE TAX ACT)

Sr.No.	Topics
1.	Introduction
2.	Levy and Collection of Tax
3.	Time, Place and Value of Supply
4.	Input Tax Credit & Payment of Tax
5.	Registration under GST Law

# CURRENT SYLLABUS (PG) SEMESTER-III

# ADVANCED FINANCIAL ACCOUNTING

Sr.No.	Topics
1.	Foreign Currency Conversion
2.	Final Accounts & Statutory Requirements of Banking Companies
3.	Accounting and Statutory Requirements of Insurance Companies
4.	Accounting & Statutory Requirements of Co-operative Societies

# ADVANCED COST ACCOUNTING

Sr.No.	Topics
1.	Process Costing

2.	Cost Allocation and Activity Based Costing Systems
3.	Responsibility Accounting
4.	Strategic Cost Management

# DIRECT TAXATION

Sr.No.	Topics
1.	Definitions and Basis of Charge
2.	Heads of Income
3.	Deductions u/s 80 and Exclusions from the Total Income
4.	Computation of Income and Tax of Individual, Firm and Company
	(Excluding MAT) and Provisions for Filing Return of Income - Sec
	139(1) and Sec 139(5)

# CURRENT SYLLABUS (PG) SEMESTER - IV

# **COPORATE FINANCIAL ACCOUNTING**

Sr.No.	Topics
1.	Corporate Financial Reporting
2.	International Financial Reporting Standards (IFRS) & Ind – AS
3.	Valuation of Business for Amalgamation & Merger
4.	Consolidated Financial Statements

# FINANCIAL MANAGEMENT

Sr.No.	Topics
1.	Types of Financing
2.	Investment Decisions : Capital Budgeting
3.	Management of Working Capital
4.	Financial Planning
5.	Financial Policy and Corporate Strategy

# **INDIRECT TAXATION**

Sr.No.	Topics
1.	Overview of Goods and Service Tax
2.	Registration under GST
3.	Collection of Tax under Integrated Goods and Services Tax Act,
	2017
4.	Place of supply of goods or services or both under Integrated Goods
	and Services Tax Act, 2017