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Department of B.Voc. Studies

Industrial Aquaculture and Fisheries

NAME OF FACULTY: BASUDHA BASU

PAPER: Taxonomy of fish and shell fish (SBVOC-IAF-V-102)

(Semester – I)

LECTURES ALLOTED: 31

ALLOTED SYLLABUS:

Unit – 2: Taxonomy of Fish and Shell Fish

(SBVOC-IAF-V-102) **Credit :4**
(MARKS : 70)

Theory:

1. Principles of taxonomy, nomenclature, types.
2. Classification and interrelationships, Criteria for generic and specific identification.
3. Morphological, morphometric and meristic characteristics of taxonomic significance. Major taxa of inland and marine fishes.
4. Commercially important freshwater and marine fishes of India and their morphological characteristics.
5. Study of external morphology and meristic characteristics of Crustacea and Mollusca.
6. Classification of Crustacea and Mollusca up to the level of species with examples of commercially important species.

Practical:

1. Collection, preservation and identification of commercially important fish organisms.
2. Fin formula calculation.
3. Study of external morphology. Collection, preservation and identification of commercially important prawns, shrimps' crabs, lobsters, bivalves, gastropods, cephalopods from natural habitats.
4. Field visits for collection and identification of commercially important shellfishes.

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TOPIC/SUBTOPIC:	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
	THEORY
1-2	Principles of taxonomy, nomenclature, types.
3-6	Classification and interrelationships, Criteria for generic and specific identification.
7-11	Morphological, morphometric and meristic characteristics of taxonomic significance. Major taxa of inland and marine fishes.
12-14	Commercially important freshwater and marine fishes of India and their morphological characteristics.
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
15-16	Study of external morphology and meristic characteristics of Crustacea and Mollusca.
17-18	Classification of Crustacea and Mollusca up to the level of species with examples of commercially important species.
	PRACTICAL
19-21	Collection, preservation and identification of commercially important fish organisms.
22-23	Fin formula calculation.
24-27	Study of external morphology. Collection, preservation and identification of commercially important prawns, shrimps' crabs, lobsters, bivalves, gastropods, cephalopods from natural habitats.
28-31	Revision

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Industrial Aquaculture and Fisheries

NAME OF FACULTY: BASUDHA BASU

PAPER : Zoology **(GBVOC-V-104)**

(Semester – I)

LECTURES ALLOTED: 18

ALLOTED SYLLABUS:

Zoology **(GBVOC-V-104)**

Credit : 3 (MARKS : 50)

Sl. No.	Topic
1.	Idea about general classification of animal kingdom with special reference to Porifera, Arthropoda, Mollusca ,Chordate
2.	Physio-chemical properties, types, structures [in brief] & functions of DNA & RNA.
3.	Ecology & Ecosystem – definition, components, energy flow, food chain, food web, ecological pyramids.
4.	Enzyme – classification& characteristics; mechanism of enzyme action; effects on enzymatic action [pH & temperature].
5.	Poultry : Duck & fowl – types of breeds, rearing & disease management.

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TOPIC/SUBTOPIC:	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
	THEORY
1-4	Idea about general classification of animal kingdom with special reference to Porifera, Arthropoda, Mollusca ,Chordate
5-7	Physio-chemical properties, types, structures [in brief] & functions of DNA & RNA.
8-10	Ecology & Ecosystem – definition, components, energy flow, food chain, food web, ecological pyramids.
11-13	Enzyme – classification& characteristics; mechanism of enzyme action; effects on enzymatic action [pH & temperature].
14 - 15	Poultry : Duck & fowl – types of breeds, rearing & disease management.
16 - 18	Revision

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Department of B.Voc. Studies

Industrial Aquaculture and Fisheries

NAME OF FACULTY: BASUDHA BASU

PAPER : Zoology **(GBVOC-VI-304)**

(Semester – III)

LECTURES ALLOTED: 18

ALLOTED SYLLABUS:

Zoology **(GBVOC-VI-304)**

Credit : 3 (MARKS : 50)

Sl. No.	Topic
1.	General structure & function of the following : Excretory system of prawn [Green gland]. Excretory system – pro.,meso., & metanephric kidneys.Head kidney in fish & function.
2.	Fertilization in sea-urchin & cleavages, Process of Gastrulation (Type: Frog).
3.	Basic concept of Biodiversity, Biodiversity hot-spots.
4.	Osmoconformers & Osmoregulators; osmoregulation in fishes.
5.	Outline structure & classification of immunoglobulin, antigen-antibody reaction, basic principle of vaccination.

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TOPIC/SUBTOPIC:	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
	THEORY
1-4	Excretory system of prawn [Green gland]. Excretory system – pro.,meso., & metanephric kidneys.Head kidney in fish & function.
5-7	Fertilization in sea-urchin & cleavages, Process of Gastrulation (Type: Frog).
8-10	Basic concept of Biodiversity, Biodiversity hot-spots.
11-13	Osmoconformers & Osmoregulators; osmoregulation in fishes.
14-16	Outline structure & classification of immunoglobulin, antigen-antibody reaction, basic principle of vaccination.
17-18	Revision

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Department of B.Voc. Studies

Industrial Aquaculture and Fisheries

NAME OF FACULTY: BASUDHA BASU

PAPER: Fundamentals of genetics (SBVOC-IAF-VII-501)

(Semester – V)

LECTURES ALLOTED: 32

ALLOTED SYLLABUS:

Fundamentals of genetics (SBVOC-IAF-VII-501) **Credit : 6 (MARKS : 100)**

Theory:

1. Historical development of genetics and physical basis of heredity; Mendelian principles: scope, limitation, probability of Mendelian inheritance.
2. Genetic variation: Causes and measurement; Chromosome theory ofinheritance: genetic basis of determination of sex.
3. Chromosome manipulation: Ploidy induction, sex reversal, gynogenesisand androgenesis.
4. Modern concept of gene; DNA as genetic material, genetic code andprotein synthesis, transfer and regulation of genetic information.
5. Mutation: natural and induced, mutagens fate of mutant allele in thepopulation; Cross breeding and genetic drift.

Practical:

1. Practical demonstration of chromosome manipulations, Linkage and crossing over, ploidy induction;

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TOPIC/SUBTOPIC:	
LEC. NO.	**PROPOSED TOPIC(S) TO BE TAUGHT**
	THEORY
1-4	Historical development of genetics and physical basis of heredity; Mendelian principles: scope, limitation, probability of Mendelian inheritance.
5-8	Genetic variation: Causes and measurement; Chromosome theory ofinheritance: genetic basis of determination of sex.
9-13	Chromosome manipulation: Ploidy induction, sex reversal, gynogenesisand androgenesis
14-18	Modern concept of gene; DNA as genetic material, genetic code andprotein synthesis, transfer and regulation of genetic information.
19-22	Mutation: natural and induced, mutagens fate of mutant allele in thepopulation; Cross breeding and genetic drift.
	PRACTICAL

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23-27	Practical demonstration of chromosome manipulations, Linkage and crossing over , ploidy induction;
28-32	Revision

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Department of B.Voc. Studies

Industrial Aquaculture and Fisheries

NAME OF FACULTY: BASUDHA BASU

PAPER: Fish and non fish breeding

(SBVOC-IAF-VII-504)

(Semester – V)

LECTURES ALLOTED: 32

ALLOTED SYLLABUS

Fish and non fish breeding (SBVOC-IAF-VII-504) **Credit : 6 (MARKS : 100)**

Theory:

1. Breeding habits of different fishes.
2. Brood stock transport and management;
3. Breeding techniques of Indian Major Carps, Exotic carps, Sea bass, Mullets, cat fishes, commercially important shell fishes, crabs.
4. New generation drugs and its application on fisheries.
5. Hatchery, types of hatchery systems, hatchery operation of commercially important fishes and shellfishes.
6. Nursery rearing techniques of commercially important fishes and shellfishes.

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7. Seed transport technique.
8. Collection of seeds from natural resources.

Practical :

1. Induced breeding techniques, collection and preparation of pituitary gland extract, dissection of fish head to collect pituitary glands, preservation of pituitary gland and extract for future use.
2. Dosage calculation of pituitary glands and synthetic hormones
3. Injection procedure and stripping methods for induced spawning.
4. Eye stalk ablation of shellfish.
5. Visit to any fish breeding centre for training and report submission.

TOPIC/SUBTOPIC:	
LEC. NO.	**PROPOSED TOPIC(S) TO BE TAUGHT**
	THEORY
1	Breeding habits of different fishes.
2	Brood stock transport and management;
3-4	Breeding techniques of Indian Major Carps, Exotic carps, Sea bass, Mullets, cat fishes, commercially important shell fishes, crabs.
5-6	New generation drugs and its application on fisheries.
7-9	Hatchery, types of hatchery systems, hatchery operation of commercially important fishes and shellfishes

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10-12	Nursery rearing techniques of commercially important fishes and shellfishes.
13	Seed transport technique.
14	Collection of seeds from natural resources.
	Practical
15-17	Induced breeding techniques, collection and preparation of pituitary gland extract, dissection of fish head to collect pituitary glands, preservation of pituitary gland and extract for future use.
18-20	Dosage calculation of pituitary glands and synthetic hormones
21-23	Injection procedure and stripping methods for induced spawning.
24-25	Eye stalk ablation of shellfish.
26-29	Visit to any fish breeding centre for training and report submission.
30-32	Revision

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Industrial Aquaculture and Fisheries

NAME OF FACULTY: DR. MUKTI CHANDA (PAUL)

PAPER: Principles of Aquaculture (SBVOC-IAF-V-101) (Semester – I)

LECTURES ALLOTED: 32

ALLOTED SYLLABUS:

Credit: 5 (Marks: 80)

Theory:

1. Basics of aquaculture-definition and scope.
2. Present global and national scenario.
3. Overview of national and international aquaculture systems. Systems of aquaculture - pond culture, cage culture, running water culture, zero water exchange system, raceway .
4. Extensive, semi-intensive, intensive and super intensive aquaculture in different types of water bodies viz., freshwater, brackish water and inland saline water.
5. Principles of organic aquaculture, sewage fed aquaculture.
6. Pre-stocking and post stocking pond management.
7. Criteria for selection of candidate species for aquaculture. Major candidate species for aquaculture: freshwater, brackish-water and marine.
8. Monoculture, polyculture and integrated culture systems.
9. Water and soil quality in relation to fish production and estimation of productivity. Physical, chemical and biological factors affecting productivity of ponds. Nutrition, health management and economics.
10. Introduction of Exotic Fish Species in India (Teach in brief definition, a few examples and possible impact
11. Predatory and Weed Fishes and its Management (brief idea).
12. Aquatic insect management.
13. Weed management in Pond

Practical:

1. Practices on pre-stocking and post stocking management.
2. Identification of Predatory and Weed Fishes.
3. Identification of Aquatic Insect
4. Identification of Aquatic weeds, preparation of herbarium sheets.

Field Visit:

Visit to any Krishi Vigyan Kendra or fish farm to take detailed training about fish farming and report submission.

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TOPIC/SUBTOPIC:	
LEC. NO.	**PROPOSED TOPIC(S) TO BE TAUGHT**
	THEORY
1	Basics of aquaculture-definition and scope
2	Present global and national scenario.
3-4	Overview of national and international aquaculture systems. Systems of aquaculture - pond culture, cage culture, running water culture, zero water exchange system, raceway
5	Extensive, semi-intensive, intensive and super intensive aquaculture in different types of water bodies viz., freshwater, brackish water and inland saline water.
6	Principles of organic aquaculture, sewage fed aquaculture.
7	Pre-stocking and post stocking pond management.
8.	Criteria for selection of candidate species for aquaculture. Major candidate species for aquaculture: freshwater, brackish-water and marine.
9	Monoculture, polyculture and integrated culture systems.
10	Water and soil quality in relation to fish production and estimation of productivity. Physical, chemical and biological factors affecting productivity of ponds. Nutrition, health management and economics.
11	Introduction of Exotic Fish Species in India (Teach in brief definition, a few examples and possible impact.
12	Predatory and Weed Fishes and its Management (brief idea).
13-15	Aquatic insect management.
16-17	Weed management in Pond.
	PRACTICAL:
18	Practices on pre-stocking and post stocking management.
19-21	Identification of Predatory and Weed Fishes.
22-24	Identification of Aquatic Insect.
25-28	Identification of Aquatic weeds, preparation of herbarium sheets.
29-32	Visit to any Krishi Vigyan Kendra or fish farm to take detailed training about fish farming and report submission.

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Industrial Aquaculture and Fisheries

NAME OF FACULTY: DR. MUKTI CHANDA (PAUL)

PAPER: Fish and Shell Fish Biology (SBVOC-IAF-V-103) (Semester – I)

LECTURES ALLOTED: 26

ALLOTED SYLLABUS:

Credit: 5 (Marks: 80)

Theory:

1. Study of fish for their external morphology and diagnostic features, Study of general morphology of a typical elasmobranch and a typical teleost and difference between them.
2. Body shapes (types and advantages), skin (structure, components, significance), coloration and its significance in fishes, scales (structure, types, significance), mouth (types, adaptations, importance), jaws (structure), fins and fin rays (structure, types and function), swim bladder (structure and function), Weberian apparatus (structure and function), sense organs (eyes, lateral line organ, barbells, chemoreceptors), special organs (electric organ and light organ).
3. Internal anatomy of fish (teleost) – digestive system and associated structure, respiratory and accessory respiratory organs, heart and circulatory system, reproductive system, excretory system.
4. Study of shell fish for their external morphology and diagnostic features, Study of general morphology of shellfish - External character of prawn, crab, lobster, bivalve, gastropod and cephalopod.
5. Internal anatomy of prawn, crab, lobster, bivalve, gastropod and cephalopod. Studies on Digestive system and Associated digestive glands. Circulatory system. Respiratory system. Nervous system. Urino-genital system. Endocrine system, Circulatory, Skeletal systems and Sensory organs.
6. Breeding and feeding habits of prawn, crab, lobster, bivalve, gastropod and cephalopod.

Practical:

1. Dissection of fish: internal anatomical structures – urinogenital systems, digestive systems, accessory respiratory organ.
2. Estimation of RLG and gut content analysis.
3. Estimation of fecundity.
4. Dissection of different external parts of shell fishes and their identification.
5. Dissection of internal anatomy of prawns and crabs.

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TOPIC/SUBTOPIC:	
LEC. NO.	**PROPOSED TOPIC(S) TO BE TAUGHT**
	THEORY
1-5	Study of fish for their external morphology and diagnostic features, Study of general morphology of a typical elasmobranch and a typical teleost and difference between them.
6-8	Body shapes (types and advantages), skin (structure, components, significance), coloration and its significance in fishes, scales (structure, types, significance), mouth (types, adaptations, importance), jaws (structure), fins and fin rays (structure, types and function), swim bladder (structure and function), Weberian apparatus (structure and function), sense organs (eyes, lateral line organ, barbells, chemoreceptors), special organs (electric organ and light organ).
9-11	Internal anatomy of fish (teleost) – digestive system and associated structure, respiratory and accessory respiratory organs, heart and circulatory system, reproductive system, excretory system.
12-15	Study of shell fish for their external morphology and diagnostic features, Study of general morphology of shellfish - External character of prawn, crab, lobster, bivalve, gastropod and cephalopod.
16-18	Internal anatomy of prawn, crab, lobster, bivalve, gastropod and cephalopod. Studies on Digestive system and Associated digestive glands. Circulatory system. Respiratory system. Nervous system. Urino-genital system. Endocrine system, Circulatory, Skeletal systems and Sensory organs.
19-20	Breeding and feeding habits of prawn, crab, lobster, bivalve, gastropod and cephalopod.
	PRACTICAL:
21-22	Dissection of fish: internal anatomical structures – urogenital systems, digestive systems, accessory respiratory organ.
23	Estimation of RLG and gut content analysis.
24	Estimation of fecundity.
25	Dissection of different external parts of shell fishes and their identification.
26	Dissection of internal anatomy of prawns and crabs.

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Industrial Aquaculture and Fisheries

NAME OF FACULTY: DR. MUKTI CHANDA (PAUL)

PAPER: Aquatic Animal Health (SBVOC-IAF-VI-304) (Semester – III)

LECTURES ALLOTED: 25

ALLOTED SYLLABUS:

Credit: 4 (Marks: 70)

Theory:

1. Introduction to the pathogenic diseases of fish and shell-fish organisms – viral, bacterial, fungal and parasitic, prophylactic and therapeutic measurement of fish diseases.
2. Immune system in fish. Lymphoid tissues and cellular components of the immune system. Defence mechanisms in fishes against pathogenic microorganisms – specific and non-specific defences. Mechanisn of disease production.
3. Types of immune response-humoral and cellular and the interaction between the two, immunological toleranc and memory function, activation and interaction of T and B lymphocytes. T-cell receptors, immunoglobulin theories of antibody production, monoclonal antibodies, antigen-antibody reactions, complement system.
4. Major histo-compatibility complex. Vaccines for fishes. Techniques of vaccination. Host response and effect of environmental factors.
5. Identification of the pathogens in fishes and shell-fish organisms, morphology.
6. Introduction to the non-infectious fish and shell-fish diseases, nutritional and environmental diseases to the fish, different soil and water parameters related to fish health.
7. Application of different chemicals, drugs, antibiotics, probiotics etc. to the fish pond, dosage calculation, preparation of healthy diets of the fish.
8. Histopathological study of different organs in fish.

Practical:

1. Examination of moribund fishes, sampling techniques of microbial investigation.
2. Culture, identification and isolation of different disease causing agents in fish and shell-fish, Serological and molecular techniques for disease diagnosis.
3. Preparation of histological slides of different organs in fishes.
4. Field application of different chemicals and drugs to infected fish.

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TOPIC/SUBTOPIC:	
LEC. NO.	**PROPOSED TOPIC(S) TO BE TAUGHT**
	THEORY
1-3	Introduction to the pathogenic diseases of fish and shell-fish organisms – viral, bacterial, fungal and parasitic, prophylactic and therapeutic measurement of fish diseases.
4-5	Immune system in fish. Lymphoid tissues and cellular components of the immune system. Defense mechanisms in fishes against pathogenic microorganisms – specific and non-specific defenses. Mechanisms of disease production.
6-7	Major histo-compatibility complex. Vaccines for fishes. Techniques of vaccination. Host response and effect of environmental factors.
8	Identification of the pathogens in fishes and shell-fish organisms, morphology.
9-12	Introduction to the non-infectious fish and shell-fish diseases, nutritional and environmental diseases to the fish, different soil and water parameters related to fish health.
13-14	Application of different chemicals, drugs, antibiotics, probiotics etc. to the fish pond, dosage calculation, preparation of healthy diets of the fish.
15	Histopathological study of different organs in fish.
	PRACTICAL:
16-18	Examination of moribund fishes, sampling techniques of microbial investigation.
19-20	Preparation of histological slides of different organs in fishes.
21-25	Field application of different chemicals and drugs to infected fish.

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Industrial Aquaculture and Fisheries

NAME OF FACULTY: DR. MUKTI CHANDA (PAUL)

PAPER: Population Genetics (SBVOC-IAF-VII-502) (Semester – V)

LECTURES ALLOTED: 20

ALLOTED SYLLABUS:

Credit: 3 (Marks: 50)

Theory:

1. Genetics of population: Individual vs. population, genetic structure of random mating populations.
2. Hardy Weinberg principles: Test of equilibrium, application and properties of equilibrium populations;
3. Change in gene frequency under migration, mutation and selection;
4. Effect of small population on gene frequency.

Practical:

1. Exercises on various statistical procedures with emphasis on nonparametric distributions;
2. Estimation of effective population size,
3. Marking and tagging techniques of fish for migration and population study.
4. Maintenance of genetic stock

TOPIC/SUBTOPIC:	
LEC. NO.	**PROPOSED TOPIC(S) TO BE TAUGHT**
	THEORY
1-3	Genetics of population: Individual vs. population, genetic structure of random mating populations.
4-5	Hardy Weinberg principles: Test of equilibrium, application and properties of equilibrium populations;
6-7	Change in gene frequency under migration, mutation and selection
8	Effect of small population on gene frequency
	PRACTICAL:
9-12	Exercises on various statistical procedures with emphasis on nonparametric distributions.
13-15	Estimation of effective population size.
16-19	Marking and tagging techniques of fish for migration and population study.
20	Maintenance of genetic stock

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Industrial Aquaculture and Fisheries

NAME OF FACULTY: DR. MUKTI CHANDA (PAUL)

PAPER: Selection Genetics (SBVOC-IAF-VII-503) (Semester – V)

LECTURES ALLOTED: 18

ALLOTED SYLLABUS:

Credit: 3 (Marks: 50)

Theory:

1. Selection of species for breeding, scope, application, role of genetics in fish selection.
2. Inbreeding depression: causesand methods to overcome; Selection for threshold characters; Small stockand inbreeding effects;
3. Out breeding: crossbreeding, utilization of heteroticeffects.
4. Hybridization and its effect on fish.
5. Monosex fish production techniques and its culture procedure.

Practical:

1. Method of selection of species for fish breeding.
2. Techniques of monosex fish production (Tilapia).
3. Methods of hybridization of fish.

TOPIC/SUBTOPIC:	
LEC. NO.	**PROPOSED TOPIC(S) TO BE TAUGHT**
	THEORY
1-3	Selection of species for breeding, scope, application, role of genetics in fish selection.
4-5	Inbreeding depression: causes and methods to overcome; Selection for threshold characters; Small stock and inbreeding effects;
6-7	Out breeding: crossbreeding, utilization of heterotic effects
8	Hybridization and its effect on fish
9	Monosex fish production techniques and its culture procedure
	PRACTICAL:
10-12	Method of selection of species for fish breeding.
13-15	Techniques of monosex fish production (Tilapia).
16-18	Methods of hybridization of fish.

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Department of B.Voc. Studies

Industrial Aquaculture and Fisheries

NAME OF FACULTY: Vincent Souvik Gomes

PAPER: Microbiology (General) (GBVOC-V-103) (Semester – I)

LECTURES ALLOTED: 48

ALLOTED SYLLABUS:

Credit: 3 (Marks: 50)

THEORY:

Concept of Microbiology
Introduction – Definition, scope, and history of Microbiology. Notable contributions in the development of microbiology.

Microscopy
Simple, compound microscope, light & dark field microscope, Fluorescent microscope, electron and phase contrast microscopes –functions and applications- Resolving power, Numerical aperture.

Stains and Staining procedures
Dyes and stains: Types, Fixatives, Mordants, Decolorizers. Simple and differential staining. Special staining (Cell wall, Capsule, Spores & Flagella)

Carbohydrates
Definition, Classification, Structure and Biological role of -Monosaccharides, Disaccharides and Polysaccharide (Only Preliminary idea)

Amino acids & proteins
General structure and features of amino acids (emphasis on amphoteric nature) Classification by Rgroup, Uncommon amino acids, and their functions. Amphoteric molecule, Zwitterion, Isoelectric point.
Peptides and proteins- Definition and general features and examples with the biological role. Primary, secondary, tertiary, quaternary structures of proteins- Brief outline

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TOPIC/SUBTOPIC:	
LEC. NO.	**PROPOSED TOPIC(S) TO BE TAUGHT**
	THEORY
1-9	**Concept of Microbiology** Introduction – Definition, scope, and history of Microbiology. Notable contributions in the development of microbiology.
10-19	**Microscopy** Simple, compound microscope, light & dark field microscope, Fluorescent microscope, electron and phase contrast microscopes –functions and applications- Resolving power, Numerical aperture.
20-29	**Stains and Staining procedures** Dyes and stains: Types, Fixatives, Mordants, Decolorizers. Simple and differential staining. Special staining (Cell wall, Capsule, Spores & Flagella)
30-39	**Carbohydrates** Definition, Classification, Structure and Biological role of - Monosaccharides, Disaccharides and Polysaccharide (Only Preliminary idea)
40-48	**Amino acids & proteins** General structure and features of amino acids (emphasis on amphoteric nature) Classification by Rgroup, Uncommon amino acids, and their functions. Amphoteric molecule, Zwitterion, Isoelectric point. Peptides and proteins- Definition and general features and examples with the biological role. Primary, secondary, tertiary, quaternary structures of proteins- Brief outline

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Department of B.Voc. Studies

Industrial Aquaculture and Fisheries

NAME OF FACULTY: Vincent Souvik Gomes

PAPER: Fundamentals of Microbiology (SBVOC-IAF-VI-301)

(Semester – III)

LECTURES ALLOTED: 64

ALLOTED SYLLABUS:

Credit: 4 (Marks: 70)

Theory:

1. History of microbiology, microbial world and their structural characters.
2. Classification of bacteria and fungi- molecular methods in taxonomy, ribosomal RNA sequences and evolutionary relationships.
3. Microscopy – bright-field, fluorescence, phase-contrast, dark ground and electron microscopy.
4. Staining techniques - chemistry and various types – Sterilization – principles and various physical and chemical methods.
5. Nutritional requirements of microorganisms – general growth media, differential media, selective media. Isolation, enumeration, preservation and maintenance of cultures - growth curve.
6. Routine tests for identification of bacteria - morphological, cultural, biochemical and serological. Anaerobic bacteria - methods of anaerobiosis. Basics of mycological techniques. Introduction to molecular techniques in microbiology.

Practical:

1. Microscopic techniques & Micrometry.
2. Staining techniques, isolation, enumeration and identification of microorganisms, serological techniques, Culture of bacteria, isolation.

Field Visit: Field training to any microbiological laboratory (Govt. or Private Sector) and report submission.

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TOPIC/SUBTOPIC:	
LEC. NO.	**PROPOSED TOPIC(S) TO BE TAUGHT**
	THEORY
1-4	History of microbiology, microbial world and their structural characters.
5-10	Classification of bacteria and fungi- molecular methods in taxonomy, ribosomal RNA sequences and evolutionary relationships.
11-14	Microscopy – bright-field, fluorescence, phase-contrast, dark ground and electron microscopy.
15-20	Staining techniques - chemistry and various types – Sterilization – principles and various physical and chemical methods.
21-26	Nutritional requirements of microorganisms – general growth media, differential media, selective media. Isolation, enumeration, preservation and maintenance of cultures - growth curve.
27-32	Routine tests for identification of bacteria - morphological, cultural, biochemical and serological. Anaerobic bacteria - methods of anaerobiosis. Basics of mycological techniques. Introduction to molecular techniques in microbiology.
	PRACTICAL
1-16	Microscopic techniques & Micrometry.
17-32	Staining techniques, isolation, enumeration and identification of microorganisms, serological techniques, Culture of bacteria, isolation.
	FIELD VISIT
	Field training to any microbiological laboratory (Govt. or Private Sector) and report submission.

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Department of B.Voc. Studies

Industrial Aquaculture and Fisheries

NAME OF FACULTY: Vincent Souvik Gomes

PAPER: Food microbiology (SBVOC-IAF-VI-302)

(Semester – III)

LECTURES ALLOTED: 80

ALLOTED SYLLABUS:

Credit: 5 (Marks: 80)

Theory:

1. Common Food borne Bacteria, Moulds and yeasts. Role, and Significance of Microorganisms in Foods. Methods for detection of microorganisms in food: freshwater fish, sea foods.
2. Food Preservation &Principles of Quality Control - Chemicals, Antibiotics, Bacteriocin. Applications of Probiotics and prebiotics.
3. Food spoilage and food borne diseases - Common food borne pathogens, Entero pathogens and diseases: Applications of food microbiology: Microorganisms in Food Fermentation.
4. Detection of microbial spoilage in canned foods.
5. Hazard analysis and critical control path (HACCP) – Overview of HACCP, advantages and benefits of HACCP, principles and steps of HACCP, evaluation of HACCP procedures,
6. Basic concept of good manufacturing practice (GMP) – definitions, requirements and historical background, categories of GMP, quality assurance, quality management, principles of documentation in GMP.
7. Sanitation standard Operating Procedures – principles, definitions, pre operational and operational SSOPs, Actions and steps of SSOPs in fish processing industries.

Practical:

1. Culture and identification of bacteria from fresh fish specimen collected from markets, standard plate count.
2. Outline different HACCP based systems in different fish processing unit including CODEX and ISO 22000.
3. Outline relevant codes of practice and industrial guides.
4. Microbial analysis in industries of fish products.

Field Visit: Visit to any microbiological laboratory of central government or state government institutions or any private industry based laboratory for microbiological training and report submission.

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TOPIC/SUBTOPIC:	
LEC. NO.	**PROPOSED TOPIC(S) TO BE TAUGHT**
	THEORY
1-7	Common Food borne Bacteria, Moulds and yeasts. Role, and Significance of Microorganisms in Foods. Methods for detection of microorganisms in food: freshwater fish, sea foods.
8-13	Food Preservation &Principles of Quality Control - Chemicals, Antibiotics, Bacteriocin. Applications of Probiotics and prebiotics.
14-20	Food spoilage and food borne diseases - Common food borne pathogens, Entero pathogens and diseases: Applications of food microbiology: Microorganisms in Food Fermentation.
21-24	Detection of microbial spoilage in canned foods.
25-33	Hazard analysis and critical control path (HACCP) – Overview of HACCP, advantages and benefits of HACCP, principles and steps of HACCP, evaluation of HACCP procedures.
34-39	Basic concept of good manufacturing practice (GMP) – definitions, requirements and historical background, categories of GMP, quality assurance, quality management, principles of documentation in GMP.
40-48	Sanitation standard Operating Procedures – principles, definitions, pre operational and operational SSOPs, Actions and steps of SSOPs in fish processing industries.
	PRACTICAL
1-8	Culture and identification of bacteria from fresh fish specimen collected from markets, standard plate count.
9-17	Outline different HACCP based systems in different fish processing unit including CODEX and ISO 22000.
16-24	Outline relevant codes of practice and industrial guides.
25-32	Microbial analysis in industries of fish products.
	FIELD VISIT
	Visit to any microbiological laboratory of central government or state government institutions or any private industry based laboratory for microbiological training and report submission.

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Department of B.Voc. Studies

Industrial Aquaculture and Fisheries

NAME OF FACULTY: Vincent Souvik Gomes

PAPER: Environmental Microbiology (SBVOC-IAF-VI-303)

(Semester – III)

LECTURES ALLOTED: 80

ALLOTED SYLLABUS:

Credit: 5 (Marks: 80)

Theory:

1. Microbial communities in the aquatic environment, kinetics of microbial population, biofilms, microbial interactions – symbiosis, antagonism and commensalisms, biogeochemical cycles.
2. Pollution – nature and types, their effects on living organisms. Water pollution microbial changes induced by inorganic and organic pollutants, industrial effluents and domestic sewage. Water-borne pathogens – faecal contamination; enteroviruses. Standards for various types of water, conventional wastes and their treatment – Biological pollution – algal blooms and their effect on fish production, biological and chemical control of algal bloom.
3. Metals as pollutants – accumulation of mercury, cadmium, lead, etc. in fishes, microbial conversion of mercury. Microbial pollution in industries-corrosion of iron, acid-mine drainage, cooling systems etc.

Practical:

1. Microbial pollution of water, detection and characterization of different indicator and pathogenic organisms such as *S. aureus*, *E. coli*, *V. cholerae*, *Salmonella*,*Shigella*, etc., by conventional and rapid methods.
2. Antibiotics testing Chloramphenicol, nitrofevron, ozone testing in particular Post larvae buy elisa testing machine with kits (mandatory practical)

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TOPIC/SUBTOPIC:	
LEC. NO.	**PROPOSED TOPIC(S) TO BE TAUGHT**
	THEORY
1-15	Microbial communities in the aquatic environment, kinetics of microbial population, biofilms, microbial interactions – symbiosis, antagonism and commensalisms, biogeochemical cycles.
16-32	Pollution – nature and types, their effects on living organisms. Water pollution microbial changes induced by inorganic and organic pollutants, industrial effluents and domestic sewage. Water-borne pathogens – faecal contamination; enteroviruses. Standards for various types of water, conventional wastes and their
33-48	Metals as pollutants – accumulation of mercury, cadmium, lead, etc. in fishes, microbial conversion of mercury. Microbial pollution in industries-corrosion of iron, acid-mine drainage, cooling systems etc.
	PRACTICAL
1-16	Microbial pollution of water, detection and characterization of different indicator and pathogenic organisms such as *S. aureus*, *E. coli*, *V. cholerae*, *Salmonella*,*Shigella*, etc., by conventional and rapid methods.
17-32	Antibiotics testing Chloramphenicol, nitrofevron, ozone testing in particular Post larvae buy elisa testing machine with kits (mandatory practical)

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Department of B.Voc. Studies

Industrial Aquaculture and Fisheries

NAME OF FACULTY: Vincent Souvik Gomes

PAPER: Microbiology (General) (GBVOC-V-303)

(Semester – III)

LECTURES ALLOTED: 48

ALLOTED SYLLABUS:

Credit: 3 (Marks: 50)

Air Microbiology
Different types of microorganisms in the air, aerosols, sampling techniques, airborne pathogens, techniques of room sterilization.

Soil Microbiology
Different microbial groups in soil, a method of study, Rhizosphere, Phyllosphere. Brief account of microbial interactions-(Symbiosis, Neutralism, Commensalism, Competition, Ammensalism, Parasitism, and Predation)

Control of Growth of Microbes
Sterilization, Disinfection, Antiseptic, Sanitizer, Germicide, Antimicrobial agent (definition, application & examples); physical and chemical methods of disinfection and sterilization (mode of action, applications). Chemotherapeutic agents - Antibiotics (examples and mode of action).

Medical microbiology
Normal Microbial Flora (normal) of the human body: Thoracic, Abdominal, Urogenital & Skin. Mechanism of Bacterial Pathogenicity: Entry, colonization, growth, mechanism of damage of host cell. Production of endo-and exo-toxins - definition and general properties

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TOPIC/SUBTOPIC:	
LEC. NO.	**PROPOSED TOPIC(S) TO BE TAUGHT**
	THEORY
1-12	**Air Microbiology** Different types of microorganisms in the air, aerosols, sampling techniques, airborne pathogens, techniques of room sterilization.
13-25	**Soil Microbiology** Different microbial groups in soil, a method of study, Rhizosphere, Phyllosphere. Brief account of microbial interactions-(Symbiosis, Neutralism, Commensalism, Competition, Ammensalism, Parasitism, and Predation)
26-38	**Control of Growth of Microbes** Sterilization, Disinfection, Antiseptic, Sanitizer, Germicide, Antimicrobial agent (definition, application & examples); physical and chemical methods of disinfection and sterilization (mode of action, applications). Chemotherapeutic agents - Antibiotics (examples and mode of action).
39-48	**Medical microbiology** Normal Microbial Flora (normal) of the human body: Thoracic, Abdominal, Urogenital & Skin. Mechanism of Bacterial Pathogenicity: Entry, colonization, growth, mechanism of damage of host cell. Production of endo-and exo-toxins - definition and general properties

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DEPARTMENT OF B. VOC STUDIES

SOFTWARE DEVELOPMENT

TEACHING PLAN FOR SEMESTER - I

NAME OF FACULTY: BEAUTY SARKAR

PAPER: DIGITAL SYSTEM DESIGN AND COMPUTER ARCHITECTURE

PAPER CODE: SBVOC-SWD-V-101

LECTURES ALLOTTED: 32

ALLOTED SYLLABUS:

Credit – 5 Full Marks – 80

THEORY (20 Classes)

Digital components

- Overview of Computer Organisation.
- Logic gates adder flip flop as one bit memory.
- Decoders
- Multiplexers
- Register ,shift register counter Ram

Data representation

- Hexadecimal numbers
- ASCII code two component addition subtraction overflow
- Floating point representation

Register transfer and Micro-operations

- Bus and memory transfers, three State Bus buffer
- Binary adder, binary Arithmetic circuit logic and shift micro operations
- ALU basic Computer Organisation
- Direct and indirect address
- Timing and control signal generation.
- Memory reference instructions input output instruction.
- Central Processing Unit organisation memory stack one address and two address

Arithmetic

- Register and shift instruction software
- Instruction pipelines
- Arithmetic – Addition and subtraction with signed magnitude data manipulation algorithms.
- Algorithm division algorithm input output organisation data transfer handshaking as synchronous serial transfer interrupt interface.
- DMA transfer interfacing peripherals with CPU introduction keyboard.
- Scanner Network
- Introduction to pipelining and linear pipeline. .

Organisation

- Rom ram hard disk cache memory direct mapping virtual memory.
- Cache memory working principles.
- Programming assembly language of Intel 8086 simple character operations.

PRACTICAL (12 Classes)

- Logic gates
- Flip flop as one bit memory
- Encoders
- Decoders
- Multiplexers

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TOPIC/SUBTOPIC:

LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1 - 4	**THEORY** • Digital components
5 - 8	**THEORY** • Data representation
9 - 12	**THEORY** • Register transfer and Micro-operations
13 -16	**THEORY** • Arithmetic
1 7 - 20	**THEORY** • Organisation
21 - 32	**PRACTICAL** • Logic gates • Flip flop as one bit memory • Encoders • Decoders • Multiplexers

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DEPARTMENT OF B. VOC STUDIES

SOFTWARE DEVELOPMENT

TEACHING PLAN FOR SEMESTER - I

NAME OF FACULTY: BEAUTY SARKAR

PAPER: INTRODUCTION TO ALGORITHMS

PAPER CODE: SBVOC-SWD-V-104

LECTURES ALLOTTED: 24

ALLOTED SYLLABUS:

Credit – 4 Full Marks – 70

THEORY (24 Classes)

Elementary Algorithms: Notation for Expressing Algorithms; Role and Notation for Comments; Example of an Algorithm

Problems and Instances; Characteristics of an Algorithm; Building Blocks of Algorithms; Procedure and Recursion – Procedure, Recursion; Outline of Algorithms; Specification Methods for Algorithms

Mathematical Functions and Notations Functions and Notations; Modular Arithmetic / Mod Function; Mathematical Expectation in Average Case Analysis; Efficiency of an Algorithm; Well Known Asymptotic Functions and Notations

Analysis of Algorithms . Divide and Conquer Divide and Conquer Strategy. Greedy Method Greedy Method Strategy. Dynamic Programming Dynamic Programming Strategy. Backtracking Strategy

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TOPIC/SUBTOPIC:

LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1 - 6	**THEORY** Elementary Algorithms: Notation for Expressing Algorithms; Role and Notation for Comments; Example of an Algorithm
7 - 12	**THEORY** Problems and Instances; Characteristics of an Algorithm; Building Blocks of Algorithms; Procedure and Recursion – Procedure, Recursion; Outline of Algorithms; Specification Methods for Algorithms.
13 - 18	**THEORY** Mathematical Functions and Notations Functions and Notations; Modular Arithmetic / Mod Function; Mathematical Expectation in Average Case Analysis; Efficiency of an Algorithm; Well Known Asymptotic Functions and Notations
18 - 24	**THEORY** Analysis of Algorithms . Divide and Conquer Divide and Conquer Strategy. Greedy Method Greedy Method Strategy. Dynamic Programming Dynamic Programming Strategy. Backtracking Strategy

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DEPARTMENT OF B. VOC STUDIES

SOFTWARE DEVELOPMENT

TEACHING PLAN FOR SEMESTER - III

NAME OF FACULTY: BEAUTY SARKAR

PAPER: OBJECT ORIENTED PROGRAMMING WITH C++

PAPER CODE: SBVOC-SWD-VI-302

LECTURES ALLOTTED: 32

ALLOTED SYLLABUS:

Credit – 5 Full Marks – 80

THEORY (12 Classes)

- Basic of Object Oriented Programming and software design C++ Object Oriented Programming. C++ & ANSI standard
- C Predefined classes in C++. Building objects with classes.
- Introduction to Constructor & Destructor. Defining operations on objects.
- Using Inheritance in C++. Concepts of Overloading. Virtual functions and Polymorphism.
- Using C libraries in C++ programs using commercial Class libraries (Standard template library).
- Advanced Topics in C++ (Template Exception Handling file handling Stream)

PRACTICAL (20 Classes)

- Constructor & Destructor
- Inheritance
- Overloading
- Virtual functions
- Polymorphism
- Exception Handling

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TOPIC/SUBTOPIC:

LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1 - 2	**THEORY** Basic of Object Oriented Programming and software design C++ Object Oriented Programming. C++ & ANSI standard
3 - 4	**THEORY** C Predefined classes in C++. Building objects with classes.
5 - 7	**THEORY** Introduction to Constructor & Destructor. Defining operations on objects.
8 - 11	**THEORY** Using Inheritance in C++. Concepts of Overloading. Virtual functions and Polymorphism.
12	**THEORY** Using C libraries in C++ programs using commercial Class libraries (Standard template library). Advanced Topics in C++ (Template Exception Handling file handling Stream)
13 - 14	**PRACTICAL** Constructor & Destructor
15 - 18	**PRACTICAL** Inheritance

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19 - 22	**PRACTICAL** Overloading
23 - 26	**PRACTICAL** Virtual functions
27 - 30	**PRACTICAL** Polymorphism
31 - 32	**PRACTICAL** Exception Handling

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DEPARTMENT OF B. VOC STUDIES

SOFTWARE DEVELOPMENT

TEACHING PLAN FOR SEMESTER - V

NAME OF FACULTY: BEAUTY SARKAR

PAPER: PROGRAMMING WITH ADVANCED JAVA (JSP)

PAPER CODE: SBVOC-SWD-VII-503

LECTURES ALLOTTED: 32

ALLOTED SYLLABUS:

Credit – 5 Full Marks – 80

THEORY (12 Classes)

Oops concept (revised all)

Introduction advanced java JDBC – Java Database Connectivity Introduction to JDBC, JDBC Drivers & Architecture, CURD operation Using JDBC, Connecting to non-conventional Databases.

Java Servlets Java Server Technologies Servlet Web Application Basics, Architecture and challenges of Web Application, Introduction to servlet, Servlet life cycle, Developing and Deploying Servlets, Exploring Deployment

Descriptor (web.xml), Handling Request and Response. JSP (Java Server Pages) Introduction to JSP, Life cycle of JSP ,Disadvantages of Servlet ,JSP Components ,Custom Tags ,JSP implicit objects, Accessing database from JSP, Using JavaBeans with JSP ,Working with JSP Standard action tags ,Working with expression language, Error Handling in a jsp , Creating custom tags , JSTL (Java Server Pages Tag Library)

PRACTICAL (20 Classes)

Java Database Connectivity

Java Server Technologies Servlet Web Application

JSP Web Application

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TOPIC/SUBTOPIC:

LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1 - 3	**THEORY** Oops concept
4 - 6	**THEORY** Introduction advanced java JDBC – Java Database Connectivity Introduction to JDBC, JDBC Drivers & Architecture, CURD operation Using JDBC, Connecting to non-conventional Databases.
7 - 9	**THEORY** Java Servlets Java Server Technologies Servlet Web Application Basics, Architecture and challenges of Web Application, Introduction to servlet, Servlet life cycle, Developing and Deploying Servlets, Exploring Deployment
10 - 12	**THEORY** Descriptor (web.xml), Handling Request and Response. JSP (Java Server Pages) Introduction to JSP, Life cycle of JSP ,Disadvantages of Servlet ,JSP Components ,Custom Tags ,JSP implicit objects, Accessing database from JSP, Using JavaBeans with JSP ,Working with JSP Standard action tags ,Working with expression language, Error Handling in a jsp , Creating custom tags , JSTL (Java Server Pages Tag Library)
13 - 19	**PRACTICAL** Java Database Connectivity
20 - 26	**PRACTICAL** Java Server Technologies Servlet Web Application
27 - 32	**PRACTICAL** JSP Web Application

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Department of B.Voc. Studies
Software Development

NAME OF FACULTY: Bidhan Chandra Jana
PAPER: Physics
Paper Code: GBVOC-V-105
Lecture Allotted: 32

Allotted Syllabus **Credit – 3 Full Marks – 50**

THEORY

Classical mechanics and gravitation
Dimensions of physical quantities: Principle of dimensional homogeneity.
Vectors: axial and polar vectors, dot product and cross product, scalar triple product and vector triple product. Scalar and vector fields -gradient, divergence and curl.
Mechanics of a particles: Newton's laws of motion , principle of conservation of linear momentum, path integral of force, conservative force field, concept of potential, conservation of total energy.
Gravitation: gravitational potential and intensity due to thin uniform spherical shell and solid sphere of uniform density, escape velocity.
Waves and oscillations
Simple harmonic motion: differential equation and its solution.
Differential equation of wave motion: plane progressive wave- energy, and intensity. Bel, decibel and phon. Superposition of waves. Beats, velocity of longitudinal wave in slid and gas, velocity of transverse wave in string.

TOPIC/SUBTOPIC	
LEC. NO.	**PROPOSED TOPIC(S) TO BE TAUGHT**
1-2	Dimensions of physical quantities: Principle of dimensional homogeneity
3-4	Vectors: axial and polar vectors.
5-6	Dot product and cross product, scalar triple product and vector triple product.
7-8	Scalar and vector fields – gradient, divergence and curl.

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9-10	Mechanics of a particles: Newton's laws of motion
11-12	Principle of conservation of linear momentum, path integral of force.
13-14	Conservative force field, concept of potential, conservation of total energy
15-16	Gravitation: Newton's law of gravitation, Universal gravitational constant, potential.
17-18	Potential and intensity due to thin uniform spherical shell and solid sphere of uniform density.
19-20	Escape velocity. Numerical.
21-22	Simple harmonic motion: differential equation and its solution.
23-24	Differential equation of wave motion : plane progressive wave- energy, and intensity.
25-26	Bel, decibel and phon. Superposition of waves.
27-28	Beats, velocity of longitudinal wave in slid and gas, velocity of transverse wave in string.
29-32	Revisions

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Department of B.Voc. Studies
Software Development

NAME OF FACULTY: Bidhan Chandra Jana
PAPER: Electronics
Paper Code: GBVOC-V-106
Lecture Allotted: 36

Allotted Syllabus **Credit – 3 Full Marks – 50**

THEORY

Introduction to Electric circuits, Physics of Semiconductor and Basic Electronics:
I. Introduction to Electric Circuits and Physics of semiconductor
Electric Circuit Elements: Resistance and resistors, types of resistors, resistor colour coding, variable resistors(pots and resistance boxes), power rating of resistors, capacitance and capacitors, types of capacitors, voltage rating of capacitors, capacitor coding, self-inductance and inductor coils, air-core and iron-core coils, mutual-inductance and transformers, autotransformer, transformer ratings, variable inductance.
Kirchoff's Laws and Network Theorems: Kirchoff's current and voltage laws, branch-current, mesh-current and node voltage methods of circuit analysis, T to Pi and Pi to T conversions, Maximum Power Transfer.
Forced oscillations and resonance: Theory of forced oscillations in a series LCR circuit, series resonance in an acceptor circuit, Q factor, parallel resonance in a rejector circuit.

Physics of Semiconductors: Classification of crystals into insulators, metals and semiconductors using energy band theory, intrinsic and extrinsic semiconductors, p and n type semiconductors, mechanism of current conduction in semiconductors (drift and diffusion), mobility, current density and conductivity..

TOPIC/SUBTOPIC	
LEC. NO.	**PROPOSED TOPIC(S) TO BE TAUGHT**
1-2	Electric Circuit Elements: Resistance and resistors, types of resistors, resistor colour coding.
3-4	Variable resistors(pots and resistance boxes), power rating of resistors,
5-6	Capacitance and capacitors, types of capacitors, voltage rating of capacitors,

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	capacitor coding
7-8	self-inductance and inductor coils, air-core and iron-core coils
9-10	Mutual-inductance and transformers, autotransformer, transformer ratings, variable inductance.
11-12	Kirchoff's Laws and Network Theorems: Kirchoff's current and voltage laws,
13-14	branch-current, mesh-current and node voltage methods of circuit analysis,
15-16	T to Pi and Pi to T conversions, Maximum Power Transfer.
17-18	Numerical practice.
19-20	Forced oscillations and resonance: Theory of forced oscillations in a series LCR circuit
21-22	Series resonance in an acceptor circuit, Q factor
23-24	Parallel resonance in a rejector circuit.
25-26	Physics of Semiconductors: Classification of crystals into insulators, metals and semiconductors using energy band theory
27-28	intrinsic and extrinsic semiconductors, p and n type semiconductors
29-32	mechanism of current conduction in semiconductors (drift and diffusion), mobility, current density and conductivity.
33-36	Revisions

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Department of B.Voc. Studies
Software Development

NAME OF FACULTY: Bidhan Chandra Jana
PAPER: Physics
Paper Code: GBVOC-VI-305
Lecture Allotted: 34

Allotted Syllabus **Credit – 3 Full Marks – 50**

THEORY

Heat
Kinetic Theory of Gases : Perfect gas, pressure exerted by it(no derivation required), Maxwell's law of distribution of molecular velocities (statement only) - rms, mean and most probable velocities, degrees of freedom, principle of equipartition of energy - application in simple cases. Van der Waals equation (qualitative study),critical constants.
Thermal Conductivity : Steady state and variable state, thermal and thermometric conductivity, Ingen Hausz's experiment.
Physical Optics
Light as an electromagnetic wave : Full electromagnetic spectrum, properties of electromagnetic waves, Huygens' principle — explanation of the laws of reflection and refraction.
Interference of light : Young's experiment, intensity distribution, conditions of interference, Newton's ring.
Diffraction : Fresnel and Fraunhofer class, Fresnel's half-period zones, zone plate. resolving power.
Current Electricity
Steady Current : Network analysis — Kirchoff's laws, Thevnin and Norton's theorem, Wheatstone bridge, potentiometer.

TOPIC/SUBTOPIC	
LEC. NO.	**PROPOSED TOPIC(S) TO BE TAUGHT**
1-2	Kinetic Theory of Gases : Perfect gas, pressure exerted by it.
3-4	Maxwell's law of distribution of molecular velocities (statement only) - rms, mean and most probable velocities.
5-6	Degrees of freedom, principle of equipartition of energy - application in simple cases.
7-8	Van der Waals equation (qualitative study),critical constants.
9-10	Thermal Conductivity : Steady state and variable state, thermal and thermometric conductivity

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11-12	Ingen Hausz's experiment.
13-14	Light as an electromagnetic wave : Full electromagnetic spectrum, properties of electromagnetic waves.
15-16	Huygens' principle — explanation of the laws of reflection and refraction.
17-18	Interference of light : Young's experiment, intensity distribution,
19-20	Conditions of interference, Newton's ring.
21-22	Diffraction : Fresnel and Fraunhofer class, Fresnel's half-period zones
23-24	Zone plate. resolving power.
25-26	Steady Current : Network analysis — Kirchoff's laws,
27-28	Thevnin and Norton's theorem.
29-30	Wheatstone bridge, potentiometer.
31-34	Revisions

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Department of B.Voc. Studies
Software Development

NAME OF FACULTY: Bidhan Chandra Jana
PAPER: Electronics
Paper Code: GBVOC-VI-306
Lecture Allotted: 30

Allotted Syllabus **Credit – 3 Full Marks – 50**

THEORY

Analog Electronic Circuits
Transistor biasing: Operating point and the need for biasing, Fixed bias and self-bias.
Transistor amplifier: CE amplifier, R-C coupled amplifier
Operational Amplifier (Op-Amp)and Op-Amp circuits
The 741 Op-Amp: Ideal and practical characteristics of the 741 Op-amp: open loop voltage gain, unity-gain frequency, input resistance, output resistance, input bias current, input offset current, input offset voltage, common-mode rejection ratio .
Op-amp circuits: Inverting amplifier, concept of virtual ground, adder, non-inverting amplifier, concept of virtual short, unity gain buffer, phase-shifter, differential amplifier, differentiator, integrator, first order low pass and high pass active filter, comparator, Schmitt-trigger.
Feedback and Oscillators: Concept, negative Feedback, Advantages of negative feedback, Barkhaussen criteria Wien Bridge oscillator.
Power Amplifier: Class A, B, AB amplifier, transformer coupled.

TOPIC/SUBTOPIC	
LEC. NO.	**PROPOSED TOPIC(S) TO BE TAUGHT**
1-2	Transistor biasing: Operating point and the need for biasing, Fixed bias and self-bias.
3-4	Transistor amplifier: CE amplifier, R-C coupled amplifier
5-6	The 741 Op-Amp: Ideal and practical characteristics of the IC-741
7-8	Op-amp: open loop voltage gain, unity-gain frequency, input resistance, output resistance, input bias current
9-10	Input offset current, input offset voltage, common-mode rejection ratio.
11-12	Op-amp circuits: Inverting amplifier, concept of virtual ground, non-inverting amplifier
13-14	Adder, concept of virtual short, unity gain buffer, phase-shifter
15-16	Differential amplifier, differentiator, integrator .

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17-18	first order low pass and high pass active filter, comparator, Schmitt-trigger.
19-20	Feedback and Oscillators: Concept, negative Feedback, Advantages of negative feedback.
21-22	Barkhausen criteria Wien Bridge oscillator.
23-24	Power Amplifier: Class A, B.
25-26	Power Amplifier: AB amplifier, transformer coupled.
27-30	Revisions

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Department of B.Voc. Studies
Software Development

NAME OF FACULTY: Bidhan Chandra Jana
PAPER: Electronics
Paper Code: GBVOC-VII-503
Lecture Allotted: 20

Allotted Syllabus **Credit – 3 Full Marks – 50**

THEORY

Analog Communication and digital communication:
II. Analog Communication
Analog Modulation: Need for modulation, modulating signal, need for carrier signal, types of modulation.
Amplitude modulation (AM): Mathematical representation, modulation index and percentage modulation.
Frequency (FM) and Phase Modulation (PM): Mathematical representation of FM and PM, maximum frequency deviation, modulation index, bandwidth in FM.
III. Digital communication
Sampling theorem, Pulse modulation, PPM, PWM, ASK,PSK,FSK basic concept.

TOPIC/SUBTOPIC	
LEC. NO.	**PROPOSED TOPIC(S) TO BE TAUGHT**
1-2	Analog Modulation: Need for modulation, modulating signal, need for carrier signal, types of modulation.
3-4	Amplitude modulation (AM): Mathematical representation
5-6	modulation index and percentage modulation.
7-10	Frequency (FM) and Phase Modulation (PM): Mathematical representation of FM and PM
11-12	maximum frequency deviation, modulation index, bandwidth in FM.
13-14	Digital communication, Sampling theorem,
14-15	Pulse modulation, PPM, PWM
16-17	ASK,PSK,FSK
18-20	Revisions

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NAME OF FACULTY: Bidhan Chandra Jana
PAPER: Quantitative Aptitude
Paper Code: GBVOC-VII-504
Lecture Allotted: 34

Allotted Syllabus **Credit – 3 Full Marks – 50**

THEORY

Unit 1 – Numbers
Unit 2 - H.C.F. and L.C.M. of Numbers
Unit 3 - Square Root and Cube Root
Unit 4 - Simplification
Unit 5 - Percentage
Unit 6 - Average
Unit 7 - Ratio and Proportion
Unit 8 - Partnership
Unit 9 - Profit and Loss

TOPIC/SUBTOPIC	
LEC. NO.	**PROPOSED TOPIC(S) TO BE TAUGHT**
1-2	Numbers
3-6	H.C.F. and L.C.M. of Numbers
7-8	Square Root and Cube Root
9-10	Simplification
11-14	Percentage
15-18	Average
19-22	Ratio and Proportion
23-26	Partnership
27-30	Profit and Loss
31-34	Revisions

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DEPARTMENT OF B. VOC STUDIES

SOFTWARE DEVELOPMENT

TEACHING PLAN FOR SEMESTER - I

NAME OF FACULTY: MR. RISHI BHATTACHARJEE

PAPER: INTRODUCTION TO APPLICATION PACKAGES (MS-OFFICE)

PAPER CODE: SBVOC-SWD-V-102

LECTURES ALLOTTED: 24

ALLOTED SYLLABUS:

Credit – 4 Full Marks – 70

PRACTICAL (24 Classes)

- Microsoft Word
- Microsoft Excel
- Microsoft Power Point

TOPIC / SUBTOPIC:

LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1 - 8	**PRACTICAL** • Microsoft Word Page Layout Tab – Orientation, Margins, Size Fonts Group • Edit - Drag/Drop, Copy Paste, Delete • Spell Fix • Grammar • Paragraph Group – Align, Spacing, Indent Show/Hide • View Tab - Page Layout, Ruler, Zoom • File Tab - Save/Save as Print • Find / replace • Quick Access Toolbar • Format Painter • Save to .pdf • Page Break • Sections Breaks • Table of Contents – Headings • Header, Footer, Page numbers • Columns • Insert Hyperlink • Insert Basic Table – Format, Edit • Insert screen shot – Format, Edit • Wrap text • Bullets • Numbering • Mail Merge • Track changes • Adding Comments • Forms and Templates - Table Forms, Developer Forms • Restrict Editing • Macros and repetitive actions

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9 - 16	• Microsoft Excel Page Layout – Orientation, Margins & Size Fonts Group • Edit - Drag/Drop, Copy Paste, Delete • Spell Check, Alignment Group Cells, Rows, Columns • View Tab – Normal • & Zoom, Column Format – Width, Height, Cell Entry line • Sheets - Name sheets, Reorder Sheets • Simple Sort • Auto Sum Column and Row Print • Financials and formulas.• Find/Replace • Quick Access Toolbar • Format Painter • Wrap Text Merge Cells Format Cells -Numbers Alignment Font Border • Fill Protection • Header/ Footer • Print Options - Set Print Area, Repeat Top Rows, Print Page Break • Freeze rows and columns Comments • Remove Duplicates Advanced Sort Filter • The Excel environment Navigating a worksheet Spreadsheet terminology • Getting help Entering and editing data Entering and editing text and values Entering • and editing formulas Saving and updating workbooks. Modifying a worksheet, Moving and copying data Moving and copying • formulas, Inserting and deleting ranges, rows, and columns, Cell comments Using functions Entering functions AutoSum Other common functions • Formatting Text formatting • Row and column formatting, Number formatting, Conditional • formatting, Additional formatting options Printing Preparing to print Page Setup options Printing worksheets • Charts Chart basics • Pie Chart • Bar Chart • Case Study Modifying existing worksheet Use shortcut keys • Create and email worksheet• Subtotal Functions • Create an outline and consolidate data Create subtotals in a list • Use multiple subtotal functions – SUBTOTAL, SUMIF • Create custom views to save different sets of worksheet display and print • settings. Range names and Filter date Define and apply cell and range names Use • names in Formulas Filter data based on complex criteria Use conditional filters • Copy filtered results to another range • Pivot Tables • Prepare data in a table format and name the table • Create a PivotTable for analyzing • Use the Download Actual page in Account Reconciliation as example • Modify or re-arrange fields • Selected Functions Using IF and SUMIF functions to calculate a value • based on specified criteria Use ROUND functions to round off numbers Use VLOOKUP to find • values in worksheet data Use HLOOKUP to find values in worksheetdata. Import/Export Data • Export data from Excel to other formats Import data from a text file into • an Excel workbook.

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17 – 24	• Microsoft Power Point Common functions Insert slide • Insert Task Box • Find / replace • Quick Access Toolbar • Format Painter • Save to .pdf • Design – Themes, Background • Insert – Picture, ClipArt, Shapes, Smart Art, Format • Header • Footer • Slide number • View - Normal Slide, Slide Sort • Slide Show – Animation, Transition • Insert Comments • Create Master Slide - Create Master Layouts, Understanding • placeholders Create custom Template - Apply a template

Signature

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DEPARTMENT OF B. VOC STUDIES

SOFTWARE DEVELOPMENT

TEACHING PLAN FOR SEMESTER - III

NAME OF FACULTY: MR. RISHI BHATTACHARJEE

PAPER: COMPUTER GRAPHICS

PAPER CODE: SBVOC-SWD-VI-304

LECTURES ALLOTTED: 24

ALLOTED SYLLABUS:

Credit – 4 Full Marks – 70

THEORY (4 Classes)

- Introduction to Computer Graphics
  Two-Dimensional Transformations
  Three-Dimensional Transformations
  Scan conversion – lines, circles and Ellipses; Filling polygons and clipping algorithms

PRACTICAL (16 Classes)

- ADOBE Photo Shop

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TOPIC / SUBTOPIC:

LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1-8	**THEORY** Introduction to Computer Graphics Two-Dimensional Transformations Three-Dimensional Transformations Scan conversion – lines, circles and Ellipses; Filling polygons and clipping algorithms
9 - 24	**PRACTICAL** • ADOBE Photo Shop ▪ Interface & operations ▪ Layers ▪ Brushes & Text ▪ Colouring

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DEPARTMENT OF B. VOC STUDIES

SOFTWARE DEVELOPMENT

TEACHING PLAN FOR SEMESTER - V

NAME OF FACULTY: MR. RISHI BHATTACHARJEE

PAPER: PROGRAMMING WITH C#.NET

PAPER CODE: SBVOC-SWD-VII-501

LECTURES ALLOTTED: 32

ALLOTTED SYLLABUS:

Credit – 3 Full Marks – 80

THEORY (8 Classes)

- MS.NET Framework Introduction
- VS.NET and Entry Point Method –Main
- C # Language Syntax
- N-Tier Layered Architecture Application
- Windows Services
- Delegates & Events
- Packaging and Deployment
- Debugging and Diagnostics

PRACTICAL (12 Classes)

- Developing GUI Application Using WINFORMS
- Database Programming Using ADO.NET
- User Control and Custom Control
- Managing Data using Data Set

MINOR PROJECT (12 Classes)

- **Some Modules / Application developed in C#.NET**

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TOPIC / SUBTOPIC:

LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1-4	• MS.NET Framework Introduction • C # Language Syntax • N-Tier Layered Architecture Application
5-10	**PRACTICAL** • Developing GUI Application Using WINFORMS
11-16	• Database Programming Using ADO.NET (Both Using OLEDB provider & SQL CLIENT provider)
16-20	• User Control and Custom Control • Managing Data using DataSet
20 - 32	**PROJECT** • MINOR PROJECT

Signature

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DEPARTMENT OF B. VOC STUDIES

SOFTWARE DEVELOPMENT

TEACHING PLAN FOR SEMESTER - V

NAME OF FACULTY: MR. RISHI BHATTACHARJEE

PAPER: WEB DEVELOPMENT USING PHP AND MYSQL

PAPER CODE: SBVOC-SWD-VII-502

LECTURES ALLOTTED: 32

ALLOTED SYLLABUS:

Credit – 3 Full Marks – 80

THEORY (4 Classes)

- Basics & Introduction of Web Development

PRACTICAL (16 Classes)

- HTML 5
- CSS 3
- Bootstrap
- Word press
- PHP
- My SQL

MINOR PROJECT (12 Classes)

- **Some Modules / Web Application developed in Php**

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TOPIC / SUBTOPIC:

LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1-2	**THEORY** • Basics & Introduction of Web Development
3-6	**PRACTICAL** • HTML 5 • CSS 3
7-10	• Bootstrap
11-14	• Word press
15-20	• PHP • My SQL
21 - 32	**PROJECT** • MINOR PROJECT

Signature

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DEPARTMENT OF B. VOC STUDIES

SOFTWARE DEVELOPMENT

TEACHING PLAN FOR SEMESTER - I

NAME OF FACULTY: DR. SANTANU MODAK

PAPER: INTRODUCTION TO C PROGRAMMING

PAPER CODE: SBVOC-SWD-V-103

LECTURES ALLOTTED: 34

ALLOTED SYLLABUS:

Credit – 5 Full Marks – 80

THEORY (17 Classes)

- **Constants, Variables & Data Types**

Character set, C Tokens, Identifiers and Keywords, Constants, Variables, Data types, Declaration of variables, declaration of storage class, assigning values to variables, defining symbolic constants, declaring a variable as constant, declaring a variable as volatile, overflow and underflow of data.

- **Operators & Expressions**

Arithmetic operators, Relational, Logical operators, Assignment, increment and decrement operators, conditional operators

- **Decision Making – Branching & Looping**

Decision making with IF statement, switch statement? : operator, goto statement. While statement, do-while statement, for statement, Jumps in loops

- **Arrays**

One dimensional array: Array Manipulation, Different operations on one dimensional array, two-dimensional array, operations on two dimensional arrays, multi-dimensional array

- **Handling of Character Strings**

Declaring and initializing string variables, reading string from terminal, writing string to screen, putting strings together, comparison of two strings, string handling functions

- **Functions**

Top-down approach of problem solving, standard library functions, passing values between functions, scope rules of functions, calling convention, return type of functions, call by value and call by reference, recursive functions

- **Structures and Unions**

Defining a structure, Declaring Structure variables, accessing structure members, structure initialization, copying and comparing structure variables, union

- **Pointers**

Understanding pointers, accessing the address of a variable, declaring pointer variables, initialization of pointer variables, accessing a variable through its pointer

PRACTICAL (17 Classes)

- C Program to Add Two Integers
- C Program to Swap Two Numbers
- C Program to Check Whether a Number is Even or Odd
- C Program to Find the Largest Number Among Three Numbers
- C Program to Check Leap Year
- C Program to Find Factorial of a Number
- C Program to Display Fibonacci Sequence
- C Program to Reverse a Number
- C Program to Check Armstrong Number
- C Program to Calculate Average Using Arrays
- C Program to Add Two Matrices Using Multi-dimensional Arrays
- C Program to Find Transpose of a Matrix
- C Program to print Pyramid patten
- C program for various string handling functions: Find the frequency of a character in a string
- Find the number of vowels, consonants, digits and white spaces
- Reverse a string using recursion
- Find the length of a string
- Concatenate two strings
- C Program to Copy a String

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TOPIC / SUBTOPIC:

LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1	**THEORY** Programming fundamentals, High level and low level language
2 - 3	**THEORY** Constants, Variables & Data Types Character set, C Tokens, Identifiers and Keywords, Constants, Variables, Data types, Declaration of variables **PRACTICAL** C Program to Add Two Integers
4 - 7	**THEORY** Decision making with IF statement, switch statement **PRACTICAL** C Program to Check Whether a Number is Even or Odd C Program to Find the Largest Number Among Three Number
8 - 10	**THEORY** **Operators & Expressions** Arithmetic operators, Relational, Logical operators, Assignment, increment and decrement operators, conditional operators **PRACTICAL** Related programming example.
11 - 15	**THEORY** **Arrays** One dimensional array: Array Manipulation, Different operations on one dimensional array, two-dimensional array, operations on two dimensional

	arrays, multi-dimensional array **PRACTICAL** C Program to Calculate Average Using Arrays C Program to Add Two Matrices Using Multi-dimensional Arrays C Program to Find Transpose of a Matrix
16 - 20	**THEORY** Declaration of storage class, assigning values to variables, defining symbolic constants, declaring a variable as constant, declaring a variable as volatile overflow and underflow of data. **PRACTICAL** Related programming example.
21 - 25	**THEORY** **Handling of Character Strings** Declaring and initializing string variables, reading string from terminal, writing string to screen, putting strings together, comparison of two strings, string handling functions **PRACTICAL** Find the frequency of a character in a string Find the number of vowels, consonants, digits and white spaces Reverse a string using recursion Find the length of a string Concatenate two strings C Program to Copy a String
26 - 28	**THEORY** **Pointers** Understanding pointers, accessing the address of a variable, declaring pointer variables, initialization of pointer variables, accessing a variable through its pointer

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	PRACTICAL Programs on pointer arithmetic.
29 - 31	**THEORY** **Structures and Unions** Defining a structure, Declaring Structure variables, accessing structure members, structure initialization, copying and comparing structure variables, union **PRACTICAL** Program to implement structure to collect data.
32 - 34	**THEORY** **Functions** Top-down approach of problem solving, standard library functions, passing values between functions, scope rules of functions, calling convention, return type of functions, call by value and call by reference, recursive functions **PRACTICAL** Program to implement call by value and call by reference, recursive functions

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DEPARTMENT OF B. VOC STUDIES

SOFTWARE DEVELOPMENT

TEACHING PLAN FOR SEMESTER - III

NAME OF FACULTY: DR. SANTANU MODAK

PAPER: DATABASE MANAGEMENT SYSTEM

PAPER CODE: SBVOC-SWD-VI-301

LECTURES ALLOTTED: 30

ALLOTED SYLLABUS:

Credit – 5 Full Marks – 80

THEORY (10 Classes)

An Overview of the Database Management System
What is database? Why database? Database system, database management system (DBMS), advantages of DBMS.

An Architecture of the Database system
Three levels of architecture, mappings, role of database administrator(DBA), E-R model, three approaches of DBMS- relational, hierarchical and network.

Relational Database Management System (RDBMS)
Introduction, RDBMS terminology, relational model, base tables, keys.

Normalization
Normal forms, Boyce-Codd Normal form, higher normal forms.

Relational Algebra
Relational operators

The SQL Language
Introduction , Characteristics of SQL, data definition, data manipulation, SQL commands, SQL operators, Queries, aggregate functions.

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92, S.P. Mukherjee Road
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PRACTICAL (20 Classes)

Introduction to SQL : Data Definition Language (DDL), Data Manipulation Language (DML)

SQL Constraints:
PRIMARY KEY
FOREIGN KEY
NOT NULL
UNIQUE
CHECK
DEFAULT

ORDER BY, SELECT DISTINCT, DELETE, DROP, WHERE Operators: LIKE, IN, BETWEEN

Data Schema: Table creation, insert data, run queries

Create database and run specified queries.

TOPIC / SUBTOPIC:

LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1 - 4	**THEORY** **An Overview of the Database Management System** What is database? Why database? Database system, database management system (DBMS), advantages of DBMS.
5 - 6	**THEORY** Introduction to SQL Data Definition Language (DDL) Data Manipulation Language (DML)
7 - 10	**THEORY** **An Architecture of the Database system** Three levels of architecture, mappings, role of database administrator(DBA),

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	E-R model, three approaches of DBMS- relational, hierarchical and network.
11 - 13	**PRACTICAL** SQL Constraints PRIMARY KEY FOREIGN KEY NOT NULL UNIQUE CHECK DEFAULT
14 - 16	**THEORY** **Relational Algebra** Relational operators: Select Operation, Project Operation, Union Operation, Se Intersection, Set Difference, Cartesian product, Rename Operation
17 - 19	**THEORY** **Relational Database Management System (RDBMS)** Introduction, RDBMS terminology, relational model, base tables, keys.
20 - 23	**PRACTICAL** ORDER BY, SELECT DISTINCT, DELETE, DROP, WHERE Operators: LIKE, IN, BETWEEN Data Schema: Table creation, insert data, run queries
24 - 26	**THEORY** **Normalization** Normal forms, Boyce-Codd Normal form, higher normal forms.
27 - 30	**PRACTICAL** Create database and run specified queries

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DEPARTMENT OF B. VOC STUDIES

SOFTWARE DEVELOPMENT

TEACHING PLAN FOR SEMESTER - III

NAME OF FACULTY: DR. SANTANU MODAK

PAPER: DATA COMMUNICATION AND COMPUTER NETWORKING (DCN)

PAPER CODE: SBVOC-SWD-VI-303

LECTURES ALLOTTED: 30

ALLOTED SYLLABUS:

Credit – 4 Full Marks – 70

THEORY (24 Classes)

1. Define and understand the meaning and role of a protocol, the concept of layering, appreciate the role of the TCP/IP five-layer model, and identify the major functions at each layer.
2. Describe how bits are represented as a signal on various physical media of data communication systems, which include A/D conversion, modulation, spread spectrum, synchronous and asynchronous communications, multiplexing, and framing.
3. Understand the various types of transmission media and their signal propagation characteristics associated with signal bandwidth.
4. Demonstrate understanding of the basic concepts of error detection, checking, and correction at the data link layer and application to flow control protocols.
5. Demonstrate understanding of the various switching methodologies, networking concepts, and associated IEEE 802 family of protocol standards.
6. Apply formulae to practical communication systems and analyze their performance in transmitting data signals.

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TOPIC / SUBTOPIC:

LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1 - 4	Overview and Protocol Architecture, TCP/IP
5 - 9	Data Transmission and Transmission Media: simplex, followed by half duplex, and full duplex, wired media & wireless media
10 - 13	Signal Encoding and Digital Data Communication Schemes
14 - 17	Data Link Control Protocols and Multiplexing
18 - 20	Error detection and correction schemes.
21 - 22	TCP / IP Model
23	Hamming Code
24	IPv4 Addressing

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DEPARTMENT OF B. VOC STUDIES

SOFTWARE DEVELOPMENT

TEACHING PLAN FOR SEMESTER - V

NAME OF FACULTY: DR. SANTANU MODAK

PAPER: INTRODUCTION TO PYTHON PROGRAMMING

PAPER CODE: SBVOC-SWD-VII-504

LECTURES ALLOTTED: 24

ALLOTED SYLLABUS:

Credit – 3 Full Marks – 60

THEORY (13 Classes)

- Introduction to Python Language
- Python Language Syntax
- Python Keywords and Identifiers
- Python Comments
- Python Variables
- Python Data Types
- Python Operators
- Control Flow – Decision Making, Looping, Branching
- Strings
- Lists
- Array
- Regular expressions
- Data Visualization

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PRACTICAL (11 Classes)

- Installing Python IDES – Python IDLE and Anaconda
- Data-types in Python
- Variables in Python – Declaration and Use
- Typecasting in Python
- Operators in Python – Assignment, Logical, Arithmetic etc.
- Taking User Input (Console)
- Conditional Statements – If else and Nested If else and elif
- Python Collections (Arrays) – List, Tuple, Sets and Dictionary
- Loops in Python – For Loop, While Loop & Nested Loops
- String Manipulation – Basic Operations, Slicing & Functions and Methods
- User Defined Functions – Defining, Calling, Types of Functions, Arguments
- Lambda Function
- Importing Modules – Math Module
- Regular Expressions
- Data Visualization

TOPIC / SUBTOPIC:

LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1 - 5	**THEORY** • Introduction to Python Language, Python Language Syntax • Python Keywords and Identifiers, variables, comments
6 - 8	**PRACTICAL** Basic programs to check functions of various keywords.
9 - 10	**THEORY** Control Flow – Decision Making, Looping, Branching

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11 - 15	**PRACTICAL** IF-ELSE-ELIF, Loop implementation
16	**THEORY** String
17	**PRACTICAL** String implementation
18	**THEORY** List
19	**PRACTICAL** List implementation
20	**PRACTICAL** Regular Expression
21	**THEORY** Data Visualization
22 - 23	**PRACTICAL** Data Visualization

Semester 1

General Components

Paper Code- GBVOC-V-101

Communicative English
Credit – 3 Full Marks – 50 Total Hours – 45 Hours

Introduction : What is Communication and why communication?	**05 Hours**
Types of Communication, Stages of Communication, Interpersonal and Intrapersonal Communication	**10 Hours**
Verbal and non Verbal Communication, What is effective communication? Barriers of Effective Communication	**10 Hours**
Spoken and written Communication, Role and function	**08 Hours**
Model of Communication	**06 Hours**
The four language skills: listening, speaking, reading, and writing	**06 Hours**

Paper Code- GBVOC-V-105

Physics
Credit – 3 Full Marks – 50 Total Hours – 45 Hours

Dimensions of physical quantities: Principle of dimensional homogeneity.	**2 Hours**
Vectors: axial and polar vectors, dot product and cross product, scalar triple product and vector triple product. Scalar and vector fields – gradient, divergence and curl.	**10 Hours**
Mechanics of a particles: Newton's laws of motion , principle of conservation of linear momentum, path integral of force, conservative force field, concept of potential, conservation of total energy.	**10 Hours**
Gravitation: gravitational potential and intensity due to thin uniform spherical shell and solid sphere of uniform density, escape velocity.	**8 Hours**
Waves and oscillations **Simple harmonic motion**: differential equation and its solution. **Differential equation of wave motion :** plane progressive wave- energy, and intensity. Bel, decibel and phon. Superposition of waves. Beats, velocity of longitudinal wave in slid and gas, velocity of transverse wave in string.	**15 Hours**

Paper Code- GBVOC-V-106

Electronics

Credit – 3 Full Marks – 50 Total Hours – 45 Hours

Introduction to Electric Circuits and Physics of semiconductor Electric Circuit Elements: Resistance and resistors, types of resistors, resistor colour coding, variable resistors(pots and resistance boxes), power rating of resistors, capacitance and capacitors, types of capacitors, voltage rating of capacitors, capacitor coding, self-inductance and inductor coils, air-core and ironcore coils, mutual-inductance and transformers, autotransformer, transformer ratings, variable inductance.	**10 Hours**
Kirchoff's Laws and Network Theorems: Kirchoff's current and voltage laws, branch-current, mesh current And node voltage methods of circuit analysis, T to Pi and Pi to T conversions, Maximum Power Transfer.	**10 Hours**
Forced oscillations and resonance: Theory of forced oscillations in a series LCR circuit, series resonance in an acceptor circuit, Q factor, parallel resonance in a rejector circuit.	**10 Hours**
Physics of Semiconductors: Classification of crystals into insulators, metals and semiconductors using energy band theory, intrinsic and extrinsic semiconductors, p and n type semiconductors, mechanism of currentconduction in semiconductors (drift and diffusion), mobility, current density and conductivity.	**15 Hours**

Paper Code- GBVOC-V-107

Mathematics

Credit – 3 Full Marks – 50 Total Hours – 45 Hours

Mensuration. Permutation and combination, Probability, Binomial Theorem. Theory of equations upto 3rd degree.	**10 Hours**
Complex Numbers:Basic concepts and applications.DeMoivre's Theorem and its applications.	**10 Hours**
Polynomials:FundamentalTheorem of Classical Algebra (Statement only). Polynomials with real co-efficients: The nth degree polynomial equation has exactlynroots. Nature of roots of an equation (Surd or Complex roots occur in pairs). Statement of Descarte's Rule of signs and its applications.	**15 Hours**
Integral Calculus Integration of the form : Derivative of first and second order	**10 Hours**

Semester 2

General Components

Paper Code- GBVOC-V-201

Communicative English
Credit – 3 Full Marks – 50 Total Hours – 45 Hours

Introduction : Remedial English Grammar (with emphasis on functions and structures)	**05 Hours**
The article, linking verbs, negative sentences, questions tags, agreement or concord, verbs transitive and intransitive, regular and irregular	**10 Hours**
Tense and their uses	**08 Hours**
Verbs and adverbs, confusion of adjective and adverb, adverbials, use of no, not and none, difficulties with comparative and superlative, confusion of participles	**08 Hours**
Active and passive voice, prepositions, negative verbs, redundant pronouns and prepositions	**07 Hours**
The use of correlative, use of who and whom, much and many, still and yet, so that, so as, make and do, errors in the use of individual words	**07Hours**

Paper Code- GBVOC-V-205

Physics
Credit – 3 Full Marks – 50 Total Hours – 45 Hours

General properties of Matter **Elasticity:** Elastic behaviour, Stress-strain relationship, Hooke's law, Young's modulus, bulk modulus, shear, modulus of rigidity, poisson's ratio.	**5 Hours**
Viscosity: streamline and turbulent flow. Critical velocity, Reynold's number, Bernoulli's theorem and its applications.	**5 Hours**
Surface tension: Surface energy and surface tension, angle of contact, capillary rise.	**5 Hours**
Geometrical Optics **Reflection and refraction** : Fermat's Principle, laws of reflection and refraction at a plane surface, refraction at a spherical surface, lens formula. Combination of thin lenses - equivalent focal length.	**10 Hours**
Optical instrument: Dispersion and dispersive power, chromatic aberration, different types of seidel aberration. Ramsden and Huygens eye-piece.	**5 Hours**
Dynamics of rigid body: Moment of inertia and radius of gyration - their physical significance, theorems of parallel and perpendicular axes, rotational kinetic energy, calculation of moment of inertia for some simple symmetric systems. Physical significance of MI.	**15 Hours**

Paper Code- GBVOC-V-206

Electronics

Credit – 3 Full Marks – 50 Total Hours – 45 Hours

Basic Electronic Devices: p-n junction and the semiconductor diode: the p- n diode, Volt-ampere (V-I)characteristic of a forward and reverse biased p-n junction diode, difference in characteristics among Si, Ge and GaAs diodes, Shockley's equation,V-I characteristics of a reverse biased Zener diode.	**15 Hours**
Diode circuits: Diode as a circuit element, half and full-wave rectifier, PIV rating, Bridge rectifier, Effect of filters, load and line regulation with a zener diode.	**15 Hours**
Bipolar Junction Transistor(BJT): pnp and npn transistors in Common Base (CB) , Common Emitter (CE) andCommon Collector (CC) modes, current components in a BJT, current gains, input, output characteristics in CB and CE modes.	**8 Hours**
Field Effect Transistor (FET): Construction of a Junction Field Effect Transistor (JFET), n-channel and p-channel JFETs, drain characteristics of an n-channel JFET,construction of a Metal Oxide Semiconductor Field Effect Transistor (MOSFET), n-channel and p-channel, depletion and enhancement type MOSFETs, drain of n channel depletion MOSFET, FET parameters. Application of FET and MOSFET	**7 Hours**

Paper Code- GBVOC-V-207

Mathematics

Credit – 3 Full Marks – 50 Total Hours – 45 Hours

Polynomials:(ii) Rolle's Theorem and its direct applications. Relation between roots and co-efficients. Symmetric functions of roots, Transformations of equations.	**15 Hours**
Differential Calculus :Derivative – its geometrical and physical interpretation. Sign of derivative – Monotonic increasing and decreasing functions. Relation between continuity and derivability. Differential – application in finding approximation	**15 Hours**
Integral Calculus : Integration of rational functions. Evaluation of definite integrals.Integration as the limit of a sum (with equally spaced as well as unequal intervals).	**15 Hours**

Semester 3

General Components

Paper Code- GBVOC-VI-301

Communicative English
Credit – 3 Full Marks – 50 Total – 45 Hours

Introduction of various language skills	**05 Hours**
Listening : What is active listening? Listening and hearing, listening and hearing, listening and giving feedback, listening comprehension	**14 Hours**
Speaking : The phonemes of English, syllable, stress and intonation, pronunciation practice, accuracy focused and fluency focused activities	**14 Hours**
Personality building : Appropriate use of register, style, lexis and body language, concept of soft skill, confidence and personality building	**12 Hours**

Paper Code- GBVOC-VI-305

Physics
Credit – 3 Full Marks – 50 Total – 45 Hours

Heat **Kinetic Theory of Gases :** Perfect gas, pressure exerted by it(no derivation required), Maxwell's law of distribution of molecular velocities (statement only) - rms, mean and most probable velocities, degrees of freedom, principle of equipartition of energy - application in simple cases. Van der Waals equation (qualitative study), critical constants.	**15 Hours**
Thermal Conductivity : Steady state and variable state, thermal and thermometric conductivity, Ingen Hausz's experiment.	**5 Hours**
Physical Optics **Light as an electromagnetic wave :** Full electromagnetic spectrum, properties of electromagnetic waves, Huygens' principle — explanation of the laws of reflection and refraction. **Interference of light :** Young's experiment, intensity distribution, conditions of interference, Newton's ring.	**15 Hours**
Diffraction : Fresnel and Fraunhofer class, Fresnel's half-period zones, zone plate. resolving power.	**5 Hours**
Current Electricity **Steady Current :** Network analysis — Kirchoff's laws, Thevnin and Norton's theorem, Wheatstone bridge, potentiometer.	**5 Hours**

Paper Code- GBVOC-VI-306

Electronics
Credit – 3 Full Marks – 50 Total – 45 Hours

Transistor biasing: Operating point and the need for biasing, Fixed bias and self-bias.	**2 Hours**
Transistor amplifier: CE amplifier, R-C coupled amplifier	**3 Hours**
Operational Amplifier (Op-Amp)and Op-Amp circuits The 741 Op-Amp: Ideal and practical characteristics of the 741 Op-amp: open loop voltage gain, unity-gain frequency, input resistance, output resistance, input bias current, input offset current, input offset voltage, common-mode rejection ratio .	**15 Hours**
Op-amp circuits: Inverting amplifier, concept of virtual ground, adder, non-inverting amplifier, concept of virtual short, unity gain buffer, phase-shifter, differential amplifier, differentiator, integrator, first order low pass and high pass active filter, comparator, Schmitt-trigger. Feedback and Oscillators: Concept, negative Feedback, Advantages of negative feedback, Barkhaussen criteria Wien Bridge oscillator.	**20 Hours**
Power Amplifier: Class A, B, AB amplifier, transformer coupled.	**5 Hours**

Paper Code- GBVOC-VI-307

Mathematics
Credit – 3 Full Marks – 50 Total – 45 Hours

Differential Equations:Order, degree and solution of an ordinary differential equation (ODE) in presence of arbitrary constants. Formation of ODE. First order equations: • Variables separable. • Homogeneous equations and equations reducible to homogeneous forms. • Exact equations and those reducible to such equation. • Euler's and Bernoulli's equations (Linear). (v) Clairaut'sEquations : General and Singular solutions.	**45 Hours**

Semester 4

General Components

Paper Code- GBVOC-VI-401

Communicative English
Credit – 3 Full Marks – 50 Total 45 Hours

Introduction : Reading & Writing skills	**05 Hours**
Reading : Effecting reading, skimming and scanning, reading comprehension	**10 Hours**
Writing : Concept of good and effective writing, gist and summaries, writing advertisements, business letter writing	**10 Hours**
Writing : Report writing, CV writing, E-mail, Fax, Notices, Agenda, Minutes	**10 Hours**
Speaking : Group discussion (GD), Debate, Extempore, Mock Interview, Presentation and Role Play etc. turn-taking and gap-fillers	**10 Hours**

Paper Code- GBVOC-VI-405

Physics Credit – 3 Full Marks – 50
Total 45 Hours

Thermoelectricity: seebeck , peltire and Thomson effect,laws of thermoelectricity, thermoelectric curve- neutral and inversion temperature.	**10 Hours**
Magnetic effect of current : Biot and Savart's law, ampere's circuital law (statement only), magnetic field due to a straight conductor, circular coil, solenoid, Ampere's equivalence theorem.	**10 Hours**
Steady Current : Network analysis — Kirchoff's laws, Thevnin and Norton's theorem, Wheatstone bridge, potentiometer.	**10 Hours**
Lorentz force : Force on a moving charge in simultaneous electric and magnetic fields, force on a current carrying conductor in a magnetic field.	**5 Hours**
Varying currents: growth and decay of currents in L-R circuit; charging and discharging of capacitor in C-R circuit.	**5 Hours**
Alternating current : Mean and r.m.s. values of current and emf with sinusoidal wave form; LR, CR and series LCR circuits.	**5 Hours**

Paper Code- GBVOC-VI-406

Electronics

Credit – 3 Full Marks – 50 Total 45 Hours

Regulated Power Supply: Construction of a power supply with rectifier, filter, zener and IC regulator.	**12 Hours**
Cathode ray oscilloscope: Block diagram of CRO, cathode ray tube (CRT), construction, basic principles of focusing and deflection of electron beam, basic elements of a CRO.	**12 Hours**
Meters: DC ammeters, voltmeters, voltmeter sensitivity, ohm meter, ammeter (series, and shunt types), basic features of analog and digital multimeter (DMM), digital voltmeter (DVM) (block diagram, A-D conversion techniques, display).	**12 Hours**
Signal Generators: Generation of sinusoidal, square wave and triangular waves, Function generator(block diagram).	**9 Hours**

Paper Code- GBVOC-VI-407

Mathematics

Credit – 3 Full Marks – 50 Total 45 Hours

Determinants up to the third order :Properties, Cofactor and Minor. Product of two determinants. Adjoint, Symmetric and Skew-symmetric determinants. Solutions of linear equations with not more than three variables by Cramer's Rule.	**25 Hours**
Matrices of Real Numbers :Equality of matrices. Addition of matrices. Multiplication of a matrix by a scalar. Multiplication of matrices – Associative properties. Transpose of matrix – its properties. Inverse of a non-singular square matrix. Symmetric and Skew-symmetric matrices. Scalar matrix. Orthogonal matrix. Elementary operations on matrices.	**20 Hours**

Semester 5

General Components

Paper Code- GBVOC-VII-501

Communicative English
Credit – 3 Full Marks – 50 Total 45 Hours

Introduction : Use of language in different fields	**05 Hours**
English for Specific Purposes (ESP) : What is ESP? Vocabulary related to travel and tourism, hospitality, airlines, banking, corporate, media, sports etc	**16 Hours**
EAP (English for Academic Purposes)	**08 Hours**
GD (Group Discussion), Debate	**10 Hours**
Interview Techniques & Skills	**06 Hours**

Paper Code- GBVOC-VII-502

Communicative Hindi
Credit – 3 Full Marks – 50 Total 45 Hours

हिंदी भाषा का विकास - सामान्य परिचय	**5 Hours**
वर्ण की परिभाषा – वर्णमाला – स्वर-वर्ण – व्यंजन-वर्ण	**10 Hours**
शब्द की परिभाषा – अर्थ के आधार पर – तत्सम — तद्भव – देशज -शंकर शब्द संज्ञा , सर्वनाम , विशेषण ,प्रविशेषण,	**15 Hours**
काल- परिभाषा – काल के भेद – भूतकाल – भविष्यत् काल – वर्तमान काल क्रिया, अव्यय	**15 Hours**

Paper Code- GBVOC-VII - 503

Electronics
Credit – 3 Full Marks – 50 Total 45 Hours

Analog Communication **Analog Modulation**: Need for modulation, modulating signal, need for carrier signal, types of modulation.	**5 Hours**
Amplitude modulation (AM): Mathematical representation, modulation index and percentage modulation.	**10 Hours**
Frequency (FM) and Phase Modulation (PM): Mathematical representation of FM and PM, maximum frequency deviation, modulation index, bandwidth in FM.	**15 Hours**
Digital communication Sampling theorem, Pulse modulation, PPM, PWM, ASK,PSK,FSK basic concept.	**15 Hours**

Paper Code- GBVOC-VII-504

Quantitative Aptitude
Credit – 3 Full Marks – 50 Total 45 Hours

Unit 1 – Numbers	**5 hours**
Unit 2- H.C.F. and L.C.M. of Numbers	**5 hours**
Unit 3- Square Root and Cube Root	**5 hours**
Unit 4- Simplification	**5 hours**
Unit 5- Percentage	**5 hours**
Unit 6- Average	**5 hours**
Unit 7- Ratio and Proportion	**5 hours**
Unit 8- Partnership	**5 hours**
Unit 9- Profit and Loss	**5 hours**

Semester 6

General Components

Paper Code- GBVOC-VII-601

Communicative English
Credit – 3 Full Marks – 50 Total 45 Hours

Introduction : About Acuracy & Fluency in Speaking	**05 Hours**
Presentation Skills & Accuracy	**08 Hours**
Accuracy and Fluency in English Conversation	**08 Hours**
Mock Interview, Comprehension	**06 Hours**
Non Verbal Communication & Body Language	**06 Hours**
Effective Communications & Soft Skills	**06 Hours**
Business Communication	**06 Hours**

Paper Code- GBVOC-VII-602

Communicative Hindi
Credit – 3 Full Marks – 50 Total 45 Hours

वर्तनी : शब्द एवं वाक्य शुद्धिकरण	**05 Hours**
पर्यायवाची शब्द	**05 Hours**
विलोम शब्द / विपरीतार्थक	**06 Hours**
हिंदी मुहावरे और अर्थ	**06 Hours**
अनेक शब्दों के लिए एक शब्द	**06 Hours**
संक्षेपण- संक्षेपण के नियम – उदाहरण	**06 Hours**
पल्लवन- पल्लवन और व्याख्या – पल्लवन के सामान्य नियम – उदाहरण	**06 Hours**
अपठित गद्यांश और प्रश्नोत्तर- उदाहरण	**05 Hours**

Paper Code- GBVOC-VII-604

Electronics
Credit – 3 Full Marks – 50 Total 45 Hours

Embedded system **Microcontroller:** concept, different types of micro-controller, 8051 family, basic programming with assembly language and C. AVR series microcontroller, Arduino concept and programming.	**20 Hours**
Digital system design: VHDL or Verilog programming, basic digital circuit design program, half adder, 2:1 MUX.	**25 Hours**

Paper Code- GBVOC-VII-606

Quantitative Aptitude
Credit – 3 Full Marks – 50 Total 45 Hours

Unit 1 - Time and Work, Work and Wages	**5 Hours**
Unit 2 - Pipes and Cisterns	**5 Hours**
Unit 3 - Time and Distance	**5 Hours**
Unit 4 - Boats and Streams	**5 Hours**
Unit 5 - Races and Games of Skill	**5 Hours**
Unit 6 - Alligation or Mixture	**5 Hours**
Unit 7 - Problems on Ages	**5 Hours**
Unit 8 - Simple Interest	**5 Hours**
Unit 9 - Compound Interest	**5 Hours**

Semester 1

Skilled Components

Paper Code- SBVOC-SWD-V-101

Digital System Design and Computer Architecture
Credit – 5 Full Marks – 80 Total 75 Hours

Digital components Overview of Computer Organisation logic gates adder flip flop as one bit memory. Decoders multiplexers register shift register counter Ram	**15 Hours**
Data representation hexadecimal numbers ASCII code two component addition subtraction overflow floating point representation	**15 Hours**
Data representation hexadecimal numbers ASCII code two component addition subtraction overflow floating point representation	**15 Hours**
Register transfer and microoperations Bus and memory transfers three State Bus buffer binary adder binary Arithmetic circuit logic and shift micro operations ALU basic Computer Organisation, Direct and indirect address timing and control signal generation.Memory reference instructions input output instruction. Central Processing Unit organisation memory stack one address and two address	**15 Hours**
Arithmetic Register and shift instruction software and Instruction pipelines, Arithmetic. – Addition And subtraction with signed magnitude data manipulation algorithms. Algorithm division algorithm input output organisation data transfer handshaking as synchronous serial transfer interrupt interface, DMA transfer interfacing peripherals with CPU introduction keyboard. Scanner Network ka introduction to pipelining and linear pipeline. . Organisation Rom ram hard disk cache memory direct mapping virtual memory. cache memory working principles. Programming assembly language of Intel 8086 simple character operations.	**15 Hours**

Paper Code- SBVOC-SWD-V-102

Introduction to Application Packages (MS-OFFICE)
Credit – 4 Full Marks – 70 Total 60 Hours

Word	**20 Hours**
Page Layout Tab – Orientation, Margins, Size Fonts Group Edit - Drag/Drop, Copy Paste, Delete Spell Fix Grammar Paragraph Group – Align, Spacing, IndentShow/Hide View Tab - Page Layout, Ruler, Zoom File Tab - Save/Save as Print Find / replace Quick Access Toolbar Format Painter Save to .pdf Page Break Sections Breaks Table of Contents - Headings Header, Footer, Page numbers Columns Insert Hyperlink Insert Basic Table – Format, Edit Insert screen shot – Format, Edit Wrap text Bullets Numbering Mail Merge Track changes Adding Comments Forms and Templates - Table Forms, Developer Forms Restrict Editing Macros and repetitive actions	
Power Point	**20 Hours**
Common functions Insert slide Insert Task Box Find / replace Quick Access Toolbar Format Painter Save to .pdf Design – Themes, Background Insert – Picture, ClipArt, Shapes, Smart Art, Format Header Footer Slide number View - Normal Slide, Slide Sort Slide Show – Animation, Transition Insert Comments Create Master Slide - Create Master	

Layouts,Understanding placeholders Create custom Template - Apply a template	
Excel Page Layout – Orientation, Margins & Size Fonts Group Edit - Drag/Drop, Copy Paste, Delete Spell Check, Alignment Group Cells, Rows,Columns View Tab – Normal & Zoom, Column Format – Width, Height, Cell Entry line Sheets - Name sheets, Reorder Sheets Simple Sort Auto Sum Column and Row Print Financials and formulas. Find/Replace Quick Access Toolbar Format Painter Wrap Text Merge Cells Format Cells -Numbers Alignment Font Border Fill Protection Header/ Footer Print Options - Set Print Area, Repeat Top Rows, Print Page Break Freeze rows and columns Comments Remove Duplicates Advanced Sort Filter The Excel environment Navigating a workshee Spreadsheet terminology Gettinghelp Entering and editing data Entering and editing text and values Entering and editing formulas Saving and updating workbooks. Modifying a worksheet, Moving and copying data Moving and copying formulas, Inserting and deleting ranges, rows, and columns, Cell comments Using functions Entering functions AutoSum Other common functions Formatting Text formatting Row and column oformatting, Number formatting, Conditional formatting, Additional formatting options Printing Preparing to print Page Setup options Printing worksheets Charts Chart basics Pie Chart Bar Chart Case Study Modifying existing worksheet Use shortcut keys Create and email worksheet Subtotal Functions Create an outline and consolidate data Create subtotals in a list Use multiple subtotal functions – SUBTOTAL, SUMIF Create custom views to save different sets of	**20 Hours**

worksheet display and print settings. Range names and Filter date Define and apply cell and range names Use names in Formulas Filter data based on complex criteria Use conditional filters Copy filtered results to another range Pivot Tables Prepare data in a table format and name the table Create a PivotTable for analyzing Use the Download Actual page in Account Reconciliation as example Modify or re-arrange fields Selected Functions Using IF and SUMIF functions to calculate a value based on specified criteria Use ROUND functions to round off numbers Use VLOOKUP to find values in worksheet data Use HLOOKUP to find values in worksheetdata. Import/Export Data Export data from Excel to other formats Import data from a text file into an Excel workbook.	

Paper Code- SBVOC-SWD-V-103

Introduction to C Programming
Credit – 5 Full Marks – 80 Total – 75 Hours

Introduction to Programming How to develop a program, Algorithms, Flow-charts, Types of Programming Languages, Compiler and Linker, Testing and Debugging a program, Documentation.	**2 Hours**
Constants, Variables & Data Types Character set, C Tokens, Identifiers and Keywords, Constants, Variables, Data types, Declaration of variables, declaration of storage class, assigning values to variables, defining symbolic constants, declaring a variable as constant, declaring a variable as volatile, overflow and underflow of data.	**4 Hours**
Operators & Expressions Arithmetic operators, Relational, Logical operators, Assignment, increment and decrement operators, conditional operators, bitwise operators, special operators, arithmetic expressions, evaluation of arithmetic expressions, precedence of arithmetic expressions, some computational problems, type conversion in expressions, operator precedence and associatively, mathematical functions.	**8 Hours**
Managing Input & output operations Reading a character, writing a character, formatted input, and formatted output.	**6 Hours**
Decision Making – Branching & Looping Decision making with IF statement, switch statement ? : operator, goto statement. While statement, do-while statement, for statement, Jumps in loops	**8 Hours**
Arrays One dimensional array: Array Manipulation, Different operations on one dimensional arrays, two dimensional array, operations on two dimensional arrays, multi-dimensional array, dynamic arrays.	**8 Hours**
Handling of Character Strings Declaring and initializing string variables, reading string from terminal, writing string to screen, putting strings together, comparison of two strings, string handling functions, table of strings	**4 Hours**

Functions Top down approach of problem solving, standard library functions, passing values between functions, scope rules of functions, calling convention, return type of functions, call by value and call by reference, recursive functions.	**8 Hours**
Storage Classes Scope and extent, Storage Classes in a single source file: auto, extern and static, register.	**6 Hours**
Structures and Unions Defining a structure, Declaring Structure variables, accessing structure members, structure initialization, copying and comparing structure variables, operation on individual members, arrays of structures, arrays within structures, structures and functions, union, size of structure, bit fields.	**6 Hours**
Pointers Understanding pointers, accessing the address of a variable, declaring pointer variables, initialisation of pointer variables, accessing a variable through its pointer, chain of pointers, pointer expression, pointer increment and scale factor, pointer and arrays, pointers and character strings, array of pointers, pointers as function arguments, functions returning pointers, pointers to functions, pointers andstructures.	**8 Hours**
Dynamic Memory Allocation andLinkList Dynamic Memory Allocation, Allocation a Block of memory: malloc, allocating multiple blcoks of memory: calloc, releasing the used space: free, Altering the size of a block: realloc. Concept of Link list, advantages of link lists, types of link list, pointers revisited creating a linked list, inserting an item, deleting an item, application of linked lists.	**3 Hours**
FileProcessing Defining and Opening a file, closing a file, input/output operations on files, error handling during I/O operations, random access to files, Command Line Arguments.	**4 Hours**

Paper Code- SBVOC-SWD-V-104

Introduction to Algorithms
Credit – 4 Full Marks – 70 Total – 60 Hours

Elementary Algorithms: Notation for Expressing Algorithms; Role and Notation for Comments; Example of an Algorithm; Problems and Instances; Characteristics of an Algorithm; Building Blocks of Algorithms; Procedure and Recursion – Procedure, Recursion; Outline of Algorithms; Specification Methods for Algorithms.	**20 Hours**
Mathematical Functions and Notations Functions and Notations; Modular Arithmetic / Mod Function; Mathematical Expectation in Average Case Analysis; Efficiency of an Algorithm; Well Known Asymptotic Functions and Notations; Analysis of Algorithms .	**20 Hours**
Divide and Conquer Divide and Conquer Strategy. Greedy Method Greedy Method Strategy.	**10 Hours**
Dynamic Programming Dynamic Programming Strategy. Backtracking Strategy.	**10 Hours**

Semester 2

Skilled Components

Paper Code- SBVOC-SWD-V 201

Data Structures
Credit – 5 Full Marks – 80 Total 75 Hours

Analysis of Algorithm Introduction to Algorithm design and data structure: Design and analysis of algorithm, Algorithm definition, comparison of algorithms, Top-down and bottom-up approaches to algorithm design, Analysis of algorithm, Frequency count, Complexity measures in terms of time and space, Structured approach to programming.	**8 Hours**
Basics of C, Structure of a Program Variables, Data types, Constants Operators, Basic Input/Output, Control Structure, Functions, Compound Data Types, Arrays, Pointers, Dynamic Memory, Object Oriented Programming, Classes, Encapsulation, Abstraction, Inheritance, Polymorphism.	**6 Hours**
Representation of arrays: Single and multidimensional arrays, Address calculation using column and row major ordering, Various operations on Array, Vector.	**4 Hours**
Application of arrays: Matrix multiplication, Sparse Polynomial representation and addition.	**5 Hours**
Stack and Queues: Representation of stack and queues using array and linked list, Circular queues, Priority Queue and D-queue. Application of stack: Conversation from infix to postfix and prefix expression. Evaluation of postfix expression using stacks.	**10 Hours**
Pointer: Definition, Pointer Arithmetic ,Array of pointers, Linked list:Singly linked list,Oprations on list,Linked stack and queues, Polynomial representation and manipulation using linked list, Circular linked lists and Doubly linked lists, Generalized list structure, Sparse matrix representation using generalized list structure, stacks and queues.	**8 Hours**
Abstract Data types Stacks and Queues Definition of ADT, Stack ADT (array implementation), FIFO queue ADT (array implementation)	**4 Hours**
Trees Binary tree traversal method: Pre-order, ln-order, Post-ordered traversal, Recursive Algorithm for above mentioned Traversal methods. Representation of trees and its applications: Binary tree representation of a general tree, Conversion of forest into tree, Threaded binary trees. Binary search tree: Height balanced (AVL) tree, B-trees	**10 Hours**
Searching Searching, Sorting and Complexity Selection sort, lnsertion sort, Bubble sort, quick sort, merge sort.Heap sort, Radix sort and their complexity. Searching: Sequential search, Binary search, Binary search tree,ASVLtrees,B trees Searching, sorting and complexity. Searching : Sequential and binary searchs, Indexed search, Hashing Schemes. Sorting: Insertion, selection	**10 Hours**

,bubble,Quick,Merge,Radix, Shell, Heap sort comparison of timecomplexity.	
Graph Representation,Adjacencymatrix,Adjacencyliss.Traversal schemes: Depth first search,Breadth first search.Spanning tree: Defination, Minimal Spanning tree algorithm,shortst Path algorithm(Prime s and Kruskal's)	**10 Hours**

Paper Code- SBVOC-SWD-V 202

System Design, Trouble shooting and Operating System
Credit – 4 Full Marks – 70 Total Hours – 60 Hours

Introduction: Concept and views OS view of processes, OS services for process management, scheduling algorithms.	**09 Hours**
Performance evaluation: lnter-process communication **Mutual Exclusion and Memory Management:** Synchronisation, mutual exclusion, semaphores, hardware support for mutual exclusion, queuing implementation of Semaphores. Classical problem of concurrent programming, critical region and conditional critical region, monitors, messages, deadlocks. Resource manager, Memory management, file management processor management, device management.	**15 Hours**
Authentication: Security and protection authentication, protection and access control, formal models of protection worms and viruses.	**12 Hours**
Multiprocessor system Multiprocessor system, classification and types OS functions and requirements, Introduction to parallel computing, multiprocessor interconnection synchronisation.	**15 Hours**
Distributes OS- rationales, algorithm for distributed processing	**09 Hours**

Paper Code- SBVOC-SWD-V 203

Basic Web Design

Credit – 5 Full Marks – 80 Total Hours – 75 Hours

Web Programming Introduction Basic introduction to web development	**03 Hours**
HTML Introduction a) History of HTML b) Make your first HTML page c) HTML tags and attributes, HTML tag and HTML-Images	**06 Hours**
HTML- Basic formatting tags HTML Basic tags, HTML Formatting Tags, HTML color coding	**05 Hours**
HTML-Grouping using Div Span Div and span tag, block and inline HTML lists Unordered Lists, Ordered lists, Definition list **Images tag** About images HTML-Hyperlink About hyperlink	**10 Hours**
HTML Table About tables <table>, <TH>,<TR>, <TD>, <caption>,<THEAD>, <TBODY>, <TBODY>, <TFOOT>, <colgroup>, <col> HTML-iframe About iframe, Attributes using iframe as the target HTML-Form About forms <input>, <textarea>, <button>, <select>, <label> HTML-headers About HTML headers, title, base ,link, style, script, meta HTML-miscellaneous About miscellaneous tags HTML meta tag, XHTML, HTML deprecated tags and attributes	**10 Hours**
CSS2-introduction CSS and benefits of using CSS, Benefits of CSS, CSS versions history, CSS syntax, external style sheet using <link>, multiple style sheets, value length and percentage **CSS2-Syntax** About CSS syntax CSS-Selectors About selectors, ID selectors, class selectors, grouping selectors, Universal selectors, Descendant / child selectors, attribute selectors, CSS-pseudoclasses	**06 Hours**
CSS2-color background cursor About background-color and cursor, background color, background image, background repeat,	**06 Hours**

background position, CSS cursor. **CSS-text fonts** About text fonts, color, background-color, text decoration, text-align, vertical align, text indent, text transform, white-space, letter spacing,word spacing, line height, font family, font size, font-style, font-variant, font-weight	
CSS2 list tables About list tables CSS table border, width and height, text-align, vertical-align padding color CSS2-box model Borders and outline, margin and padding, height and width, CSS dimension	**06 Hours**
CSS2-display positioning About display Positioning CSS visibility, CSS display, CSS scrollbars, CSS Positioning Static Positioning, fixed positioning, relative Positioning, absolute Positioning, CSS layer with z-index CSS floats About floats The float property, the clear property, the clear fix hack	**05 Hours**
The nature of JavaScript Evolution of scripting languages, JavaScript-definition, comparison between Java JavaScript and VB script Jump starting JavaScript Introduction to objects, methods and events, events and program flow, jumping right In Running script	**08 Hours**
Script writing basics Launching HTML documents with JavaScript, The Quintessential building blocks, script mechanics Using names, objects and methods Names and references in JavaScript, Built-in-objects, Home-Built objects, The hierarchy of names, Using methods, Operators and variables, keywords functions, Object interaction	**10 Hours**

Paper Code- SBVOC-SWD-V 204

Software Engineering
Credit – 4 Full Marks – 70 Hours – 60 Hours

Software Engineering Fundamentals Definition of software product and process, Software Characteristics, Components, Applications, Layered Technologies, Processes and Product, Methods and Tools, Generic View of Software Engineering, Software Crisis, Software development paradigms, Techniques of Process Modeling, Software Process and lifecycle models: Build & Fix Model, Waterfall Model, Prototyping Model, Iterative Enhancement Model, Evolutionary Development Model and Spiral Model, Incremental, and Concurrent Development Model.	**6 Hrs**
Software Requirements Analysis & Specification System specification, Software requirements specification (SRS) standards, Formal specification methods, Specification tools, Requirements validation and management. Problem Recognition, Evaluation and Synthesis, Modeling, Specifications and Review Techniques. Analysis Modeling: Difference between Data and Information, ER Diagram, Dataflow Model, Control Flow Model, Control and Process Specification, Data Dictionary.	**6 Hrs**
Software Design Software architecture, Modular design - cohesion and coupling, Process-oriented design, Process and Optimization, Data-oriented design, User-interface design, Real-time software design, Architectural Designing, Interface Design, Procedural Design, Object Oriented Design.	**6 Hrs**
CASE Tools Computer-aided software engineering, Introduction to CASE, Building Blocks of CASE, Relevance of CASE tools, High-end and low-end CASE tools, automated support for data dictionaries, DFD, ER diagrams, Integrated Case Environment, CASE workbenches.	**6 Hrs**
Coding and Testing Choice of Programming languages, Coding standards, Introduction to Testing Process, Functional & Structural Testing, Testing Activities like Unit, Integration & System Testing, Testing tools and workbenches.	**6 Hrs**
User Interface Design Concepts of Ui, Interface Design Model, Internal and External Design, Evaluation, Interaction and Information Display.	**6 Hrs**

Configuration Management Concepts in Configuration Management, The Configuration Management Process: Planning and Setting up Configuration Management, Perform Configuration Control, Status Monitoring and Audits.	**4 Hrs**
Software Maintenance What is software maintenance, Maintenance Process & Models, Reverse Engineering, Software re-engineering, Configuration Management issues and concept, Configuration planning & techniques, Software versions and change control process, Documentation.	**6 Hrs**
Software Quality and Metrics SQA-Software Quality Assurance, Debugging and reliability analysis, Program complexity analysis, Software quality and metrics, Quality Control, Approaches to SQA, Reliability, ISO9000 and 9001, CMM Levels and SIX sigma.	**6 Hrs**
Object-Oriented Software Engineering OO Concepts and Approach, OO Analysis, Domain Analysis, OOA Process and Object Models, OO Design, System Design process and Models, UML and diagrams	**4 Hrs**
Advance Software Engineering Topics Clean room approach and strategy, Functional specification and design, Component-based software engineering process, Reusability and Metrics, Reengineering Essentials, Software Agents.	**4 Hrs**

Semester 3

Skilled Components

Paper Code- SBVOC-SWD-VI-301

DATABASE MANAGEMENT SYSTEM (DBMS)
Credit – 5 Full Marks – 80 Total 75 Hours

An Overview of the Database Management System What is database? Why database? Database system, database management system (DBMS), advantages of DBMS.	**4 Hours**
An Architecture of the Database system Three levels of architecture, mappings, role of database administrator(DBA), E-R model, three approaches of DBMS- relational, hierarchical and network.	**10 Hours**
Relational Database Management System (RDBMS) Introduction, RDBMS terminology, relational model, base tables, keys.	**10 Hours**
Normalization Normal forms, Boyce-Codd Normal form, higher normal forms.	**10 Hours**
Relational Algebra and Relational Calculus Relational operators, tuple calculus, well formed formulae.	**10 Hours**
The SQL Language Introduction , Characteristics of SQL, data definition, data manipulation, SQL commands, SQL operators, Queries, aggregate functions.	**10 Hours**
Backup and Recovery Transaction recovery, system recovery, SQL support	**4 Hours**
Security General considerations, controls, audit trail, data encryption, SQL support.	**6 Hours**
Integrity General considerations, integrity rules, SQL support.	**6 Hours**
Design and Development of Database Applications Database applications using some standard RDBMS.	**5 Hours**

Paper Code- SBVOC-SWD-VI-302

OBJECT ORIENTED PROGRAMMING WITH C++
Credit – 5 Full Marks – 80 Total 75 Hours

Basic of Object Oriented Programming and software design	**6 Hours**
C++ Object Oriented Programming.	**6 Hours**
C++ & ANSI standard C Predefined classes in C++.	**4 Hours**
Building objects with classes.	**8 Hours**
Introduction to Constructor &Destructor .	**8 Hours**
Defining operations on objects.	**8 Hours**
Using Inheritance in C++.	**9 Hours**
Concepts of Overloading.	**9 Hours**
Virtual functions and Polymorphism.	**9 Hours**
Using C libraries in C++ programs using commercial Class libraries (Standard template library).	**4 Hours**
Advanced Topics in C++ (Template Exception Handling file handling Stream).	**4 Hours**

Paper Code- SBVOC-SWD-VI-303

DATA COMMUNICATION AND COMPUTER NETWORKING (DCN)

Credit – 4 Full Marks – 70 Total 60 Hours

Data Communications Introduction, Communication Systems, Signal and data, Transmission modes, Synchronous and asynchronous transmission, Circuits, channels and multichanneling, Signaling, Encoding and decoding, Error detection and Recovery, Flow control, Sliding Window, Congestion Management, Multiplexing [FDM, TDM, CDM, WDM] and Spreading [DS. FH], Concept of Modulation, Baseband versus Broadband; Pulse Code Modulation (PCM), Shift Keying [ASK, FSK, PSK, QPSK, DPSK]; Encoding techniques and CODEC; Classification of Modems, Standards and Protocols, Protocols used by Modem to Transfer files, Establishing a Connection (Internet connectivity); Digital Subscriber Loop (DSL)	**6 Hours**
Communication Network Fundamentals Introduction, Switching techniques: Circuit Switching, Packet switching, Datagram, Virtual circuit and Permanent Virtual Circuit, Connectionless and connection oriented communication, Message switching, Cell switching (ATM); Telephone network signaling Network topologies, Layering the communication process, Open Systems Interconnection (OSI) model, Data encapsulation; Protocols, services and layering, PDU/SDU; TCP/IP suite, Hour-glass model, Internet Architecture and Protocol overview.	**6 Hours**
Media Access Control Introduction, Access Techniques (STDM, FDMA, TDMA, Spread Spectrum techniques and CDMA, DSSS, FHSS); Media Access Control: Aloha and Slotted Aloha, Media Access Control Address, Polling, CSMA, CSMA/CA, CSMA/CD and Reservation Aloha, Digital hierarchies [SONET/SDH]	**6 Hours**

Network Components Introduction, LAN Hardware, LAN Operating Systems, Transmission Media: Guided Media (Twisted pair, Co-axial cable, Optical fiber); Unguided Media (Radio, VHF, microwave, satellite, Infrared); Fiber Optics Communication Components (Source, Channel Detector.	**6 Hours**
Link Control and MAC Protocols Framing, Error Detection and Correction; Window-based Flow Control; Logical Link Control, HDLC Protocol, Point-to-Point Protocol (PPP), X.25 CCITT standard for packet data transmission; Media access control, Random Access Techniques, Scheduling Mechanisms.	**6 Hours**
Local Area Network (LAN) LAN topologies and protocols; IEEE 802 Standard; Ethernet (Standard, Fast, Gigabit), Token Ring, FDDI, Wireless LANs (802.11x); Connecting LANs: Repeaters, Bridges, Switches, Routers; Virtual LANs	**6 Hours**
Wide Area Network (WAN) Network Layer Addressing and Routing concepts (Forwarding Function, Filtering Function); Routing Methods (Static and dynamic routing, Distributed routing, Hierarchical Routing); Distance Vector Protocol, Link State protocol, Open Shortest Path First (OSPF); Internet Protocol (IP): Addressing & Routing; Internet Control Message Protocol, (ICMP), Address Resolution Protocol (ARP), Dynamic Host Control Protocol (DHCP), Network Address Translation (NAT), IPv6, Mobile IP Process-to-Process delivery in Transport Layer: User Datagram Protocol (UDP), Transmission Control Protocol (TCP), congestion control	**6 Hours**
Application Protocols Client/Server Model, Network File System (NFS), Remote Login: Telnet; File Transfer Protocol (FTP), Trivial File Transfer Protocol (TFTP); E-mail system: Simple Mail Transfer Protocol (SMTP), Post Office Protocol (POP); World Wide Web (WWW), Domain Name System (DNS), DNS servers; Hyper Text system: Hyper Text Transfer Protocol (HTTP), Hyper Text markup Language (HTML)	**6 Hours**
Wireless Networks Radio Communications, Cellular Radio, Mobile Telephony (GSM & CDMA), Satellite Networks (VSAT), Mobile Adhoc Networks (MANET).	**6 Hours**
Security and Management Cryptography, IPsec, SSL/TLS, PGP, secure HTTP, proxy, firewall, VPN; Simple Network Management Protocol (SNMP), Network policies.	**6 Hours**

Paper Code- SBVOC-SWD-VI-304

COMPUTER GRAPHICS
Credit – 4 Full Marks – 70 Total 60 Hours

Introduction to Computer Graphics Overview of Computer Graphics, Computer Graphics Application and Software, Description of some graphics devices, Input Devices for Operator Interaction, Active and Passive Graphics Devices, Display Technologies, Storage Tube Graphics Displays, Calligraphic Refresh Graphics Displays, Raster Refresh (Raster-Scan) Graphics Displays, Cathode Ray Tube Basics, Color CRT Raster Scan Basics, Video Basics, The Video Controller, Random Scan Display Processor, LCD displays.	**5 Hours**
Two-Dimensional Transformations Transformations and Matrices, Transformation Conventions, 2D Transformations, Homogeneous Coordinates and Matrix Representation of 2D Transformations, Translations and Homogeneous Coordinates, Rotation, Reflection, Scaling.	**5 Hours**
Three-Dimensional Transformations Introduction, Three-Dimensional Scaling, Three-Dimensional Shearing, Three-Dimensional Rotation, Three-Dimensional Reflection, Three-Dimensional Translation, Multiple Transformation, Rotation about an Arbitrary Axis in Space, Reflection through an Arbitrary Plane, Matrix Representation of 3D Transformations, Composition of 3D Transformations	**5 Hours**
Scan conversion – lines, circles and Ellipses; Filling polygons and clipping algorithms Scan Converting Lines, Mid-point criteria, Problems of Aliasing, end-point ordering and clipping lines, Scan Converting Circles, Scan Converting Ellipses, Filling Polygons, edge data structure, Clipping Lines algorithms– Cyrus-Beck, Cohen-Sutherland.	**5 Hours**
ADOBE PhotoShop **Overview of the Photoshop** o What is Photoshop **Interface & operations** o About Interface o Touring The Toolbar o Options Palette Bar o Tabbed Palettes o Zoom Tool Interface o The Blank Canvas o Starting Out o Specific Size o Color Modes o Converting Color Modes o Opening A File o Resize Image o Resizing Canvas o Rotating And Flopping	**40 Hours**

	○ File browser intro ○ Rotating and Ranking ○ image organization ○ rename and delete ○ workspaces ○ options at bottom ○ organizing documents ○ Saving Your File ○ File types ○ document sizes ○ customize document ○ Crop Tool ○ Trimming Image ○ Background Layer ○ Creating A New Layer ○ Re-arranging Layers ○ auto color ○ Presenting to Clients	
Layers	○ History Undo ○ Preference setting ○ Preserving States ○ Move Tool with Layers ○ Linking Layer Movement ○ Layer Sets ○ Move Via Layer Sets ○ Locking Layer Movement ○ Layer Transparency ○ Layer Set Transparency ○ Labeling Layers ○ Marquee Tool ○ Elliptical Marquee Tool ○ Constrained Aspect Tool ○ Saving A Selection ○ Moving A Selection ○ Histogram ○ Adjustment Layers ○ Layer Adjustments ○ Grouping Adjustments ○ curves zoom box ○ Auto Curves ○ Brightness / Contrast ○ Levels ○ Output Levels ○ RGB Levels ○ Hue / Saturation ○ Desaturate ○ Cloning Out Problems ○ Cloning Document ○ Color Picking ○ Eyedropper Tool ○ Other Imaging Tools ○ Blur ○ Sharpen ○ Dodge ○ Burn ○ Eraser ○ Saturate-Desaturate	
Brushes & Text	○ Healing Brush ○ healing brush	

	○ patch tool ○ Type Tool ○ Text Boxes ○ Font Size ○ Type Kerning ○ Type Leading ○ Type Tracking ○ Faux Fonts ○ Vertical and Horizontal ○ Warp Text ○ Coloring Logo ○ Image Transparency ○ Gradient ○ Gradient Editor ○ Gradient Layer ○ Image Adjustments ○ Invert ○ Threshold ○ Gradient Map ○ Transformations ○ Free Transform ○ Transforming Type ○ layer mask ○ creating mask ○ disable mask ○ painting on mask ○ vector mask ○ quick mask ○ Paint Bucket ○ Custom Shape ○ custom brush ○ Filters Intro ○ Motion Blur ○ Radial Blur ○ Noise Filters ○ Wave Filters ○ Fading Filters	
Coloring	○ Grouping ○ Adjustment Grouping ○ Grouping Layer Sets ○ Liquify ○ Liquify ○ Multiply ○ Screen ○ Dissolve ○ Color ○ Saturation ○ Coloring Black and White Artwork ○ Colorizing Photos ○ Airbrush Tool ○ Paintbrush ○ Pencil ○ Clone Stamp ○ Keyboard Brush Shortcuts ○ Straight Lines ○ batch rename ○ What Are Effects ○ Deleting Effects ○ Drop Shadow ○ Inner Shadow	

○ Inner Glow ○ Outer Glow ○ Bevel and Emboss ○ Satin ○ Color Overlay ○ Gradient Overlay ○ Pattern Overlay ○ Stroke ○ Pasting Effects ○ Blending Options ○ Capturing Styles ○ Drawing Effects ○ pattern maker ○ Picture Package ○ Creating Actions	

Semester 4

Skilled Components

Paper Code - SBVOC-SWD-VI 401

WEB APPLICATION DEVELOPMENT USING ASP.NET
Credit – 5 Full Marks – 80 Total 75 Hours

ASP.Net (C# Programming) with SQLSERVER Overview of the ASP.NET Introduction of different Web Technology What is Asp.Net How Asp.Net Works Use of visual studio	**6 Hours**
Different Languages used in Asp.Net Framework Common Language Runtime (CLR) .NET Framework Class Library. Setting up and Installing ASP.NET Installing Internet Information Server Installation of Visual Studio Virtual directory Application Setting in IIS.	**7 Hours**
Microsoft SQL Server Overview of SQL Server Installation of SQL Server Features of SQL Server Express SQL Server 2008 Express management tools SQL Server Basic Database Architecture	**6 Hours**
Data Manipulation Language (DML) Data Definition Language (DDL) Manipulation of Data (SQL Command) Stored Procedure Function Trigger Views Cursor	**10 Hours**
Overview of coding standards follows during programming Asp.Net Standard Controls Displaying information Label Controls Literal Controls Bulleted List Accepting User Input Textbox controls RadioButton and RadioButtonList Controls CheckBox and CheckBoxList Controls Button controls	**10 Hours**

LinkButton Control ImageButton Control Using Hyperlink Control DropDownList ListBox Displaying Images Image Control Image Map Control Using Panel Control Using Hyperlink Control Asp.Net Page & State Management Asp.Net Validation Controls + Javascript Validation Required Field Validator Control Regular Expression Validator Control Compare Field Validator Control Range Validator Control Validation Summary Control Custom Validator Control Designing Websites with master pages Creating master pages Creating default contents Nesting master pages Registering master pages in web configuration Using the Rich Controls Accepting File Uploads Saving files to file system Calendar Control Displaying advertisements Displaying Different Page view Displaying a Tabbed Page View Wizard Control	
C# Data Type and syntax Language Fundamentals Classes Namespaces Object Oriented Programming concepts Overview of Asp.Net inbuilt Classes and method File Handling	**8 Hours**
Using the Grid View Control Grid View Control fundamentals Displaying Data Using Data Keys Sorting Data Paging through Data Using the Details View and Form View Controls Using the Details View control Displaying data with the Details View control	**8 Hours**

Using Fields with the Details View control Displaying Empty data with the Details View control Using Repeater and Data List Controls Using Repeater Control Displaying data with the Repeater Control Displaying Data with the Data List Control Using Navigation Controls	
Understanding Site Maps Using the Sitemap Path Control Formatting the Sitemap Path Control Using the Menu Control Using Tree View Control Working with XML and Web Services Overview of XML Creating /Reading/Deleting XML Files Web Services AJAX (Asynchronous JavaScript and XML) About Ajax Setting up and implementing Ajax FTP Management Understanding FTP Setting up FTP Server (Live) Uploading and downloading FTP contents Sending Emails Designing email panel How to send an email to various users Sending auto emails Deployment Deploying application on Web Server	**5 Hours**
Minor Project	**15 Hours**

Paper Code - SBVOC-SWD-VI 402

PROGRAMMING WITH CORE JAVA
Credit – 5 Full Marks – 80 Total 75 Hrs

Introduction to Object Oriented Programming	**04 Hours**
OOPs Concept and Introduction to JAVA	**08 Hours**
An overview of Java	**06 Hours**
Data Types-variables and arrays	**06 Hours**
Operators and Control Statements	**06 Hours**
Classes and objects, Inheritance String and string buffer, Packages, Interfaces	**15 Hours**
Exception Handling, Multithreaded Programming Applets Event handling Abstract window Toolkit	**15 Hours**
Minor Project	**15 Hours**

Paper Code - SBVOC-SWD-VI 403

UNIX/LINUX & SHELL PROGRAMMING

Credit – 4 Full Marks – 70 Total 60 Hrs

Operating System Concepts Overview of OS. System Calls, Process Management, Memory Management, Disk and filesystems, Networking, Security, Graphical User Interface, Device Drivers.	**3 Hours**
Linux Ideas and History What is Open Source? , Linux Origins, Red Hat Distributions, Linux Principles	**3 Hours**
Linux Usage and Basics Logging in to a Linux System, Switching between virtual consoles and the graphical environment, Elements of the X Window System, Starting the X server, Changing your password, The root user, Changing identities, Editing text files.	**3 Hours**
Running Commands and Getting Help Running Commands, Some Simple commands, Getting Help, Thewhatis command, The –help Option, Reading Usage Summaries, The man command, Navigating man pages, The info command, Navigating info pages, Extended Documentation, Red Hat Documentation.	**5 Hours**
Browsing the File System Linux File Hierarchy Concepts, Some Important Directories, Current Working Directory, File and Directory Names, Absolute and Relative Pathnames, Changing Directories, Listing Directory Contents, Copying Files and Directories, Copying Files and Directories: The Destination, Moving and Renaming Files and Directories, Creating and Removing Files, Creating and Removing Directories, Using Nautilus, Determining File Content.	**5 Hours**
The X-Window System XOrg: The X11 Server, XOrg Server Design, XOrg Server Configuration, XOrg Modularity, Server and Client Relationship, XOrg in runlevel 3, XOrg in runlevel 5, Configuration Utilities, Remote X	**5 Hours**
Users, Groups and Permissions Users, Groups, Linux File Security, Permission Precedence, Permission Types, Examining Permissions, Interpreting Permissions, Changing File Ownership, Changing Permissions – Symbolic Method, Changing Permissions – Numeric Method, Changing Permissions – Nautilus	**3 Hours**

Advanced Topics in Users, Groups and Permissions User and Group ID Numbers, /etc/passwd, /etc/shadow and /etc/group files, User Management tools, System Users and and Groups, Monitoring Logins, Default Permissions, Special Permissions for Executables, Special Permissions for Directories.	**3 Hours**
The Linux File System In-depth Partitions and Filesystems, Inodes, Directories, Inodes and Directories, cp and inodes, mv and inodes, rm and inodes, Hard Links, Symbolic (or soft) Links, The Seven Fundamental Filetypes, Checking Free Space, Removable Media, Mounting CDs and DVDs, Mounting USB Media, Mounting Floppy Disks, Archiving Files and Compressing Archives, Creating, Listing and Extracting File Archives, Creating File Archives: Other Tools.	**3 Hours**
vim: An Advanced Text Editor Introducing vim, vim: A Modal Editor, vim basics, Opening a file in vim, Modifying a file, Saving a file and exiting vim, Using Command Mode, Moving around, Search and Replace, Manipulating Text, Undoing changes, Visual Mode, Using multiple “windows”, Configuring vi and vim, Learning more.	**3 Hours**
Standard I/O and Pipes Standard Input and Output, Redirecting Output to a File, Redirecting STDOUT to a Program(Piping), Combining Output and Errors, Redirecting to Multiple Targets (tee), Redirecting STDIN from a file, Sending Multiple Lines to STDIN.	**2 Hours**
Using the Bash Shell Bash Introduction, Bash Heritage and Features, Command Line Shortcuts, History Tricks, Command Line Expansion, Command Editing Tricks, gnome-terminal	**2 Hours**
Configuring the Bash Shell Bash Variables, Environment variables, The TERM Environment variable, The PATH Environment variable, Some common variables, Aliases, How bash expands a Command Line, Preventing Expansion, Login vs non-login shells, Bash startup tasks: profile, Bash startup tasks: bashrc, Bash exit tasks	**2 Hours**
Shell Programming Scripting Basics, Creating Shell Scripts, Generating Output, Handling Input, Exit Status, Control Structures, Conditional Execution, File Tests, String Tests, for and sequences, continue and break, Using positional parameters, handling parameters with Spaces, Scripting at the command line, Shell Script debugging.	**10 Hours**
Text Processing Tools Tools for Extracting Text, Viewing File Contents, Viewing File Excerpts,	**2 Hours**

Extracting Text by Keyword, Extracting Text by column, Tools for analyzing text, Gathering text statistics, Sorting Text, Eliminating Duplicate Lines, Comparing Files, Duplicating File Changes, Spell Checking with aspell, Tools for manipulating Text, sed, Special Characters for Complex Searches.	
Investigating and Managing Process What is a Process? Listing Processes, Finding Processes, Signals, Sending Signals to Processes, Scheduling Priority, Altering Scheduling Priority, Interactive Process management tools, Job Control, Scheduling a Process to execute later, Crontab File format.	**2 Hours**
Finding and Processing Files Locate, Locate Examples, find, Basic find Examples, find and Logical Operators, find and Permissions, find and Numeric Criteria, find and Access Times, Executing commands with find, find Execution Examples, The GNOME Search Tool.	**2 Hours**
Basic System Configuration Tools TCP/IP Network Configuration, Managing Ethernet Connections, Graphical Network Configuration, Network Configuration Files, Printing in Linux, Setting the System's Date and Time, Managing Services.	**2 Hours**

Paper Code - SBVOC-SWD-VI 404

Multimedia Technology
Credit – 4 Full Marks – 70 Total 60 Hrs

❖ **Adobe Premiere Pro Basics Training** • Nonlinear editing in Adobe Premiere Pro • Expanding the workflow • Touring the Adobe Premiere Pro workspace ❖ **Setting up a Project** • Setting up a project • Setting up a sequence ❖ **Importing Media** • Importing assets • Working with the Media Browser • Importing images • The media cache	**6 Hours**
❖ **Organizing Media** • The Project panel • Working with bins • Organizing media with content analysis • Monitoring footage • Modifying clips ❖ **Essentials of Video Editing** • Using the Source Monitor • Navigating the Timeline • Essential editing commands	**6 Hours**
❖ **Working with Clips and Markers** • Program Monitor controls • Controlling resolution • Using markers • Using Sync Lock and Track Lock • Finding gaps in the Timeline • Selecting clips • Moving clips • Extracting and deleting segments ❖ **Adding Transitions** • What are transitions? • Edit points and handles • Adding video transitions • Using A/B mode to fine-tune a transition • Adding audio transitions	**6 Hours**

❖ **Advanced Editing Techniques** • Four-point editing • Retiming clips • Replacing clips and footage • Nesting sequences • Regular trimming • Advanced trimming • Trimming in the Program Monitor panel	
❖ **Putting Clips in Motion** • Adjusting the Motion effect • Changing clip position, size, and rotation • Working with keyframe interpolation • Using other motion-related effects ❖ **Multicamera Editing** • The multicamera process • Creating a multicamera sequence • Switching multiple cameras • Finalizing multicamera editing	**6 Hours**
❖ **Editing and Mixing Audio** • Setting up the interface to work with audio • Examining audio characteristics • Adjusting audio volume • Creating a split edit • Adjusting audio levels in a sequence ❖ **Sweetening Sound** • Sweetening sound with audio effects • Adjusting EQ • Applying effects in the Audio Mixer • Cleaning up noisy audio	**12 Hours**
❖ **Adding Video Effects** • Working with effects • Keyframing effects • Effects presets • Frequently used effects	**6 Hours**
❖ **Color Correction and Grading** • Color-oriented workflow • An overview of color-oriented effects • Fixing exposure problems • Fixing color balance • Special color effects • Creating a look	**6 Hours**

❖ **Exploring Compositing Techniques** • What is an alpha channel? • Making compositing part of your projects • Working with the Opacity effect • Working with alpha-channel transparencies • Color keying a greenscreen shot • Using mattes ❖ **Creating Titles** • An overview of the Titler window • Video typography essentials • Creating titles • Stylizing text • Working with shapes and logos • Making text roll and crawl	**6 Hours**
❖ **Managing Your Projects** • The File menu • Using the Project Manager • Final project management steps • Importing projects or sequences • Managing collaboration • Managing your hard drives ❖ **Exporting Frames, Clips, and Sequences** • Overview of export options • Exporting single frames • Exporting a master copy • Working with Adobe Media Encoder • Exchanging with other editing applications • Recording to tape	**6 Hours**

Semester 5

Skilled Components

Paper Code- SBVOC-SWD-VII-501

PROGRAMMING WITH C#.NET
Credit – 5 Full Marks – 80 Total 75 Hours

MS.NET Framework Introduction The .NET Framework - an Overview FrameworkComponents FrameworkVersions Types of Applications which can be developed usingMS.NET MS.NET Base ClassLibrary MS.NETNamespaces MSIL / Metadata and PEfiles. The Common Language Runtime (CLR) ManagedCode MS.NET Memory Management / GarbageCollection Common Type System (CTS) Common Language Specification(CLS) Types of JITCompilers SecurityManager	**5 Hours**
VS.NET and Entry Point Method –Main Introduction to Project and Solution inStudio Entry point method -Main. Compiling and BuildingProjects Using Command LineArguments Importance of Exit code of anapplication Different valid forms ofMain Compiling a C# program using commandline utilityCSC.EXE	**5 Hours**
C # Language Syntax WhyDatatypes Global, Stack and HeapMemory Common TypeSystem Reference Type and ValueType Datatypes & Variables Declaration Implicit and ExplicitCasting Checked and Unchecked Blocks – OverflowChecks Casting between otherdatatypes Boxing andUnboxing Enum andConstant Operators Control Statements Working withArrays Working withMethods Pass by value and by reference and Outparameters	**5 Hours**
Developing GUI Application Using WINFORMS BasicControls Panel &Layouts Drawing and GDIDevices MenuStrip, ToolbarStrip andContextMenuStrip Model and Modeless Dialogboxes	**5 Hours**

Mutiple Document Interface(MDI) FormInheritance Building LoginForm Working with Resource Files andSetting Notify IconControls Using Components like Timer, FileSystemWatcher, Process,BackgroundWorker Drag andDrop Working with Advanced Controls like TreeView and ListView	
Database Programming Using ADO.NET Prerequisite - Knowledge of SQLQueries Introduction and Evolution ofADO.NET Understanding the Role of Managed Provider and ADO.NETObjects installing Required Software - Sql Server and Managementstudio Connecting to Database and ConnectionPooling Performing Insert, Update and DeleteOperations Fetching Data from database - Executing SelectStatements How to implement Login facility withdatabase Use of Multiple Active ResultSets Parameterized PreparedStatements Inserting Image into Databasetable Executing StoredProcedure UsingTransaction Asynchronous Execution ofQueries Writing Provider IndependentCode Writing Common Code for Execution of StoredProcedures Quick Overview of all ADO.NETobjects	**5 Hours**
Managing Data using DataSet Introduction DataSet and its ObjectModel Filling DataSet usingDataAdapter Binding DataSet toDataGridView Updating changes to database usingDataAdapter UsingSqlCommandBuilder Managing DataTableProgrammatically DataAdapterevents Handling concurrencyissue Working withDataViews Constraints inDataTable Using DataRelationsobject Creating DataSet/DataTabledynamically Working with TypedDataSet Summary and Important Classes and their properties andmethods	**5 Hours**
N-Tier Layered Architecture Application Understanding Tier and Layer Dividing Application into multiple layers Developing an application using Layered Architecture Creating Table and Stored Procedure Creating Data Class Creating DAL	**5 Hours**

Class Creating BO Class Creating Form and handlingevents Creating Dialog Box for Add and Edit OPerations.	
Windows Services Introduction to Windows Service Windows Service Project Template Developing Windows Services Installing, Deploying and Launching Windows Service Developing a Service Controller Application Handling Custom Commands in Windows Services	**5 Hours**
Delegates & Events Introduction to Delegates Creating a Chat Application Using Delegates Events Declaration, Raising and Handling Anonymous Methods	**5 Hours**
User Control and Custom Control Threading Overview Scheduling Thread States Programming Threads Methods of Thread Class Thread Pool Thread Synchronization ✓ Monitor ✓ Mutex ✓ Semaphore ✓ Events Parallel Programming using Task Parallel Library	**5 Hours**
Packaging and Deployment File System Editor Registry Editor File Types Editor User Interface Editor Custom Actions Launch Condition Editor Creating Uninstall Shortcut	**5 Hours**
Debugging and Diagnostics What is Debugging? Build Configuration(Debug and Release) List of Debugging Windows Break Point Hit Count and Condition Debugging Exception What is Diagnostics? Debug and Trace Classes Types of Listeners Boolean and Trace Switch	**5 Hours**
Minor Project	**15 Hours**

Paper Code- SBVOC-SWD-VII-502

WEB DEVELOPMENT USING PHP AND MYSQL
Credit – 5 Full Marks – 80 Total 75 Hours

HTML 5 What is HTML5? HTML5 Basic Syntex H1,H2, and other tags Normal tags and semantic tags Hyperlinks Table HTML5 form HTML 5 form validation	**5 Hours**
CSS 3 What is CSS? Basic syntax of CSS Font, Color and Size Div/CSS Create basic layout with CSS **Bootstrap** What is Bootstrap? Why Use Bootstrap Bootstrap Download & Installation Understanding Grid System Tables Buttons Modal Box Tabs	**5 Hours**
Bootstrap What is Bootstrap? Why Use Bootstrap Bootstrap Download & Installation Understanding Grid System Tables Buttons Modal Box Tabs	**5 Hours**
Wordpress Introduction To Wordpress Section What Is Wordpress? The Wordpress Dashboard Wordpress Themes Important: A note about X Theme and the next lecture Creating A Blog Creating An Ecommerce Site Wordpress Challenge - Create A Site	**15 Hours**
PHP PHP Intro PHP Install PHP Syntax PHP Variables PHP String	**15 Hours**

PHP Operators PHP If...Else PHP Switch PHP Arrays PHP Sorting Arrays PHP While Loops PHP For Loops PHP Functions PHP Forms PHP $_GET PHP $_POST PHP Arrays Multi PHP Date PHP Include PHP File PHP File Upload PHP Cookies PHP Sessions PHP E-mail PHP Secure E-mail PHP Error PHP Exception PHP Filter	
MySql SQL Intro SQL Syntax SQL SELECT SQL SELECT DISTINCT SQL WHERE SQL AND & OR SQL ORDER BY SQL INSERT INTO SQL UPDATE SQL DELETE SQL Advanced SQL SELECT TOP SQL LIKE SQL Wildcards SQL IN SQL BETWEEN SQL Aliases SQL Joins SQL INNER JOIN SQL LEFT JOIN SQL RIGHT JOIN SQL FULL JOIN SQL UNION SQL SELECT INTO SQL INSERT INTO SELECT SQL CREATE DB SQL CREATE TABLE SQL Constraints SQL NOT NULL SQL UNIQUE	**5 Hours**

SQL PRIMARY KEY SQL FOREIGN KEY SQL CHECK SQL DEFAULT SQL CREATE INDEX SQL DROP SQL ALTER SQL Auto Increment SQL Views SQL Dates SQL SQL NULL Values SQL NULL Functions SQL General Data Types SQL DB Data Types	
JAVASCRIPT Basic Javascript Javascript Basic Tags String Array Functions	**5 Hours**
Jquery jQuery - Overview jQuery - Basics jQuery - Selectors jQuery - Attributes jQuery - Traversing jQuery - CSS jQuery - DOM jQuery - Events jQuery - AJAX jQuery – Effects	**5 Hours**
Minor Project	**15 Hours**

Paper Code- SBVOC-SWD-VII-503

PROGRAMMING WITH ADVANCED JAVA(JSP)
Credit – 5 Full Marks – 80 Total 75 Hours

Oops concept (revised all), introduction advanced java JDBC – Java Database Connectivity Introduction to JDBC, JDBC Drivers & Architecture, CURD operation Using JDBC, Connecting to non-conventional Databases.	**20 Hours**
Java Servlets Java Server Technologies Servlet Web Application Basics, Architecture and challenges of Web Application, Introduction to servlet, Servlet life cycle, Developing and Deploying Servlets, Exploring Deployment , Descriptor (web.xml), Handling Request and Response.	**20 Hours**
JSP (Java Server Pages) Introduction to JSP , Life cycle of JSP ,Disadvantages of Servlet ,JSP Components ,Custom Tags ,JSP implicit objects, Accessing database from JSP ,Using JavaBeans with JSP ,Working with JSP Standard action tags ,Working with expression language, Error Handling in a jsp , Creating custom tags , JSTL (Java Server Pages Tag Library)	**20 Hours**
Minor Project	**15 Hours**

Paper Code- SBVOC-SWD-VII-504

INTRODUCTION TO PYTHON
Credit – 3 Full Marks – 60 Total 45 Hours

Introduction to python installation and working with Python understanding Python variables. Python basic operators understanding python.	**5 Hours**
Python data types declaring and using numeric data types :int, float, complex. Data type and string operations declaring list and list data drive data type. Python program flow control conditional blocks using if else and else if simple for loops in Python for loop using ranges commerce, stream command list and dictionaries use of while loops in Python.	**5 Hours**
Loop manipulation using pass break and else programming using Python conditional and loops block. Python functions modulus and packages organising Python codes using functions organising python project into module importing on module as well as external module programming using functions module and external packages python string list and dictionary manipulation.	**5 Hours**
Understanding string inbuilt methods list, inbuilt methods dictionary, programming using using string list and dictionary inbuilt function. Python file operation reading config files in Python writing log files in Python understanding read functions read(),readline() and readlines() understanding write functions write() And writelines() manipulating file pointer using seek programming using file operation.	**5 Hours**
Python object oriented programming oops concept of class object and instances constructor class attributes and destructors real time class in live projects inheritance overlapping overloading operators adding and retrieving dynamic attributes of classes programming using oops support.	**5 Hours**
Python Regular expression, pattern matching and searching, pattern searching using regex in Python pattern finding programs using regular expression.	**5 Hours**
Python exception handling, code break using exception handling, file operation using exception handling, developer with error code using exception handling.	**5 Hours**
Python database interaction SQL database using Python creating and searching, reading and sorting config information on database programming using database connection.	**5 Hours**
Python multithreading understanding threads synchronising the threads programming using multithreading sample project	**5 Hours**

Semester 6

Skilled Components

Paper Code- SBVOC-SWD-VII-601

Management Information System (MIS)
Credit – 3 Full Marks – 50 Total 45 Hours

Understanding MIS: Introduction to Management Information Systems, History of MIS, Impact of MIS, Role and Importance, MIS Categories, Managers and Activities in IS, Types of Computers Used by Organizations in Setting up MIS, Hardware support for MIS	**2 Hours**
Conceptual Foundations : Introduction, The Decision Making Process , System Approach to Problem Solving, The Structure of Management Information System	**2 Hours**
Kinds of Information Systems: Introduction, Types of Management Systems Concepts of Management Organization	**2 Hours**
Planning and Control: Introduction, Differences between planning and control information, Systems Analysis, Systems Design	**2 Hours**
MIS Planning and Development : Introduction, Planning, development	**2 Hours**
MIS and BPR : Introduction, Business Process Re – Engineering, Improving a process in BPR, Object Oriented methodology, BPR – Current Focus	**2 Hours**
MIS Organization Structure : Introduction, MIS at Management levels, Strategic Level Planning, Operational Level Planning,Economic and Behavior Theories.	**2 Hours**
Enterprise Resource Planning: Introduction, Basics of ERP, Evolution of ERP, Enterprise Systems in Large Organizations, Benefits and Challenges of Enterprise Systems	**4 Hours**
E-Enterprise System : Introduction: Managing the E-enterprise, Organisation of Business in an E-enterprise, E-business, E-commerce, E-communication, E-collaboration,	**4 Hours**
Trends in MIS: Introduction, Decision Support Systems (DSS), Artificial Intelligence (AI)	**4 Hours**
MIS – Support Models and Knowledge Management: Introduction, Philosophy of Modelling, DSS: Deterministic Systems, Market Research Methods, Ratio Analysis for Financial Assessment, Management Science Models, Procedural Models, Project Planning and Control Models, Cost Accounting Systems, Operations Research Models: Mathematical Programming Techniques, Knowledge Management	**4 Hours**

Organization and Computer Networks: Introduction, Basics of computer systems, Basic Network Terminologies, Definitions and Application, The Intranet and the Extranet	**4 Hours**
Database Management Systems: Introduction, Types of Database Users, DBMS, Designing of DBMS	**4 Hours**
Strategic Management Information System: Introduction, Background, Performance, Product differentiation and Value Chain, How IT influences Organizations' goals, The five levels, Governance Modes in the use of IT	**4 Hours**
Security and Ethical Issues: Introduction, Control Issues in Management Information Systems, Security Hazards, Ethical Issues, Technical solutions for Privacy Protection	**3 Hours**

Paper Code- SBVOC-SWD-VII-602

Entreprenurship Development
Credit – 3 Full Marks – 50 Total 45 Hours

Unit-I Entrepreneurs hip Development - Concept and Scope 1. Entrepreneurship as a career 2. Traits of successful intrapreneur/ entrepreneur: consistency, creativity, initiative, independent decision making, assertiveness, persuasion, persistence, information seeking, handling business communication, commitment to work contract, calculated risk' taking. 3. Entrepreneurship : scope in local and global market. 4. Intrapreneur and entrepreneur 5. Types of enterprises and their features: manufacturing, service and trading. 6. Steps in setting up of a business.	**10 Hours**
Unit – II Entrepreneurial Opportunities and selection process 1. Product/Service selection: Process, core competence, product/service life cycle, new product/ service development process, mortality curve, creativity and innovation in product/ service modification / development. 2. Process selection: Technology life cycle, forms and cost of transformation, factors affecting process selection, location for an industry, material handling. 3. Market study procedures: questionnaire design, sampling, market survey, data analysis	**10 Hours**

Unit – III Support Systems	**5 Hours**
Unit IV Business Plan Preparation 1. Sources of Product for Business : Feasibility study 2. Ownership, Capital, Budgeting, Matching entrepreneur with the project, feasibility report preparation and evaluation criteria 3. Business plan preparation	**10 Hours**
Unit -V Managing Enterprise 1. Unique Selling Proposition [U.S.P.]: Identification, developing a marketing plan. 2. Preparing strategies of handling business: policy making, negotiation and bargaining techniques. 3. Risk Management: Planning for calculated risk taking, initiation with low cost projects, integrated futuristic planning, angel investors, venture capitalist. 4. Incubation centres: Role and procedure.	**10 Hours**

Paper Code- SBVOC-SWD-VII-603

Live Industrial Project

Credit – 10 Full Marks – 150 Total 150 Hours

- **Technologies Given**
  - **.Net (ASP.Net / C#.Net)**
  - **JSP**
  - **PHP**
  - **Multimedia**

Paper Code- SBVOC-SWD-VII-604

Seminar & Grand Viva

Credit – 2 Full Marks – 50