



VIKRAMA SIMHAPURI UNIVERSITY :: NELLORE

Common Framework of CBCS for Colleges in Andhra Pradesh

(A.P. State of Council of Higher Education)

B.Sc. Biochemistry Core Syllabus under CBCS

(with effect from the Academic Year 2020-21)

Course Structure

Structure of Biochemistry Core Syllabus under CBCS

Sem	Paper	Title of course	Credits	Hrs	Marks		
					Int	SEE	Total
I	I	BCH-1 Biomolecules	4	4	25	75	100
		BCH Practical I: Quantitative Analysis lab	1	2	0	50	50
II	II	BCH-II: Analytical Techniques	4	4	25	75	100
		BCH Practical II: Biochemical Techniques	1	2	0	50	50
III	III	BCH-III Enzymology, Bioenergetics and Intermediary Metabolism	4	4	25	75	100
		BCH Practical-III: Quantitative Analysis	1	2	50	75	50
IV	IV	BCH-IV: Physiology, Nutritional and Clinical Biochemistry	4	4	25	75	100
		BCH Practical-IV: Nutritional and Clinical Biochemistry	1	2	0	50	50
IV	V	BCH-V: Microbiology, Immunology and Molecular Biology	4	4	25	75	100
		BCA Practical V: Microbiology and Immunology	1	2	0	50	100

Expected out comes of the course BCH-1:

1. The student gains knowledge in the chemistry of biomolecules such as water, carbohydrates, lipids, proteins and nucleic acids which make up all the living organisms including humans.
2. This will enable the student to understand the importance of these biomolecules in living organisms and effects of their alterations in diseases occurring in plants, animals and humans.
3. The practical will give the expertise to the student for analysis of any biological or non-biological sample for identification of its chemical composition.

**Major Domain Subject: BIO-CHEMISTRY
SEMESTER-I**

Course: Biomolecules Code: BCH-1

60HRS

(5periods/week)

Unit - I: Biophysical Concepts

12hours

Water as biological solvent, Buffers, measurement of pH, electrodes, Biological relevance of pH, pKavalue, analysis of drinking water and pond water, Total dissolved salts (TDS), BOD, COD, soil analysis (texture, organic matter, elements), Electrical conductivity.

Unit -II: Carbohydrates

12 hours

Carbohydrates: Classification, monosaccharides, D and L designation, open chain and cyclic structures, epimers and anomers, mutarotation, reactions of carbohydrates (due to functional groups -hydroxyl, aldehyde and ketone. Amino sugars, Glycosides. Structure and biological importance of disaccharides (sucrose, lactose, maltose, isomaltose, trehalose), trisaccharides (raffinose, melezitose), structural polysaccharides (cellulose, chitin, pectin) and storage polysaccharides (starch, inulin, glycogen). Glycosaminoglycans, Bacterial cell wall polysaccharides. Outlines of glycoproteins, glycolipids and blood group substances.

Unit –III: Lipids

12hours

Lipids: Classification, saturated and unsaturated fatty acids, structure and properties of fats and oils (acid, saponification and iodine values, rancidity). General properties and structures of phospholipids, **cholesterol**. Prostaglandins- structure, types and biological role. Lipoproteins- types and functions, Biomembranes-formation of micelles, bilayers, vesicles, liposomes. Membrane composition and organization - Fluid mosaic model.

Unit-IV: Amino Acids and Proteins

12hours

Amino Acids: Classification, structure, stereochemistry, chemical reactions of amino acids due to carbonyl and amino groups. Titration curve of glycine and p_x values. Essential and nonessential amino acids, non-protein amino acids. Peptide bond-nature and conformation. Naturally occurring peptides - glutathione, enkephalin.

Proteins: Classification based on solubility, shape and function. Determination of amino acid composition of proteins. General properties of proteins, denaturation and renaturation of proteins. Structural organization of proteins- primary, secondary, tertiary and quaternary structures (Eg. Hemoglobin and Myoglobin). **Protein sequencing.**

Unit-V: Nucleic acids and porphyrins

12hours

Types of RNA and DNA. Structure of purines and pyrimidines, nucleosides, nucleotides. Stability and formation of phosphodiester linkages. Effect of acids, alkali and nucleases on DNA and RNA. Structure of Nucleic acids- Watson-Crick DNA double helix structure, denaturation and renaturation kinetics of nucleic acids-, T_m -values and their significance, cot curves and their significance. Structure of **porphyrins:** Identification of Porphyrins, Protoporphyrin, porphobilinogen properties, Structure of metalloporphyrins – Heme, cytochromes and chlorophylls.

I Semester Practicals: Qualitative Analysis

1. Preparation of buffers (acidic, neutral and alkaline) and determination of pH.
2. Qualitative identification of carbohydrates- glucose, fructose, ribose/ xylose, maltose, sucrose, lactose, starch/glycogen.
3. Qualitative identification of amino acids - histidine, tyrosine, tryptophan, cysteine, arginine.
4. Qualitative identification of lipids- solubility, saponification, acrolein test,
5. Preparation of Osazones and their identification.
6. Absorption maxima of colored substances- p- Nitrophenol, Methyl orange.
7. Absorption spectra of protein-BSA, nucleic acids-Calf thymus DNA.

Recommended Books:

1. Soil Testing Manual by Dr. G. S. Wagh.
2. Soil Testing and Plant Analysis: Part I Soil Testing, Volume 2, SSSA Special publications by Glenn W. Hardy.
3. Soil Analysis: An interpretation manual by K. I. Peverill, L. A. Sparrow, D. J. Reuter
4. The biochemistry of Nucleic acids; Adams et al., Chapman and Hall, 1986.
5. Proteins: A guide to study by physical & chemical methods, Haschemeyer and Haschemeyer,

6. Proteins: Structure, function and evolution. Dickerson & Geis, 2nd. Edn, Benjamin/ Cummings
7. Biochemistry - Zubay C, Addison – Wesley, 1986.
8. Biochemistry, A problem Approach, 2nd Edn. Wood, W.B. Addison Wesley 1981.
9. Biochemistry, Lehninger A.H.
10. Textbook of Biochemistry West, E.S., Todd, Mason & Vanbruggen, Macmillan & Co.
11. Principles of Biochemistry White-A, Handler, and Smith E.L. Mc Graw Hill.
12. Organic chemistry, I.L. Finar, ELBS.(1985).
13. Organic Chemistry by Morrison and Boyd (2000) Prentice Hall
14. Fundamentals of Biochemistry by Donald Voet(1999).

@ @ @ @ @

Expected outcomes of the course BCH- II

1. The student will learn the various analytical techniques and their applications
2. In separation and isolation of cells and tissues for studying their functional abnormalities
3. The knowledge in the analytical techniques will enable the student for isolation, purification and chemical characterization of compounds from plants and microbes which will have medical or commercial importance.
4. The practicals will provide the expertise to the student for quantification of Electrolytes And other metal ions, hormones and identification of bacteria.
5. The expertise gained by the student in this course can be useful in food industries , pharma industries, clinical and microbiological labs.

Major Domain Subject: BIO-CHEMISTRY

**SEMESTER-II 60 HRS Course:
Analytical techniques Code: BCH-II**

(5 periods/week)

Unit-I: Cell homogenization and centrifugation **12 hours**

Methods of tissue homogenization: (Potter-Elvehjem, mechanical blender, sonicator and enzymatic). Centrifugation techniques, principles and applications- differential, density gradient. Ultra-centrifugation- preparative and analytical.

Unit-II: Chromatographic techniques **12 hours**

Types of chromatographic techniques, Principle and applications - Paper chromatography- solvents, Rf value, applications; Thin layer chromatography- principle, choice of adsorbent and solvent, Rf value, applications; Gel filtration, Ion-exchange- principle, resins, action of resins, experimental techniques, applications, separation of metal ions; Affinity chromatography.

Unit-III: Spectroscopy and tracer techniques **12 hours**

Electromagnetic radiation, Beer-Lambert's law. Colorimetry and Spectro photometry, spectro fluorimetry, flame photometry. Tracer techniques: Radio isotopes, units of radio activity, half life, β and γ - emitters, use of radioactive isotopes in biology, ELISA,RIA.

Unit-IV: Electrophoresis **12hours**

Electrophoresis- principles and applications of paper, polyacrylamide (native and SDS) and agarose gel electrophoresis, isoelectric focusing, immune- electrophoresis- types and applications

Unit-V: Microbial Techniques: **12 hours**

Microscopy: Basic principles of light microscopy, phase contrast, electron microscope and fluorescent microscope and their applications.

Preparation of different growth media, isolation and culturing and preservation of microbes, Gram's staining- Gram positive and Gram-negative bacteria, motility and sporulation, Sterilization techniques-Physical methods, chemical methods, radiation methods, ultrasonic and. Antibiotic resistance.

Practical BCP- 201 :

Biochemical Techniques

List of Experiments:

1. Isolation of RNA and DNA from tissue/culture.
2. Qualitative Identification of DNA, RNA and Nitrogen Bases
3. Isolation of egg albumin from egg white.
4. Isolation of cholesterol from egg yolk.
5. Isolation of starch from potatoes.
6. Isolation of casein from milk.
7. Separation of amino acids by paper chromatography.
8. Determination of exchange capacity of resin by titrimetry.
9. Separation of serum proteins by paper electrophoresis.
10. Separation of amino acids by TLC (Thin layer chromatography)

Recommended Books:

1. Principles and Techniques of practical Biochemistry. Eds. Williams and Wilson.
2. Techniques in Molecular biology Ed. Walker & Gastra, Croom Helm, 1983.
3. Principles of instrumental analysis, 2nd Ed, Holt-Sanders, 1980.
4. An introduction to spectroscopy for Biochemistry. Ed. Brown S.N., Academic press
5. Analytical Biochemistry, Holmes and Hazel peck, Longman, 1983.
6. An introduction to practical biochemistry. David T. Plummer, Tata Mac Grew-Hill.
7. Biophysical chemistry, Edshall & Wyman, Academic press Vol. II & I.
8. A textbook of quantitative inorganic analysis including elementary instrumental analysis, Vogel ELBS.
9. Biochemical calculations Seigel, IH, 2nd Edit, John Wiley & sons Inc., 1983.
10. Analytical Biochemistry by Friefelder David

Outcomes of the course BCH-III

1. The student will get knowledge in enzymes, their physiological importance and other applications.
2. The student will know how the nutrients such as carbohydrates, lipids and proteins get metabolized for the purpose of energy and other physiological functions in the body. This will enable the student to understand the pathophysiology of metabolic diseases such as diabetes, atherosclerosis etc. Which occur due to alterations in metabolisms.
3. The practicals will provide the expertise for quantification of enzymes' activities, glucose, proteins and lipid level in blood which will have clinical applications.

Major Domain Subject: BIO-CHEMISTRY

Semester-III

Course: Enzymology, Bioenergetics and Intermediary Metabolism

Code: BCH-III

60HRS

(5periods/week)

Unit-I: Enzymology

12hours

Introduction to Bio catalysis, differences between chemical and biological catalysis. Nomenclature and classification of enzymes. Definition of holo-enzyme, apo-enzyme, coenzyme, cofactor. Active site, Enzyme specificity. Principles of energy of activation, transition state. Interaction between enzyme and substrate-lock and key, induced fit models. Fundamentals of enzyme assay, enzyme units. Outlines of mechanism of enzyme action, factors affecting enzyme activity. Commercial application of enzymes.

Unit- II: Bioenergetics and Biological oxidation

12hours

Bioenergetics: Thermodynamic principles – Chemical equilibria; free energy, enthalpy (H), entropy (S). Free energy change in biological transformations in living systems; High energy compounds. Energy, change, oxidation-reduction reactions.

Organization of electron carriers and enzymes in mitochondria. Classes of electron-transferring enzymes, inhibitors of electron transport. Oxidative phosphorylation. Uncouplers and inhibitors of oxidative phosphorylation. Mechanism of oxidative phosphorylation.

Unit-III: Carbohydrate Metabolism.

12hours

Concept of anabolism and catabolism. Glycolytic pathway, energy yield. Fate of pyruvate-formation of lactate and ethanol, Citric acid cycle, regulation, energy yield, amphipathic role. Anaplerotic reactions. Glycogenolysis and glycogenesis. Pentose phosphate pathway. Gluconeogenesis. Photosynthesis- Light and Dark reactions, Calvin cycle, C4 Pathway. Disorders of carbohydrate metabolism- DiabetesMellitus, **Diabetes insipidus**.

Unit-IV: Lipid Metabolism

12 hours

Catabolism of fatty acids (β - oxidation) with even and odd number of carbon atoms, Ketogenesis, *DE NOVO* synthesis of fatty acids, elongation of fatty acids in mitochondria and microsomes, Biosynthesis and degradation of tri acylglycerol and lecithin. Biosynthesis of cholesterol. Disorders of lipid metabolism.

Unit-V: Metabolism of Amino acids

12 hours

General reactions of amino acid metabolism- transamination, decarboxylation and deamination, Urea cycle and regulation, Catabolism of carbon skeleton of amino acids- glycolytic and ketogenic amino acids. Metabolism of glycine, serine, aspartic acid, methionine, phenylalanine and leucine. Biosynthesis of creatine, **creatinine**. Inborn errors of aromatic and branched chain amino acid metabolism.

Practical – BCP-301: Quantitative analysis

1. Assay of amylase.
2. Assay of urease.
3. Assay of catalase
4. Effect of pH, temperature and substrate concentration on enzyme activity.
5. Estimation of glucose by DNS method.
6. Estimation of glucose by Benedict's titrimetric method.
7. Estimation of total carbohydrates by Anthrone method.
8. Tests for lipids- Salkowski test, Lieberman-Burchard test.
9. Estimation of amino acid by Ninhydrin method.
10. Estimation of protein by Biuret method.

Recommended Books:

1. Understanding enzymes: Palmer T., Ellis Harwood Ltd., 2001.
2. Enzyme structure and mechanism. Alan Fersht, Freeman & Co. 1997
3. Principles of enzymology for food sciences: Whitaker Marc Dekker 1972.
4. Principles of Biochemistry, White. A, Handler, P and Smith.
5. Biochemistry, Lehninger A.L.
6. Biochemistry, Lubert Stryer.
7. Review of physiological chemistry, Harold A. Harper.
8. Text of Biochemistry, West and Todd.
9. Metabolic pathways –Greenberg.
10. Mitochondria, Munn. Biochemistry, 2nd Edition, G.Zubay.

Expected out comes of course BCH-IV

1. The student will get knowledge in the different physiological systems and their functions in the human body. By studying blood, its composition and its functions the student will understand the importance of blood.
2. This course will also provide knowledge in hormones, their functions and the diseases occurring due to alterations in the level so fhormones.
3. By studying this course the student will know the nutritional importance of proteins, carbohydrates, lipids, vitamins and minerals.
4. Clinical biochemistry unit along with practicals will enable the student to dodiagnostic tests for liver diseases, Gastro intestinal diseases, renal diseases and nutrititional deficiencies.

Major Domain Subject: BIOCHEMISTRY SEMESTER-IV

Course: Physiology, Nutritional and Clinical Biochemistry

Code: BCH- 1V

60 HRS

(5 periods/week)

Unit-I: Digestion and Blood

12hours

Digestion and absorption of carbohydrates, lipids and proteins. Role of enzymes and gastrointestinal hormones in digestion. Composition of blood, Blood groups, coagulation of blood and disorders of blood coagulation (haemophilia). Hemoglobin and transport of gases in blood (oxygen and CO₂). Types of anemias, haemoglobinopathies-sickle cell anemia.

Unit-II: Nervous system and excretory system

12hours

Introduction to nervous system, general organization of nervous system, Neurons-structure, types, properties and functions; Neurotransmitters, Cerebrospinal fluid-composition and functions, Reflex-types and properties.

Introduction to excretory system. Organization of kidney, Structure and functions of nephron, Urine formation, Role of kidneys in maintaining acid-base and electrolyte balance in the body.

Unit- III: Endocrinology

12 hours

Endocrinology- organization of endocrine system. Classification of hormones. Outlines of chemistry, physiological role and disorders of hormones of thyroid, parathyroid, pituitary and hypothalamus. Introduction of gastrointestinal hormones. Mechanism of hormonal action- signal transduction pathways for glucocorticoids and insulin. Adrenalin, estrogen and progesterone.

Unit- IV: Nutritional Biochemistry

12hours

Balanced diet. Calorific values of foods and their determination by bomb calorimeter. BMR and factors affecting it. Specific dynamic action of foods. Energy requirements and recommended dietary allowance (RDA) for children, adults, pregnant and lactating

women. Sources of complete and incomplete proteins. Biological value of proteins.

Malnutrition- Kwashiorkar, Marasmus and PEM.

Vitamins- sources, structure, biochemical roles, deficiency disorders of water and fat soluble vitamins. Introduction to nutraceutical and functional foods. Bulk and trace elements-Ca, Mg, Fe, I, Cu, Mo, Zn, Se and F.

Unit- V: Clinical Biochemistry

12hours

Plasma proteins in health and disease. Liver diseases-jaundice. Liver function tests- conjugated and total bilirubin in serum, albumin: globulin ratio, Serum enzymes in liver diseases-SGOT, SGPT, GGT,CPK, Acid and alkaline phosphatases. Serum lipids and lipoproteins. Normal and abnormal constituents of urine. Renal function tests-Blood urea, creatinine, GFR, creatinine clearance. GTT and gastric and pancreatic function tests.

Practical – BCH-401: Nutritional and Clinical Biochemistry 45HRS

(3 periods/week)

List of Experiments:

1. Estimation of calcium by titrimetry
2. Estimation of iron by Wong's method.
3. Estimation of vitamin C by 2, 6 -dichlorophenol indophenols method.
4. Determination of iodine value of an oil.
5. Estimation of hemoglobin in blood.
6. Total count - RBC and WBC. Differential count.
7. Determination of blood group and Rh typing.
8. Visualization of antigen antibody reactions (Ouchterlony technique).
9. Urine analysis for albumin, sugars and ketone bodies.
10. Estimation of urinary creatinine.
11. Estimation of blood glucose.
12. Estimation of serum total cholesterol.

Recommended Books:

1. Essentials of Food and Nutrition, Vol. I & II, M.S.Swaminathan.
2. Text Book of Biochemistry with clinical correlations. Thomas M. Devlin(John Wily).
3. Harper's Review of Biochemistry, Murray et al(Longman).
4. Biochemical aspects of human disease – R.S. Elkeles and A.S. Tavit. (Blackwell Scientific Publications).
5. Clinical chemistry in diagnosis and treatment–Joan F.Zilva and P.R.Pannall (Lloyd- Luke Medical Books,1988).
6. Varley's Practical clinical Biochemistry – Ed. Alan W. Gowenlock (Heinemann Medical Books, London,1988).
7. Clinical diagnosis and management by Lab methods (John Bernard Henry,W.B. Salunders Company,1984).
8. Clinical Biochemistry – S.Ramakrishnan and Rajiswami.
9. Chemical Biochemistry (Metabolic and clinical aspects) by W.J.Marshall & S.K.Bangert.
10. Text book of clinical Biochemistry by Tietz etal.

Expected outcomes of the course BCH-V

1. This course will enable the student to know various microbes such as bacteria, fungi and viruses, their structures and other properties and diseases caused by them .The student will also get knowledge in their commercial applications by making use of their beneficial effects such as fermentation in alcohol production, nitrogen fixation in agriculture **etc.**
2. The student will also get knowledge in immune system, vaccines and also understand the patho genesis of auto immune diseases an dimmune deficiency diseases.
3. This course will provide knowledge and expert is ein molecular biology such as genes, their structure and importance. This will also enable the student to know the applications of PCR incloning and diagnosis of genetic and viral diseases.
4. The practicals will provide the expert is eto the student to work in microbiology laboratory, food and pharma industries, and biotech companies for production of vaccines and other life saving drugs.

Major Domain Subject: BIO-CHEMISTRY

Semester - IV

Course: Microbiology, Immunology and Molecular biology

Code: BCH-V

60 HRS

(5 periods/week)

Unit-I: Microbiology **12hours**

Introduction to microbiology and microbial diversity. Classification of microorganisms- prokaryotic and eukaryotic microorganisms. Bacterial structure, growth curve and kinetics of growth. Introduction to viruses-plant and animal viruses, structure, life cycle, Food and dairy microbiology.

Unit-II: Nitrogen Fixation **12hours**

Nitrogen cycle, Non-biological and biological nitrogen fixation, photosynthetic and non- photosynthetic systems, Nitrogenase system. Utilization of nitrate ion, Ammonia incorporation into organic compounds. Synthesis of glutamine and regulatory mechanism of glutamine synthase.

Unit-III: Applied Biochemistry **12hours**

Fermentation Technology: Batch, continuous culture techniques, principle types of fermentors. Pasteur effect. Industrial production of chemicals- alcohol, acids (citric acid), solvents (acetone), antibiotics (penicillin), Enzyme Technology: Immobilization of enzymes and cells, industrial applications, enzymes in Bioremediation. Introduction to bio informatics, definitions of proteomics and genomics, gene bank, NCBI, DDBI, swisprot, PBD, sequence alignment, Blast, FASIA.

Unit- IV: Immunology **12hours**

Organs and cells of immune system. Innate and acquired immunity, Cell mediated and humoral immunity (T-cells and B-cells). Classification of immunoglobulins, structure of IgG. Epitopes / antigenic determinants. Concept of haptens. Adjuvants. Monoclonal antibodies. Antigen-antibody reactions- agglutination, immunoprecipitation, immunodiffusion. Blood group antigens. Immunodiagnostics- ELISA. Vaccines and

their classification. Traditional vaccines-live and attenuated. Modern vaccines-recombinant and peptide vaccines. Outlines of hypersensitivity reactions.

Unit- V: Molecular biology

12hours

Types of RNA and DNA, DNA replication- leading and lagging strands, okazaki fragments, inhibitors of DNA replication. Genetic code, Protein synthesis-transcription, translation, inhibitors of protein synthesis. Outlines of cloning technology, vectors, restriction enzymes, PCR, applications of cloning in agriculture, industry and medical fields.

Practical – BCP-501: Microbiology and immunology

45HRS

(3 periods/week)

List of Practical Experiments

1. Biosafety and good laboratory practices (GLP) of Microbiology.
2. Sterilization of microbial media by autoclave.
3. Isolation of pure cultures: (i) Streak plate method. (ii) Serial dilution method.
4. Demonstration of alcohol fermentation.
5. Antibiotic sensitivity by paper disc method.
6. Effect of nitrogen sources on growth of E.coli
7. Immunodiffusion by Ouchterlony method.
8. Blood group analysis.
9. Isolation of DNA from plant tissues.
10. Spotters.

Recommended books:

1. Willey MJ, Sherwood, LM & Woolverton C J (2013) Prescott, Harley and Klein's Microbiology by. 9th Ed., McGrawHill.
2. Atlas RM. (1997). Principles of Microbiology. 2nd edition. W.M.T. Brown Publishers.
3. Pelczar MJ, Chan ECS and Krieg NR. (1993). Microbiology. 5th edition. McGraw Hill Book Company.
4. Fermentation Technology (2nd ed.) Standury (Pergmanpress)

5. Biotechnology: Textbook of Industrial microbiology 2nd Edit. By Crueger and Crueger(2000).
6. Principles of Biochemistry, White. A, Handler, P and Smith.
7. Goldsby RA, Kindt TJ, Osborne BA. (2007). Kuby's Immunology. 6th edition
8. Richard C and Geoffrey S. (2009). Immunology. 6th edition. Wiley Blackwell Publication.
9. Watson JD, Baker TA, Bell SP, Gann A, Levine M and Losick R (2008) Molecular Biology of the Gene, 6th edition, Cold Spring Harbour Lab. Press, Pearson Publication.
10. Molecular biology by David Freifelder

MODEL QUESTION PAPER FOR END SEMESTER EXAM

B. Sc Degree Course (CBCS Semester pattern)

B. Sc BIOCHEMISTRY

Time :3 Hrs

Max marks :75

(5 x 5 = 25marks)

SECTION A

Attempt any five of the following

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

SECTION –B

(10 X 5 = 50marks)

Attempt all the questions

UNIT-I

9.

(OR)

10.

UNIT-II

11.

(OR)

12.

UNIT-III

13.

(OR)

14.

UNIT-IV

15.

(OR)

16.

UNIT-V

17.

(OR)

18

**MODEL QUESTION PAPER FOR SEMESTER END PRACTICAL
EXAMINATIONS**

**B.Sc., Course Semester End
Practical examination B.Sc., Biochemistry**

TIME:3hours

Max. Marks: 50

1. Major experiment. - 20marks
2. Minor experiment - 10marks
3. Identify the given spotter and write a brief note on it- A, B, C,D,E,F
- (5x2M) 10marks
4. Record - 05marks
5. Viva-Voce - 05marks

Distribution of Practical Exam Marks

Practical Exam Time: 3Hrs

Max marks:50

1. MajorExperiment 20(Principle -5M, Methodology-10M,Results-05)
2. MinorExperiment 10(Principle -2M, Methodology-05M,Results-03)
3. Spotters 10(5 nos. x 2M)
4. Record 05
5. Viva-voce 05