

Dr.B.R. AMBEDKAR UNIVERSITY
BIO-CHEMISTRY SYLLABUS FOR THE ACADEMIC YEAR 2010-11 **120 hrs**
3rd Year Theory – Paper-III: Physiology, Clinical Biochemistry and Immunology **(4 hrs/ week)**

(3 hrs/week)

Unit- I : Physiology

24 hours

Digestion and absorption of carbohydrates, lipids and proteins. Composition of blood and coagulation of blood. Hemoglobin and transport of gases in blood (oxygen and CO₂).

Heart- structure of the heart, cardiac cycle, cardiac factors controlling blood pressure.

Muscle- kinds of muscles, structure of myofibril, organization of contractile proteins and mechanism of muscle contraction.

Endocrinology- organization of endocrine system. Classification of hormones. Outlines of chemistry, physiological role and disorders of hormones of pancreas, thyroid, parathyroid, gonads, placenta, adrenals, pituitary and hypothalamus. Introduction of gastrointestinal hormones. Mechanism of hormonal action- signal transduction pathways for adrenaline, glucocorticoids and insulin.

Unit- II : Nutrition

21 hours

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. Role of essential fatty acids in human nutrition. 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. Obesity and starvation.
BMI(Body Mass Index)

Unit- III : Clinical Biochemistry

23 hours

Plasma proteins in health and disease. Disorders of blood coagulation (haemophilia). Types of anemias, haemoglobinopathies-sickle cell anemia and thalassemias.

Structure and functions of the liver. Liver diseases-jaundice, hepatitis, cirrhosis. Liver function tests- conjugated and total bilirubin in serum, albumin: globulin ratio, hippuric acid and bromsulphthalein tests. Serum enzymes in liver diseases- SGPT, GGT and alkaline phosphatase.

Kidneys-structure of nephron, urine formation, normal and abnormal constituents of urine. Biological buffers. Role of kidneys in maintaining acid-base and electrolyte balance in the body. Renal function tests- creatinine and urea clearance tests, phenol red test.

Disorders of carbohydrate metabolism- hypoglycemia, hyperglycemia, glycosuria, renal threshold value. *Diabetes mellitus*-classification, glucose tolerance test (GTT), diabetic ketoacidosis.

Disorders of lipid metabolism- plasma lipoproteins, lipoproteinemias, fatty liver, hypercholesterolemia, atherosclerosis.

Biochemical tests for the diagnosis of heart diseases- HDL/LDL cholesterol, SGOT, LDH, CK, C-reactive protein, cardiac troponins.

Unit- IV : Immunology

22 hours

Organization of immune system. Organs and cells of immune system. Innate and acquired immunity. Cell mediated and humoral immunity (T- and B- cells). Classification of immunoglobulins, structure of IgG. Epitopes / antigenic determinants. Concept of haptens. Adjuvants. Theories of antibody formation- clonal selection theory. Monoclonal antibodies.

Antigen-antibody reactions- agglutination, immunoprecipitation, immunodiffusion. Blood group antigens. Immunodiagnosics-RIA, ELISA. Vaccines and their classification. Traditional vaccines-live and attenuated, toxoids. Modern vaccines- recombinant and peptide vaccines. Outlines of hypersensitivity reactions. Fundamentals of graft rejection and MHC proteins.

3rd Year – Practical -III: Nutritional and Clinical Biochemistry

90 hrs
(3 hrs/week)

List of Experiments:

1. Estimation of calcium by titrimetry
2. Estimation of iron in apple juice by phenanthroline method.
3. Estimation of sodium by flame photometry.
4. Estimation of vitamin C by 2, 6 -dichlorophenol indophenol method.
5. Isolation of total lipids by gravimetric method.
6. Determination of iodine value of an oil.
7. Determination of acid value of an oil.
8. Estimation of hemoglobin in blood.
9. Total count - RBC and WBC. Differential count.
10. Determination of blood group and Rh typing.
11. Urine analysis for albumin, sugars and ketone bodies.
12. Estimation of urinary creatinine.
13. Estimation of blood urea.
14. Determination of SGOT and SGPT activity.
15. Project work(Data Collection) on any of the following
 - a) Hemoglobin
 - b) WBC Count
 - c) Platelet Count
 - d) Urine Analysis
 - e) Blood Glucose
 - f) Minerals

Dr.B.R. AMBEDKAR UNIVERSITY
BIO-CHEMISTRY SYLLABUS ACADEMIC YEAR 2010-11
3rd Year Theory – Paper-IV: Microbiology and Molecular Biology

120 hrs
(4 hrs/ week)

Unit- I : Microbiology

24 hours

Introduction to brief history of microbiology. Classification of microorganisms- prokaryotic and eukaryotic microorganisms. Isolation and cultivation of bacteria. Selective media and enriched media. Bacterial growth curve and kinetics of growth. Batch, continuous and synchronous cultures. Gram's staining- Gram positive and Gram negative bacteria, motility and sporulation.

Industrial uses of *Aspergillus niger*, yeast and Spirulina.

Structure and composition of viruses. One-step growth and determination of plaque forming units (PFU). Isolation and cultivation of bacterial plaques. Lytic and lysogenic life cycle of λ phage. TMV, Retro viruses- HIV. Prions and Mycoplasma.

Unit- II : DNA Replication and Transcription

21 hours

Organization of genome in prokaryotes and eukaryotes. Experimental evidences to prove nucleic acids as genetic material. Nature and structure of the gene. DNA replication- models of replication, Meselson-Stahl's experimental proof for semi-conservative model. DNA polymerases I, II and III of *E.coli*, helicase, topoisomerases, primase, ligase. Bidirectional replication model. Okazaki fragments, leading and lagging strands of DNA synthesis. Inhibitors of DNA replication.

Transcription - RNA synthesis, RNA polymerases of prokaryotes. Promoters, Initiation- sigma factors and their recognition sites. Elongation- role of core enzyme. Termination- rho dependent and rho independent. RNA polymerase I, II and III of eukaryotes.

Transcriptional events in eukaryotic m-RNA synthesis, post-transcriptional modifications of eukaryotic m-RNA. Inhibitors of RNA synthesis.

Unit- III : Protein Synthesis and Regulation of Gene Expression

21 hours

Introduction to protein synthesis- Genetic code, structure of t-RNA, deciphering of genetic code, Nirenberg's and Khorana's experiments, wobble hypothesis, degeneracy of genetic code.

Protein synthesis- activation of amino acids (aminoacyl t-RNA synthetases). Ribosome structure. Initiation, elongation and termination of protein synthesis. Post- translational modifications- signal hypothesis. Inhibitors of protein synthesis.

Regulation of prokaryotic gene expression- induction and repression. Lac operon, catabolite repression. Tryptophan operon and attenuation.

Unit- IV : Recombinant DNA technology

24 hours

Outlines of cloning strategies. DNA sequencing- Maxam Gilbert and Sanger's methods. Tools of r-DNA technology: Enzymes- Restriction endonucleases, ligase, phosphatases, reverse transcriptase, polynucleotide kinases, terminal transferase nucleases- S_1 and RNAase H.

Restriction mapping. Cloning vectors- Plasmids, Ti plasmids, Cosmids, λ phages, shuttle vectors, expression vectors. Host- *E.coli*, *Sacchromyces cereviciae*, *Agrobacterium tumifaciens*.

Construction of c-DNA and genomic libraries. Isolation and sequencing of cloned genes- colony hybridization, nucleic acid hybridization, hybrid released translation (HRT) and hybrid arrested and released translation (HART) using reporter genes [β - galactosidases, green fluorescent proteins (GFP)].

Polymerase chain reaction- principle and applications. Outlines of blotting techniques-Southern, Northern and Western.

Applications of gene cloning- production of insulin and human growth hormone, production of Bt cotton and edible vaccines.

Introduction to Bioinformatics- definitions of proteomics and genomics. Gene bank, NCBI, DDBJ, Swissprot, PDB. Sequence alignments- BLAST and FASTA.

3rd Year Practical – Paper-IV: Microbiology and Molecular Biology

90 hrs
(3 hrs/week)

List of Experiments:

1. Preparation of culture media and sterilization methods.
2. Isolation of pure cultures: (i) Streak plate method.
(ii) Spread plate method.
(iii) Pour plate method
3. Gram staining.
4. Motility of bacteria by hanging drop method.
5. Bacterial growth curve.
6. Antibiotic sensitivity by paper disc method.
7. Isolation of DNA from onion/liver/coconut endosperm.
8. Estimation of DNA by diphenylamine method.
9. Estimation of RNA by orcinol method.
10. Electrophoresis of nucleic acids and visualization by methylene blue staining.

Recommended Books for UG Course (Biochemistry)

General Biochemistry

1. Lehninger's Principles of Biochemistry – Nelson.D.L. and Cox.M.M., Freeman & Co.
2. Biochemistry – Berg.J.M., Tymoczko.J.L. and Stryer.L., Freeman & Co.
3. Biochemistry – Voet.D and Voet., J.G., John Wiley & Sons .
4. Textbook of Biochemistry – West.E.S.,Todd.W.R,Mason.H.S..and. Bruggen, J.T.V., Oxford & IBH Publishers.
5. Principles of Biochemistry: General Aspects-Smith, E. L., Hill, R.L. Lehman, I. R. Lefkowitz, R.J. Handler, P., and White, A. McGraw-Hill
6. Outlines of Biochemistry – Conn.E.E.,Stumpf.P.K., Bruening, G and Doi.R.H., John Wiley & Sons .
7. Harper's Illustrated Biochemistry – Murray, R.K., Granner.D.K. & Rodwell,V.W., McGraw-Hill
8. Biochemistry-Lippincott's Illustrated Reviews. Champe, P.C. and Harvey, R. A. Lippincott
9. Fundamentals of Biochemistry –Jain, J.L., Jain, S., Jain, N. S. Chand & Co.
10. Biochemistry – Satyanarayana. U and Chakrapani. U, Books & Allied Pvt. Ltd.
11. Biochemistry – Rama Rao. A and Ratna Kumari. D, Kalyani Publishers.
12. Biochemistry- The Molecular Basis of Life – McKee. T and McKee, J. R, McGraw-Hill.

Enzymology

1. Fundamentals of Enzymology – Price.N.C.and Stevens.L., Oxford University Press.
2. Understanding Enzymes – Palmer.T., Ellis Harwood.
3. Enzymes – Biochemistry, Biotechnology, Clinical Chemistry – Palmer.T., Affiliated East-West Press

Biochemical Techniques

1. Principles and Techniques of Practical Biochemistry- Wilson, K. and Walker, J. Cambridge Press.
2. The Tools of Biochemistry- Cooper, T. G. John Wiley & Sons Press.
3. Physical Biochemistry- Friefelder, D. W.H. Freeman Press.
4. Analytical Biochemistry – Holme.D.J. and Peck.H., Longman.
5. Biophysical Chemistry: Principle and techniques- Upadhyay A, Upadhyay K and Nath. N. Himalaya Publishing House.
6. Experimental Biochemistry- Clark Jr. J.M and Switzer, R. L. Freeman & Co..

Physiology, Nutrition and Clinical Biochemistry:

1. Textbook of Biochemistry and Human Biology – Talwar, G.P. and Srivastava. L.M., Printice Hall of India
2. Review of Medical Physiology-Ganong. McGraw-Hill.
3. Human Physiology – Chatterjee.C.C, Medical Allied Agency
4. Textbook of Medical Physiology – Guyton.A.G and Hall.J.E., Saunders
5. William’s Textbook of Endocrinology – Larsen, R. P. Korenberg, H. N. Melmed, S. and Polensky, K. S. Saunders
6. Mammalian Biochemistry- White, A. Handler, P. and Smith, E. L. McGraw-Hill.
7. Textbook of Human Nutrition- Bamji, Pralhad Rao and Reddy V. Oxford & IBH Publishers.
8. Foods: Facts & Principle- Shakuntala and Shadaksharaswamy. Wiley Ester Press.
9. Essentials of Food and Nutrition – Swaminathan.M. Bangalore Press.
10. Human Nutrition and Dietetics. Davidson, S. and Passmore, J. R. ELBS.
11. A Textbook of Biochemistry: Molecular and Clinical Aspects. Nagini, S. Scitech Publishers.
12. *Tietz* Fundamentals of Clinical Chemistry- Burtis, A. A. and Ashwood, E. R. Saunders-imprint Elsevier Pub.
13. Textbook of Biochemistry with Clinical Correlations – Devlin.T.M.,Wiley – Liss
14. Textbook of Medical Biochemistry – Chatterjea.M.N. and Shinde.R, Jaypee Brothers Medical Publishers.
15. Textbook of Medical Biochemistry- Ramakrishnan, S., Prasannan, K. G. and Rajan, R. Orient Longman

Immunology:

1. Immunology. Tizard, I. R. Thomson Press.
2. Kuby Immunology – Kindt.T.J., Goldsby.R.A. and Osborne.B.A., Freeman & Co.
3. Roitt’s Essential Immunology – Roitt.I.M. and Delves.P.J., Blackwell Science.
4. Immune system- Parham. Garland Publishing.

Microbiology:

1. Introduction to Microbiology: A Case History Approach- Ingraham and Ingraham. Thomson Press.
2. Textbook of Microbiology – Ananthanarayan, R and Jayaram Paniker, C.K., Orient Longman.
3. Microbiology – Prescott.L.M.,Harley.J.P. & Klein.D.A, McGraw-Hill.
4. Microbiology: An Introduction- Tortora, G. J. Funke, B. R. and Case, C. L., Pearson-Benjamin-Cummings Co.
5. Microbiology – Pelczar Jr.,M.J., Chan.E.C.S. and Krieg.N.R., Tata McGraw-Hill.
6. Textbook of Microbiology- Dubey, R. C. and Maheshwari, D. K. S. Chand & Co.

Molecular Biology and Biotechnology:

1. Protein Biochemistry & Biotechnology- Walsh. John Wiley & Sons Press.
2. Molecular Biology of Cell- Alberts, B. Bray, D. Lewis, J. Raff, M. Roberts, K. and Watson, J. D. Garland Publishing.
3. Recombinant DNA and Biotechnology: A Guide for teachers- Helen and Massey. ASM Press.
4. Genes VIII – Lewin. B, Oxford University Press .
5. Molecular Biology- Freifelder. D. Narosa Pub. House
6. Molecular Biology of the Gene- Watson. J.D., Baker, T.A, Bell, S.P.,Gann.A, Levine, M. and Losick.R, Pearson Education.
7. Molecular Biotechnology- Glick, B. R. and Pasternak, J. J. ASM Press
8. Principles of Gene Manipulation: An Introduction to GE- Old, R. V. and Primrose, S. B. Blackwell Sci. Pub.
9. A Textbook of Biotechnology-Dubey, R. C. S. Chand & Co.
10. Gene Biotechnology- Jogdand. Himalaya Pub. House.
11. Introduction to Biotechnology: An Agricultural Revolution-Herren. Thomson Press.
12. Molecular Cell Biology- Lodish, H., Berk, A., Matsudaira, P., Kaiser, C. A., Krieger, M. Scott M. P., Zipursky, S. L. and Darnell, J. Freeman & Co.

Bioinformatics

1. Instant Notes-Bioinformatics- Westhead *et al.*, Viva Books (P), Ltd
2. Introduction to Bioinformatics- Attwood T K and Parry-Smith, D. J. Pearson Education.
3. Introduction to Bioinformatics- Lesk, A.M. Oxford University Press

Practical Biochemistry:

1. Experimental Biochemistry: *A Student companion*- Sashidhar Rao, B and Deshpande, V. IK International (P) Ltd. Pub.
2. Modern Experimental Biochemistry- Boyer. R. Pearson Education
3. Biochemical Methods –Sadasivam, S and Manickyam, A.- New Age International publishers
4. An Introduction to Practical Biochemistry- Plummer, D. T. Tata McGraw-Hill.
5. Introductory Practical Biochemistry (ed) Sawhney, S. K. Randhir Singh- Narosa Publications House
6. Lab Manual in Biochemistry, Immunology and Biotechnology- Arti Nigam and Archana Ayyagari- Tata McGraw-Hill New Delhi

7. Enzyme Assays – A Practical Approach – Eisenthal, R and Dawson, M.J., IRL Press
8. Practical Biochemistry – Rameshwar. A, Kalyani Publisher.
9. Experiments and Techniques in Biochemistry – Sheel Sharma, Galgotia Publications.
10. Practical Clinical Biochemistry-Varley,H. CBS Publishers.
11. Practical Clinical Biochemistry –Methods and Interpretations –Ranjna Chawla-Jaypee
12. Manipal Manual of Clinical Biochemistry-Shivande Naik, B - Jaypee Brother Medical publications, New Delhi
13. Hawk's Physiological Chemistry- (ed) Oser, O. Tata-McGraw-Hill
14. Laboratory Manual in Biochemistry. Jayaraman, J. Wiley-Eastern
15. Biotechnology: A laboratory Project in Molecular Biology- Thiel, Bissen and Lyons. Tata McGraw-Hill.
16. Methods in Biotechnology- Hans-Peter Schmauder. Taylor & Francis.

Practical Microbiology:

1. Microbiology – A Laboratory Manual- Cappuccino, J. G. and Sherman, N. Pearson Education.
2. Laboratory Experiments in Microbiology- Gopal Reddy, M., Reddy, M.N., Sai Gopal D. V.R.and. Mallaiah, K.V.
3. Experiments in Microbiology, Plant Pathology, Tissue Culture and Mushroom cultivation-Aneja, K. R - New Age International publishers.
4. Microbiology – A Laboratory Manual- Reddy, S. M. and Ram Reddy, S. Sri Padmavathi Pub.
5. Practical Microbiology- Dubey, R. C. and Maheshwari, D. K. S. Chand & Co.

Mathematical Problems in General Biochemistry:

1. Biochemical Calculations- Segel, I.H. John Wiley & Sons.

Lab Reference Book:

1. Lab Ref A Hand book of Recipes, Reagents and Other Reference Tools for Use at the Bench- (ed) Roskams, J. and Rodgers, L.- I.K International Pvt. Ltd, New Delhi.

MODEL QUESTION PAPER FOR THEORY

B.Sc DEGREE EXAMINATION,

Third Year

BIOCHEMISTRY PAPER III - 2012-2013

PAPER-III Physiology, Clinical Biochemistry and Immunology

Time: 3 Hrs

Maximum Marks: 100

PART- A (4x15 =60)

Answer all questions

1) (a) Describe the process of digestion and absorption of proteins

ప్రోటీన్ల జీర్ణక్రియ, పోషణ గురించి వివరించండి.

Or

(b) Explain the chemistry, physiological role and disorders of pancreatic hormones

క్లోమ హార్మోన్ల రసాయన నిర్మాణము, ధార్మిక ప్రక్రియ, అసాధారణ ప్రక్రియల గురించి

వివరించండి.

2) (a) Write about calorific value of foods and their determination by Bomb calorimeter

బాంబ్ కెలోరిమీటర్ను ఉపయోగించి ఆహార పదార్థాల కెలోరిఫిక్ విలువలను నిర్ధారించడాన్ని వివరించండి.

Or

(b) Write in detail about sources, structure, biochemical roles, deficiency disorders of Riboflavin and Niacin

రిబోఫ్లేవిన్, నియాసిన్లు లభించే ఆహార పదార్థాలు, వాటి నిర్మాణము, జీవరసాయన

పాత్ర, లోపం వల్ల కలిగే అసాధారణ పరిస్థితులను వివరించండి.

3) (a) Write in detail about Liver function tests

కాలేయ విధుల పరీక్షలను విపులంగా వ్రాయండి.

Or

(b) Explain the role of kidneys in maintaining acid – base balance

ఆమ్ల-క్షార సమతుల్యతను కాపాడే ప్రక్రియలో మూత్రపిండాల పాత్రను వివరించండి.

4) (a) Write about Innate and acquired immunity

సహజ సిద్ధ, కృత్రిమ వ్యాధినిరోధకతలను గురించి వివరించండి.

Or

(b) Write in detail about antigen-antibody reactions

ప్రతి జనక ప్రతిరక్షక చర్య విధానాలను వివరించండి.

PART-B (6x4 =24)
Answer any SIX questions

5) Mechanism of muscle contraction కండర సంకోచ యంత్రాంగం

6) Thyroid hormones థైరాయిడ్ హార్మోన్లు

7) Biological value of proteins ప్రోటీన్ల

8) Kwashiorkar కోష్కియార్కర్

9) Jaundice కామెర్లు

10) Diabetes Mellitus డయబెటిస్ మెలిటస్

11) Recombinant vaccines పున: సంయోజన వాక్సిన్లు

12) Cell mediated immunity కణమధ్యవర్తిత్వ వ్యాధి నిరోధకత

PART- C (8x2 =16)
Answer all questions

- 13) Cardiac cycle హృదయ అయ వలయము
- 14) Placental hormones జరాయు హార్మోన్లు
- 15) RDA **R.D.A**
- 16) Role of Zn, Fe in diet ఆహారంలో Zn, Fe అ పాత్ర
- 17) HDL/LDL cholesterol **HDL/LDL కోలెస్టరాల్**
- 18) Fatty liver ఫాటీ లివర్
- 19) Adjuvants ఎడ్జువెంట్స్
- 20) Peptide vaccines పెప్టైడ్ వాక్సిన్

BIOCHEMISTRY PAPER IV - 2012-2013
PAPER-IV Microbiology and Molecular Biology

Time: 3 Hrs

Maximum Marks: 100

PART- A (4x15 =60)

Answer all questions

- 1) (a) Write about isolation and cultivation of bacteria
బాక్టీరియాలను వేరుపరచడం, సంవర్ధనం చేయడం గురించి వ్రాయండి.
Or
(b) Explain the structure and composition of viruses
వైరస్ల నిర్మాణము, కాంపోజిషన్ల గురించి వ్రాయండి.
- 2) (a) Explain the various enzymes involved in replication process
రెప్లికేషన్ విధానంలో పాల్గొనే ఎంజైమ్ల గురించి వ్రాయండి
Or
(b) Explain about transcriptional events in eukaryotic m-RNA synthesis
నిజకేంద్రక జీవుల m-RNA సంశ్లేషణ అనులేఖన విధానాలను వివరించండి.
- 3) (a) Describe the steps involved in activation of aminoacids and ribosome structure
రైబోసోమ్ నిర్మాణము, అమైనో ఆమ్లాల ఉత్తేజితాల దశలను వివరించండి.
Or
(b) Define Wobble hypothesis. Explain the characteristics of genetic code
వెబల్ పరికల్పనను నిర్వహించండి, జన్యుసంకేతం లక్షణాలను వ్రాయండి.
- 4) (a) Explain the process of DNA sequencing

DNA సీక్వెన్సింగ్ విధానాన్ని వివరించండి.

Or

(b) What is **r-DNA**. Explain about the different enzymes involved in r DNA synthesis

అంటే ఏమిటి? సంశ్లేషణలో పాల్గొనే వివిధ ఎంజైమ్ల గురించి వ్రాయండి.

PART-B (6x4 =24)
Answer any SIX questions

- 5) Cultivation of bacterial plaques బాక్టీరియల్ ప్లేక్ సంవర్ధనము
- 6) Industrial use of Spirulina ప్సైరులిన్ పారాశ్రామిక ఉపయోగం
- 7) Models of DNA replication DNA రెప్లికేషన్ నమూనా
- 8) Lac operon లాక్ ఆపరాన్
- 9) Genomic library జీనోమిక్ గ్రంథాలయము
- 10) HRT and HART HART మరియు HART
- 11) Gene bank జీన్ బ్యాంక్
- 12) bacterial growth curve బాక్టీరియా పెరుగుదల రేఖ

PART- C (8x2 =16)

Answer all questions

- 13) rho dependent termination rho ఆధార టర్మినేషన్
- 14) Mycoplasma మైకోప్లాస్మా
- 15) RNA polymerases of eukaryotes నిజకేంద్రక జీవులలో RNA పాలిమరేజులు
- 16) Plaque forming units ప్లేక్ రూపొందించే యూనిట్
- 17) Inhibitors of RNA synthesis RNA సంశ్లేషణ నిరోధకాలు
- 18) Catabolite repression కాటోబోలైట్ రిప్రెషన్
- 19) RNase H RNase H
- 20) NCBI NCBI

MODEL QUESTION PAPER FOR PRACTICAL
B.Sc DEGREE EXAMINATION,
Third Year
BIOCHEMISTRY PAPER III - 2012-2013
PAPER-III Nutritional and Clinical Biochemistry

Time: **3 Hrs**

Maximum Marks: **50**

- | | |
|--|----------|
| 1) Estimation of minerals | 10 marks |
| 2) Hematology experiment | 10 marks |
| 3) Urine test (any one test from the syllabus) | 10 marks |
| 4) Submission of Project work | 15 marks |
| 5) Record | 05 marks |
| 6) Viva voce | 05 marks |

MODEL QUESTION PAPER FOR PRACTICAL
B.Sc DEGREE EXAMINATION,
Third Year
BIOCHEMISTRY PAPER IV - 2012-2013
PAPER-IV Microbiology and Molecular Biology

Time: **3 Hrs**

Maximum Marks: **50**

- | | |
|---|----------|
| 1) Culture Media Preparation / Staining technique | 10 marks |
| 2) Estimation of DNA / RNA | 10 marks |
| 3) Isolation of DNA | 10 marks |
| 4) Record | 05 marks |
| 5) Viva voce | 05 marks |