



বিদ্যাসাগর বিশ্ববিদ্যালয়

**VIDYASAGAR UNIVERSITY**

**M.Sc. Examinations 2020**

**Semester IV**

**Subject: HUMAN PHYSIOLOGY**

**Paper: PHY – 495 (Special Paper)**

(Practical)

**Full Marks: 50**

**Time: 3hrs.**

*Candidates are required to give their answers in their own words as far as practicable.*

**Unit: PHY 495.1A**

**(Special Paper A: Microbiology and Immunology)**

**(Practical)**

1. Write down the **principle, procedure including estimating calculation (if any) and underlying mechanisms justifying differential observations** obtained in *any one* of the following experiments.
  - A. Determination of antibiogram of supplied bacteria.
  - B. Determination of minimum inhibitory concentration (MIC) of a supplied antibiotic.
  - C. Determination of concentration of viable bacterial cells in a supplied bacterial culture.
  - D. Isolation and identification of enteric bacteria from supplied water samples.
  - E. Determination of concentration of supplied antibiotic by preparing standard curve.
  - F. Isolation of antibiotic-resistant mutant bacteria by replica-plating technique.
  - G. Study of lysogenic phages and their induction by Mitomycin C.
  - H. Isolation of bacteriophage by plaque assay through dilution plating in soft agar.
  - I. Microbial assay of vitamins.
  - J. Bacterial conjugation with known genotypes and isolation of transconjugants.
  - K. Determination of host range of *Virbio cholerae* phages.
  - L. Isolation of chromosomal DNA of bacteria and visualization by agarose gel electrophoresis.



**Unit: PHY 495.2A**

**(Special Paper A: Microbiology and Immunology)**

**(Practical)**

1. Write down the **principle, procedure including estimating calculation (if any) and underlying mechanisms justifying differential observations** obtained in *any one* of the following experiments.
  - A. Determination of blood group of a supplied blood sample.
  - B. Identification of an antigen by Ouchterlony Double Diffusion technique.
  - C. Type I hypersensitivity reaction from anaphylactic shock patients.
  - D. Determination of concentration of an antigen through SRID.
  - E. Determination and demonstration of phagocytic potential of a neutrophil.
  - F. Determination of C - reactive protein level.
  - G. Histological changes of lymphoid organs in the BSA-primed animals.
  - H. Hemagglutination assay and determination of titre.
  - I. Analysis of DNA fragmentation.
  - J. Appropriate staining of blood films (Thick and thin) for detection of malarial parasites.
  - K. Measurement of IgE level post allergy and infection.
  - L. Kit-based identification of malarial infection in patients.

**Unit: PHY 495.1C**

**(Special Paper C: Biochemistry, Molecular Endocrinology and Reproductive Physiology)**

**(Practical)**

1. Write down the **principle, procedure including estimating calculation (if any) and underlying mechanisms justifying differential observations** obtained in *any one* of the following experiments.
  - A. Separation of amino acids by paper chromatography
  - B. Separation of amino acids by thin layer chromatography.
  - C. Separation of proteins by Polyacrylamide Gel Electrophoresis (PAGE).
  - D. Analysis of DNA fragmentation by agarose gel electrophoresis.
  - E. Assay of mitotic indices of *Allium cepa* root cells.
  - F. Estimation of ascorbic acid in biological samples
  - G. Determination of biomolecule concentration by Spectrofluorometric method.
  - H. Identification of an antigen by Ouchterlony Double Diffusion technique
  - I. Separation of Splenic Lymphocytes.
  - J. Separation of Peritoneal Macrophages.
  - K. Separation of mixtures of proteins by Sephadex Gel Filtration (column).



**Unit: PHY 495.2C**

**(Special Paper C: Biochemistry, Molecular Endocrinology and Reproductive Physiology)**

**(Practical)**

1. Write down the **principle, procedure including estimating calculation (if any) and underlying mechanisms justifying differential observations** obtained in *any one* of the following experiments.
  - A. Bio-assay of oxytocin and epinephrine
  - B. Hormone assay by ELISA method.
  - C. Measurement of estradiol by spectrofluorometer
  - D.** Study of localization 3 beta HSD steroidogenic enzymes in testis by histochemical methods
  - E. Study of DNA fragmentation in testicular tissue after oxidative stress.
  - F. Karyotypic study after pesticide toxicity in liver of male rat
  - G. Pedigree analysis for X-linked traits
  - H. Study on estrous cycle after injection of synthetic estrogen.
  - I. Study of ovarian and adrenal cholesterol after unilateral ovariectomy
  - J. Study of acid phosphatase activity in uterus of ovariectomized animal.
  - K. Pregnancy detection by immunological kit methods.

**Unit: PHY 495.1E**

**(Special Paper E: Biophysics and Electrophysiology with Structural Biology)**

**(Practical)**

*Answer any **One** of the following questions*

1. a) Write down the principle of nerve conduction velocity measurement. b) Describe the process of measurement of conduction velocity of nerve fibre. c) Cite the clinical importance of nerve velocity measurement. d) What is genesis of fatigue? e) How atropine sulphate effects on isometric twitch-tetanus measurement of a toad.
2. a) Describe the recording methods of simple muscle twitch (SMT) from a frog. b) State the effect of increasing frequency of stimulus on SMT c) Write down the process of strength-duration measurement of an excitable tissue?
3. a) Describe a modern technique in voltage clamp measurement. b) Draw a suitable diagram of voltage clamp arrangement during voltage analysis. c) Write down the advantages of single fibre technique measurement. d) State the basic differences in between voltage clamp and patch clamp technique.
4. a) Write down the electrophysiological methods of EEG measurement of a human subject b) State the basic principle of it. c) Discuss in details the modern technique of electromagnetic blood flow measurement. d) Write down the clinical importance of blood flow measurement.



5. a) Write down the procedure of DNA sample preparation under the observation in scanning electron microscopy (SEM). b) Describe the instrumental design and components of CRO machine. c) Write the biological research application of CRO machine.

6. a) Demonstrate the kymographical process of nicotine (dose response) effects on perfused heart of toad . b) Write down the composition of heart perfusion solution (Stock and Working). c) Write the modern methods of EMG measurement.

**Unit: PHY 495.1E**

**(Special Paper E: Biophysics and Electrophysiology with Structural Biology)**

**PHY-495.2E**

**Advanced Medical Biophysics**

**(Practical)**

*Answer any one of the questions.*

1. Write the principle of one dimensional ascending paper chromatography of amino acids with suitable diagram. Write the procedure and determine the R<sub>f</sub>. Provide the composition of a suitable solvent system for the separation

OR

2. Give a brief report on the Institute visit to Bose Institute and mention the applications of the instruments you have seen there. Write briefly about the principle of five instruments with their specifications.

OR

3. Write the principle of isolation and characterization of photosynthetic pigments by chromatography and spectrophotometry. Describe the procedure and mention the absorbance maxima of each photosynthetic pigment. Interpret your result.

OR

4. Write the principle of isolating cellular fractions by centrifugation methods. How can you determine the molecular weight of biomolecules using ultracentrifuge?

OR

5. Write the principle and procedure of isolation of Chlorophyll A from spinach leaf extract by column chromatography.

OR

6. Write the principle of Thin layer chromatography(TLC). Write the procedure of separation of amino acids by TLC. What is preparative TLC? What are the adsorbants used for TLC.