

**The West Bengal University of Health Sciences**  
**MBBS 1<sup>st</sup> Professional Examination (New Regulation),**  
**August 2024**

Full Marks : 100  
Time: 3 hours

Subject: Anatomy  
Paper : I

*Attempt all questions. The figures in the margin indicate full marks.*

1. a) A 62 year old man complaining of shortness of breath, syncopal attacks and fatigue was diagnosed to have severe mitral stenosis. Under these circumstances explain the following-
  - i) What are the components of the mitral valve complex? 3+4+4+4
  - ii) What are the different types of chordae tendineae? Draw a labelled diagram.
  - iii) What are the sources of development of the interventricular septum?
  
- b) An elderly man suffering from carcinoma of prostate diagnosed to have metastasis in the vertebra.
  - i) Justify the metastasis using your knowledge of anatomy.
  - ii) Discuss briefly the capsules, lobes and relations of the prostate gland.
  - iii) Discuss microanatomy of the prostate gland using suitable labelled diagram. 3+2+3+4+3
  
2. a) Classify multicellular glands according to the secretory mechanism with examples. Explain with diagram the difference between serous and mucous acinus. 5+5
  
- b) Describe the lumbrical muscles of the palm under the following heading:
  - i) Type of muscle.
  - ii) Attachments.
  - iii) Nerve supply.
  - iv) Action. 2+4+2+2
  
- c) Classify cartilage. Draw labelled diagrams of the different types of cartilages and give the characteristics of each of them. Give examples of each of them. 2+3+3+2
  
3. Write short notes on the following:
  - a) Folding of embryo.
  - b) Communication is a fundamental prerequisite in medical profession. 2x5
  
4. Explain the following statements:
  - a) Ovary experiences an incomplete journey during its descent.
  - b) Stab wounds at the root of the neck will lead to tension pneumothorax and surgical emphysema.
  - c) A palpable nodule in the axilla of an elderly lady should be properly cared.
  - d) Cervical rib may be associated with thoracic outlet syndrome.
  - e) Volkmann's ischemic contracture following supracondylar fracture of humerus. 5x4
  
5. Choose the correct option for each of the following:
  - i) The neurovascular plane of the anterior abdominal wall lies between which muscles/fasciae/membranes? 10x1
    - a) External oblique and internal oblique muscles.
    - b) Internal oblique and transversus abdominis muscles.
    - c) Transversus abdominis muscle and fascia transversalis.
    - d) Fascia transversalis and parietal peritoneum.

- ii) All the following features are seen in the neurons of the dorsal root ganglia except:
- a) They are multipolar.
  - b) They contain lipofuscin granules.
  - c) They have centrally located nuclei.
  - d) They are derived from neural crest cells.
- iii) Which of the following is not a branch of the posterior cord of brachial plexus?
- a) Dorsal scapular nerve.
  - b) Upper subscapular nerve.
  - c) Lower subscapular nerve.
  - d) Axillary nerve.
- iv) A patient with external haemorrhoids develops pain while passing stool. The nerve mediating this pain is:
- a) Sympathetic plexus.
  - b) Hypogastric nerve.
  - c) Splanchnic visceral nerve.
  - d) Pudendal nerve.
- v) Fracture around the anatomical snuff box due to fall on outstretched hand involves distraction of
- a) Scaphoid - lunate.
  - b) Trapezoid - trapezium.
  - c) Scaphoid - trapezium.
  - d) Hamate - lunate.
- vi) False statement regarding cardinal veins is:
- a) The left posterior cardinal vein regresses entirely.
  - b) The right posterior cardinal vein regresses except for its cephalic part.
  - c) The cephalic part of the left posterior vein obliterates to form a fibrous thread within the fold of Marshall.
  - d) The caudal part of the right anterior cardinal vein forms the superior vena cava.
- vii) In case of perinephric abscess the fluid collects in:
- a) Between renal fascia and fascia transversalis.
  - b) Between renal capsule and renal fascia.
  - c) Between fascia transversalis and peritoneum.
  - d) Between renal cortex and renal capsule.
- viii) Regarding bronchial veins incorrect observation is:
- a) Superficial veins receive blood from pulmonary pleura.
  - b) Right superficial vein drains into arch of azygos vein.
  - c) Both superficial and deep veins drain into right atrium.
  - d) Deep bronchial veins drain into pulmonary vein.
- ix) Which two embryological structures together form the bilaminar disc?
- a) Cytotrophoblast and Hypoblast.
  - b) Hypoblast and Epiblast.
  - c) Epiblast and Cytotrophoblast.
  - d) Syncytiotrophoblast and Inner cell mass.
- x) Regarding rectus sheath and its contents the true statement is:
- a) The posterior wall of the rectus sheath is adherent to the rectus abdominis muscle.
  - b) During surgery the rectus abdominis is retracted laterally to expose the posterior wall of the sheath.
  - c) The lower part of the anterior lamella of the rectus sheath is thinner than the other parts.
  - d) The inferior epigastric artery enters the rectus sheath behind the arcuate line.



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Time: 3 hours

Subject: Anatomy  
Paper : II

*Attempt all questions. The figures in the margin indicate full marks.*

1. a) A 47 year old neglected hypertensive man reported to hospital emergency with complaint of spontaneous epistaxis (bleeding from nose) On speculum examination, bleeding point is located in the anterior aspect of the nasal septum.
  - i) Mention the commonest site of such bleeding with its anatomical perspective.
  - ii) Discuss nasal septum under the head – formation, nerve supply and lining epithelium.
  - iii) Mention boundary and the importance of the dangerous area of face. 1+3+3+2+2+1+3
  
- b) A new born child presented with a moderate sizes cystic swelling over the head and diagnosed as Hydrocephalus.
  - i) What is hydrocephalus and what are its types?
  - ii) Write a flow chart of CSF circulation.
  - iii) Describe the floor of fourth ventricle with a labelled diagram. 1+2+4+8
  
2. a) An obese patient presented with flat foot due to flattening of the arches of the foot.
  - i) Name the arches of the foot.
  - ii) What are the factors maintaining the arches of the foot?
  - iii) Give the most vulnerable parts of the different arches. 1+4+1+4
  - iv) Give the functions of the arches.
  
- b) Describe briefly different speech centres in the human brain along with labelled diagram. Enumerate different types of aphasia with their anatomical explanation. Occlusion of which artery may lead to different types of aphasia? 5+4+1
  
- c) Following operation of the thyroid gland, a patient developed hoarseness of voice.
  - i) State the possible cause of the hoarseness.
  - ii) Give a brief note on muscles acting on vocal cord.
  - iii) Discuss the important relations and arterial supply of the thyroid gland.
  - iv) Mention based on your anatomical knowledge what precautions are to be taken by a surgeon during the operation of the thyroid gland? 1+3+2+2+2  
2x5
  
3. Write short notes on the following:
  - a) Layers of cornea.
  - b) Chromosomal aberrations.
  
4. Explain the following statements:
  - a) Hemisection of spinal cord may cause flaccid paralysis of limb on the same side of the lesion.
  - b) Macular sparing occurs after occlusion of posterior cerebral artery.
  - c) Fracture of skull at the region of pterion may cause extradural haemorrhage.
  - d) Great saphenous vein is chosen for coronary artery bypass grafting.
  - e) A rapidly growing mole on the dorsum of foot may be associated with inguinal lymphadenopathy. 5x4

5. Choose the correct option for each of the following:

10x1

i) In peripheral vascular disease involving occlusion of femoral artery in adductor canal, which of the artery will provide collateral circulation to the thigh?

- a) Descending branch of lateral circumflex femoral artery.    b) Descending genicular artery.  
c) Obturator artery.    d) First perforating branch of arteria profunda femoris.

ii) All of the following statement regarding the pterygopalatine fossa are correct except-

- a) Lesser (superficial) petrosal nerve passes through it.  
b) It communicates with nasal cavity through sphenopalatine foramen.  
c) It contains the deep petrosal nerve.  
d) Third part of maxillary artery reaches there through the pterygomaxillary fissure.

iii) Middle meatus of the nose bears all the following openings except -

- a) Anterior ethmoidal air sinus    b) Middle ethmoidal air sinus.  
c) Maxillary air sinus.    d) Sphenoidal air sinus.

iv) The lining epithelium of vocal fold is

- a) Simple squamous.    b) Pseudo-stratified ciliated columnar.  
c) Stratified squamous non-keratinised.    d) Simple cuboidal.

v) All are true regarding the pituitary gland except-

- a) Median eminence of tuber cinerium belongs to neurohypophysis.  
b) Inferiorly related to the sphenoidal air sinuses.  
c) Entirely developed from Rathke's pouch.  
d) Supplied by the branches of internal carotid artery.

vi) Following multiple fractures of facial bones, loss of taste sensation to tip of tongue is found, which is due to involvement of :

- a) Submandibular ganglion.    b) Pterygopalatine ganglion.  
c) Geniculate ganglion.    d) Trigeminal ganglion.

vii) All of the following are true about the cerebral aqueduct of sylvius except

- a) Lies medial to the mesencephalic nucleus of the trigeminal nerve.  
b) Surrounded by grey matter.  
c) Lies dorsal to the nucleus of the trochlear nerve.  
d) Connects the fourth ventricle and the subarachnoid space.

viii) All of the following are attached to anterior clinoid process except:

- a) Carotido-clinoid ligament.    b) Interclinoid ligament.  
c) Free margin of tentorium cerebelli.    d) Attached margin of tentorium cerebelli.

ix) All are features of X-linked recessive inheritance except:

- a) Homozygous female-carrier.    b) Heterozygous female-carrier  
c) Sons of affected mother are always affected.    d) Sons of affected father are normal.

x) False statement about medial medullary syndrome is:

- a) It is due to occlusion of the anterior spinal artery.  
b) There is contralateral loss of position and vibration sense due to damage to medial lemniscus.  
c) There is contralateral hemiplegia due to damage to medullary pyramid.  
d) Tongue on protrusion is deviated opposite to paralysed side due to damage to hypoglossal nerve.



**The West Bengal University of Health Sciences**  
**MBBS 1<sup>st</sup> Professional Examination ((New Regulations),**  
**August 2024**

Full Marks: 100  
Time: 3 hours

Subject: Physiology  
Paper: I

*Attempt all questions. The figures in the margin indicate full marks.*

1. a) A 73 year old male patient presented with dyspnoea on climbing the staircase and difficulty in talking for last 3 months. He had difficulty in breathing while lying down. On examination, jugular venous pulse (JVP) was raised, liver was palpable and had pedal edema. 1+4+5+4+1
  - i) What is the condition from which the elderly person is suffering?
  - ii) Define cardiac output and cardiac index mentioning their normal values.
  - iii) Elucidate the factors that control cardiac output.
  - iv) Briefly explain heterometric regulation of cardiac output.
  - v) Mention a non-invasive method of determining cardiac output.
  
- b) A 35 year old male is brought to the emergency department with complaints of headache, weakness, shortness of breath, nausea and vomiting. He was working in a factory where Carbon monoxide (CO) leakage was suspected.
  - i) Which type of hypoxia must have occurred in this case?
  - ii) What are the features in this type of hypoxia?
  - iii) Define and classify hypoxia.
  - iv) Draw the normal Oxygen hemoglobin dissociation curve and show the change that occurs in case of CO poisoning and explain why this shift happens. 1+3+5+6
  
2. a) A 12 year old boy sustained an injury to his leg while playing football and started bleeding from the site of injury. Explain the steps involved in the spontaneous arrest of this bleeding. Describe the definitive arrest of the bleeding. 5+5
  
- b) What is a sarcomere? Describe the banding pattern in a sarcomere with a diagram. Briefly describe the mechanism of contraction of a skeletal muscle with a flowchart. 1+3+1+5
  
- c) Write down the steps of gastric emptying. Describe the factors that regulate gastric emptying. Delay in gastric emptying helps in digestion absorption process- Justify. 4+4+2
  
3. Write short notes on the following: 2x5
  - a) Starling forces.
  - b) The attributes of Indian Medical Graduate as defined by National Medical Commission.
  
4. Explain the following statements: 5x4
  - a) Level of albumin is the most important factor that contributes to colloidal osmotic tension.
  - b) About 20% of bile pigments are reabsorbed by body even though it is a metabolic waste product.
  - c) Fetus does not evoke any immunological response in mother.
  - d) Shaking of injured finger decreases pain perception.
  - e) Coronary blood flow decreases in massive pericardial effusion.

P.T.O

5. Choose the correct option for each of the following:

i) One of the following statements is true about hemolytic disease of the newborn:

- a) Affects mainly babies of Rh-positive mothers.
- b) Occurs mainly in babies who have D antigen on their RBC.
- c) Can be treated by transfusing the affected baby with Rh-positive blood.
- d) Can be prevented by injecting the mother with Anti-D agglutinins just after delivery.

ii) Rejection of liver transplant is prevented by all of the following methods except:

- a) Treatment which reduces the blood lymphocyte count.
- b) Keeping the recipient in a germ-free environment.
- c) Drug treatment which inhibits cell division.
- d) Transplanting between identical twins.

iii) Platelet count reduces in Dengue fever due to all of the following except:

- a) Decreased platelet aggregation.
- b) Bone marrow suppression.
- c) Immune mediated destruction.
- d) Decreased platelet activation.

iv) The effect which protects the heart against volume and pressure overload in the veins, atria and pulmonary circulation is the:

- a) Bainbridge reflex.
- b) Baroreceptor reflex.
- c) Marey's law.
- d) Bezold - Jarish reflex.

v) One of the following increases airway resistance:

- a) Sympathetic stimulation.
- b) Elastic recoil of chest wall.
- c) Negative intra thoracic pressure.
- d) Forced expiration.

vi) The primary force moving water molecules from the blood plasma to the interstitial fluid is:

- a) Active transport.
- b) Facilitated diffusion.
- c) Filtration.
- d) Co-transport with sodium.

vii) Compensatory mechanism for hypovolemic shock include all except

- a) Increased Epinephrine secretion from adrenal medulla.
- b) Increased Atrial Natriuretic Peptide secretion.
- c) Renin Angiotensin Aldosterone System activation.
- d) Sympathetic nerve stimulation.

viii) Fall in DBP in severe exercise occurs due to all of the following except:

- a) Sympathetic vasodilator fibres.
- b) Parasympathetic vasodilator fibres.
- c) Stimulation of  $\beta_2$  receptors in blood vessels of skeletal muscles.
- d) Accumulation of metabolites.

ix) Which of the following is not found in denervation of skeletal muscle?

- a) Atrophy of the muscle.
- b) Flaccid paralysis.
- c) Fibrillation.
- d) Fasciculation.

x) A 24 year old female patient complains of fluctuating weakness and double vision for last 3 weeks. She has noticed difficulty in lifting objects and getting out of bed. She denies muscle pain. The symptoms become worse in afternoon. The most probable diagnosis is:

- a) Botulinum toxin poisoning.
- b) Myasthenia Gravis.
- c) Lambert Eaton syndrome.
- d) Paralytic Shellfish poisoning.



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Subject: Physiology  
 Paper : II

Full Marks : 100  
 Time : 3 hours

*Attempt all questions. The figures in the margin indicate full marks.*

1. a) A 60 year old hypertensive male has presented with weakness and inability to move his right upper and lower extremities since last 2 hours. After admission in nearby hospital, clinical examination revealed increased muscle tone, exaggerated tendon jerks and extensor plantar response on his right side.
  - i) What can be the probable diagnosis?
  - ii) Explain the reason behind the increased muscle tone and exaggerated tendon jerks in this patient.
  - iii) Why the planter response is altered here?
  - iv) Describe the corticospinal tract with a suitable diagram. 1+4+3+5+2
  
- b) A middle aged woman complains of gradual weight loss, fatigue and frequent micturition since last six months. Her fasting and post-prandial blood glucose levels were 180mg/dl and 300mg/dl respectively.
  - i) What is the probable diagnosis?
  - ii) Explain the symptoms of this patient.
  - iii) Justify the beneficial role of regular exercise in this patient.
  - iv) Enumerate the hormones synthesized from the endocrine pancreas. 1+7+4+3
  
2. a) Define menstrual cycle. Describe ovarian cycle with the help of diagram. Discuss about indicators of ovulation. Explain the basis of pregnancy test. 2+4+2+2
  
- b) What are the advantages of acidic urine? Explain the role of kidney in maintaining the acid-base balance in the body? Write down the differences between cortical and juxta-medullary nephron. 2+5+3
  
- c) Describe the travelling wave concept for frequency discrimination. Enumerate the functions of middle ear. 5+5
  
3. Write short notes on the following: 2x5
  - a) Dark adaptation.
  - b) Explain the mechanism of regulating body temperature by hypothalamus.
  
4. Explain the following statements: 5x4
  - a) Parturition is achieved by a positive cycle.
  - b) Dissociated anaesthesia occurs in syringomyelia.
  - c) Pain can be inhibited by shaking of the joints.
  - d) A high protein diet increases the ability of the kidneys to concentrate the urine.
  - e) People with severe conductive deafness can follow very loud conversations.

P.T.O

5. Choose the correct option for each of the following:
- i) Male Pseudohermaphroditism is caused by all except:
    - a) 5  $\alpha$ -reductase deficiency.
    - b) Cholesterol desmolase deficiency.
    - c) 17  $\alpha$  Hydroxylase deficiency.
    - d) 21  $\beta$  Hydroxylase deficiency.
  
  - ii) Cerebellar connection to other parts of the brain is projected through which cell?
    - a) Golgi.
    - b) Basket.
    - c) Purkinje.
    - d) Stellate.
  
  - iii) All are true regarding visual receptors except:
    - a) Cones are meant for acuity of vision.
    - b) Rods are meant for dim light vision.
    - c) Rods are more sensitive than cones.
    - d) Action potentials are generated in them.
  
  - iv) Which of the following statements is correct?
    - a) The motor protein for inner hair cell is prestin.
    - b) The loudness of a sound is directly correlated with the amplitude of a sound wave and pitch is inversely related to the frequency of sound wave.
    - c) Conduction of sound wave through the fluid of the inner ear is called bone conduction.
    - d) High-pitched sounds generate waves that reach maximum height near the base of the cochlea.
  
  - v) In girls sequence of events during adolescence is:
    - a) Menarche, Adrenarche, Puberche, Thelarche.
    - b) Thelarche, Menarche, Puberche, Adrenarche.
    - c) Adrenarche, Puberche, Menarche, Thelarche.
    - d) Thelarche, Puberche, Adrenarche, Menarche.
  
  - vi) Pure word deafness is likely due to bilateral defect in:
    - a) Angular gyrus.
    - b) Frontal cortex.
    - c) Superior frontal gyrus.
    - d) Visual cortex.
  
  - vii) About paradoxical sleep, which of the following statement is true?
    - a) Prominent beta waves.
    - b) Prominent alpha waves.
    - c) Also known as NREM sleep.
    - d) Low amplitude and mixed frequency waves.
  
  - viii) A 10 year old boy cuts his finger with a pocketknife and immediately applies pressure to the damaged area with his other hand to partially alleviate the pain. Inhibition of pain signals by tactile stimulation of the skin is mediated by which type of afferent neurons from mechanoreceptors?
    - a)  $\alpha$ -type A.
    - b)  $\beta$ -type A.
    - c)  $\delta$ -type A.
    - d) Type C.
  
  - ix) What will be the renal clearance of such a substance which is freely filtered at the glomerulus and fully reabsorbed by the tubules?
    - a) Zero
    - b) Equal to GFR
    - c) Less than GFR
    - d) Greater than GFR
  
  - x) Exercise is also prescribed as an adjuvant treatment of depression, most probably it acts by:
    - a) Increasing pulse pressure.
    - b) Improving hemodynamics.
    - c) Raising endorphins levels.
    - d) Inducing good sleep.



**The West Bengal University of Health Sciences**  
**MBBS 1<sup>st</sup> Professional Examination (New Regulation),**  
**August 2024**

Subject: Biochemistry

Full Marks: 100

Paper: I

Time: 3 hours

*Attempt all questions. The figures in the margin indicate full marks.*

1. a) A middle aged woman rushed to emergency with pain abdomen and nausea. On asking patient confirmed dark urine and grey stool. After managing the emergency situation blood samples were tested for liver function. Results of the same as follows total bilirubin – 6.2mg/dl, Direct Bilirubin – 5.8mg/dl, Total protein 7.2 gm/dl, Albumin – 3.8 gm/dl, AST – 26 U/L, ALT – 32 U/L, Alkaline phosphatase – 387 U/L, GGT – 35 U/L.
  - i) As an attending medical officer what would be your provisional diagnosis? 3+4+4+4
  - ii) What all other tests would you suggest to justify your diagnosis?
  - iii) How would you exclude acute pancreatitis or alcoholic?
  - iv) What are the different causes of Conjugated hyperbilirubinemia?
  
- b) A patient with chronic renal failure is admitted in comatosed state in hospital. On clinical examination features of encephalopathy are seen. Blood investigation shows creatinine level of 6.5 mg/dl and urea level of 425 mg/dl..
  - i) Describe the metabolic derangement responsible for this condition.
  - ii) Explain the biochemical basis of ammonia toxicity in the brain.
  - iii) Describe how the alpha amino group in most of the amino acids are converted into ammonia. 4+7+4
  
2. a) Name the rate limiting enzyme of fatty acid synthesis. Describe the regulation of it. Discuss how this enzyme's activity influences beta-oxidation of fatty acid. Name the cell organelle where the fatty acids can be desaturated and elongated. 1+5+3+1
- b) Describe the process used to separate cell organelles and list the marker enzymes of cell membrane and sub-cellular organelles. 6+4
- c) A 55 year old female is complaining of joint pain. Her autoantibody profile is within normal limit. 2+6+2
  - i) Which biochemical investigation should you advice for the patient? Write the physiological reference range of that parameter.
  - ii) Describe the metabolism of that compound.
  - iii) Give a short note on management of this patient.
  
3. Write short notes on the following: 2x5
  - a) Attitude of doctors to patient and patient parties.
  - b) Transamination reaction.
  
4. Explain the following statements: 5x4
  - a) Histidine has an important role in buffering action of proteins.
  - b) Justify the clinical significance of creatinine clearance rate in renal function.
  - c) LDL cholesterol is atherogenic.
  - d) Defects in G protein mediated pathways may lead to diseases like cholera.
  - e) Kernicterus may occur in type I Crigler Najjar Syndrome.

P.T.O

5. Choose the correct option for each of the following:
- i) Methotrexate, a widely used anticancer drug acts by inhibiting:
    - a) Xanthine oxidase.
    - b) Thymidylate synthase.
    - c) Dihydrofolate reductase.
    - d) Phosphoribosyl pyrophosphate synthetase.
  - ii) A one year old child was brought to the pediatric OPD. Mother complained that the child had a mousy odour in the urine. On examination it was seen that child had many delayed milestones and hypopigmentation of hair and skin. Ferric chloride test and Guthrie test was positive. Which enzyme deficiency can lead to this disorder?
    - a) Tyrosine Hydroxylase.
    - b) Homogentisate Oxidase.
    - c) Phenylalanine hydroxylase.
    - d) Tyrosinase.
  - iii) Enzymes of glycogen metabolism are under allosteric regulation. Identify from below which of the following is not an allosteric regulator of the same?
    - a) Insulin.
    - b) Glucose 6 phosphate.
    - c) ATP.
    - d) AMP.
  - iv) End products of one cycle of beta oxidation of odd chain fatty acids are:
    - a) Acetyl Co-A+ Propionyl Co-A.
    - b) Acetyl Co-A+ Acetyl Co-A.
    - c) Acyl Co-A+ Propionyl Co-A.
    - d) Propionyl Co-A+ Propionyl Co-A.
  - v) Which of the following has pseudouridine in its structure?
    - a) rRNA.
    - b) tRNA.
    - c) mRNA.
    - d) snRNA.
  - vi) In hospital, used Ryle's tube should be discarded in:
    - a) Yellow bag.
    - b) Red bag.
    - c) White container.
    - d) Blue container.
  - vii) The precursors for the synthesis of polyamines are:
    - a) Methionine and arginine.
    - b) Ornithine and SAM.
    - c) Galactokinase.
    - d) Aldolase B.
  - viii) The enzyme associated with reverse cholesterol transport is:
    - a) LCAT.
    - b) ACAT.
    - c) HMG Co-A reductase.
    - d) Cholesterol ester hydrolase.
  - ix) After being synthesized in the reticuloendothelial cells, bilirubin is transported to the liver through which of the following transporters in blood?
    - a) Globulin.
    - b) Albumin.
    - c) Pre-albumin.
    - d) Glucuronic acid.
  - x) A 2 year old child presented with liver enlargement. On investigation, following features were found:
    - a) Von Gierke's disease.
    - b) Galactosemia.
    - c) Fructose deficiency.
    - d) G6PD deficiency.



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Subject: Biochemistry  
 Paper: II

Full Marks: 100  
 Time: 3 hours

*Attempt all questions. The figures in the margin indicate full marks.*

1. a) A 60 year old man reports to the medicine OPD with complaints of extreme weakness and fatigue as well as numbness and heaviness in lower limbs for past 6 months. On taking history it was found that he is a strict vegetarian. On examination of the patient he looks pale and neurological examination showed sensory and motor loss of both the legs.  
 Findings of the laboratory investigations are:  
 Peripheral smear showing large sized RBC.  
 Urine showed high levels of methyl malonic acid and homocysteine.  
 i) Identify the nutritional deficiency and the probable diagnosis.  
 ii) Correlate the patient symptoms and the signs on examination with the lab reports.  
 iii) Enumerate other lab investigations that can be ordered to reach to a definite diagnosis.  
 iv) Analyze the lab findings and give biochemical explanation of the same.  
 v) Plan a treatment for this patient. 2+3+2+5+3
  
- b) A seven year old boy showing small blue round cells consistent with Ewing's sarcoma.  
 i) Mention the best method to confirm translocation on t(11.22).  
 ii) Mention five different methods of conversion of proto-oncogene to oncogene.  
 iii) Give two examples of tumor suppressor genes. Describe one of them.  
 iv) Name one oncofetal marker. 2+5+2+5+1
  
2. a) Classify hormones based on their mechanism of action. Explain second messenger with example, discuss any one in detail. 5+5  
 b) What is promoter? Discuss the process of initiation of prokaryotic transcription. Enumerate types of eukaryotic RNA polymerases and mention their individual function. 6+4  
 c) Define cancer. Enumerate the causes of cancer including chemical, physical, biological, genetic and viral carcinogens/ mutagens. 2+8
  
3. Write short notes on the following: 2x5  
 a) Compare and contrast innate immunity.  
 b) Anti oxidant vitamins and their interdependency.
  
4. Explain the following statements: 5x4  
 a) Cytochrome C has important role in apoptosis.  
 b) Molecular chaperone plays a role in protein folding.  
 c) Southern blotting technique is an ideal technique for identifying a DNA segmen.  
 d) Topo-isomerase enzyme helps in correcting super-coiling.  
 e) PCR is the gold standard for TB germ detection.

**P.T.O**

5. Choose the correct option for each of the following:

i) Which out of the following are situated away from the coding region:

- a) Promoter.
- b) Enhancer.
- c) Structural gene.
- d) Operator.

ii) Which of the following isotopes of nitrogen were used in the Messelson and Stahl's experiment for proving that DNA replication is semi-conservative?

- a)  $N_{14}$  and  $N_{15}$
- b)  $C_{12}$  and  $C_{14}$
- c)  $H_1$  and  $H_3$
- d)  $O_{16}$  and  $O_{18}$

iii) Identify the incorrect statement:

- a) Both replication and transcription have primers.
- b) Both replication and transcription use template.
- c) Both replication and transcription have initiation, elongation and termination step.
- d) Both replication and transcription show polarity.

iv) Which of the following hormones act by extrinsic tyrosine kinase pathway?

- a) Growth hormone.
- b) Insulin.
- c) Glucagon.
- d) Thyroxine.

v) Which of the following post translation modification is needed for maturation of collagen fibers?

- a) Adenylation of the lysine and arginine.
- b) Glycation of valine and isoleucine.
- c) Hydroxylation of the proline and lysine.
- d) Acetylation of lysine and arginine.

vi) Elongation of the polypeptide chain requires all the following except:

- a) Peptidyl transferase.
- b) Translocase.
- c) GTPase.
- d) rho(p) factor.

vii) Viral load can best be detected by:

- a) Reverse PCR.
- b) Real time PCR.
- c) Chromosome walking.
- d) DNA fingerprinting.

viii) Which of the following enzyme is not used as a tumor marker?

- a) Prostate specific antigen.
- b) Prostatic acid phosphatase.
- c) Aspartate transaminase.
- d) Alkaline phosphatase.

ix) Which is NOT a product of transcription?

- a) tRNA.
- b) cDNA.
- c) mRNA.
- d) rRNA.

x) Connective tissue protein defective in Marfan's Syndrome is:

- a) Connexin.
- b) Tubulin.
- c) Fibrillin.
- d) Keratin.