

M.Sc. Zoology

12P/216/29

Question Booklet No. 1749

(To be filled up by the candidate by blue/black ball-point pen)

Roll No.

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Roll No.

(Write the digits in words)

Serial No. of OMR Answer Sheet

Day and Date

(Signature of Invigilator)

INSTRUCTIONS TO CANDIDATES

(Use only **blue/black ball-point pen** in the space above and on both sides of the Answer Sheet)

1. Within 10 minutes of the issue of the Question Booklet, check the Question Booklet to ensure that it contains all the pages in correct sequence and that no page/question is missing. In case of faulty Question Booklet bring it to the notice of the Superintendent/Invigilators immediately to obtain a fresh Question Booklet.
2. Do not bring any loose paper, written or blank, inside the Examination Hall *except the Admit Card without its envelope*.
3. A separate Answer Sheet is given. *It should not be folded or mutilated. A second Answer Sheet shall not be provided. Only the Answer Sheet will be evaluated.*
4. Write your *Roll Number and Serial Number of the Answer Sheet by pen* in the space provided above.
5. **On the front page of the Answer Sheet, write by pen your Roll Number in the space provided at the top, and by darkening the circles at the bottom. Also, wherever applicable, write the Question Booklet Number and the Set Number in appropriate places.**
6. No overwriting is allowed in the entries of Roll No., Question Booklet No. and Set No. (if any) on OMR sheet and also Roll No. and OMR Sheet No. on the Question Booklet.
7. Any change in the aforesaid entries is to be verified by the invigilator, otherwise it will be taken as unfair means.
8. Each question in this Booklet is followed by four alternative answers. *For each question, you are to record the correct option on the Answer Sheet by darkening the appropriate circle* in the corresponding row of the Answer Sheet, by ball-point pen as mentioned in the guidelines given on the first page of the Answer Sheet.
9. For each question, darken only one circle on the Answer Sheet. If you darken more than one circle or darken a circle partially, the answer will be treated as incorrect.
10. *Note that the answer once filled in ink cannot be changed.* If you *do not wish to attempt* a question, leave all the circles in the corresponding row blank (such question will be awarded zero mark).
11. For rough work, use the inner back page of the title cover and the blank page at the end of this Booklet.
12. Deposit *only the OMR Answer Sheet* at the end of the Test.
13. You are not permitted to leave the Examination Hall until the end of the Test.
14. If a candidate attempts to use any form of unfair means, he/she shall be liable to such punishment as the University may determine and impose on him/her.

No. of Questions/प्रश्नों की संख्या : 150

Time/समय : 2 Hours/घण्टे

Full Marks/पूर्णांक : 450

Note/नोट : (1) Attempt as many questions as you can. Each question carries **3** marks. **One** mark will be deducted for each incorrect answer. Zero mark will be awarded for each unattempted question.

अधिकाधिक प्रश्नों को हल करने का प्रयत्न करें। प्रत्येक प्रश्न **3** अंक का है। प्रत्येक गलत उत्तर के लिए एक अंक काटा जाएगा। प्रत्येक अनुत्तरित प्रश्न का प्राप्तांक शून्य होगा।

(2) If more than one alternative answers seem to be approximate to the correct answer, choose the closest one.

यदि एकाधिक वैकल्पिक उत्तर सही उत्तर के निकट प्रतीत हों, तो निकटतम सही उत्तर दें।

1. Inert gases do not react with any other element because
 - (1) their outermost electron level is filled with 8 electrons
 - (2) the pressure is not high enough
 - (3) the temperature is not high enough
 - (4) their nucleus is very small

2. Addition polymerization is often catalyzed by a chemical free radical. What is a 'free radical'?
 - (1) It is a chemical species with one or more unpaired electrons
 - (2) It is a chemical species with one or more double bonds
 - (3) It is a chemical species with all paired electrons
 - (4) It is a chemical species with all single bonds

3. During a chemical reaction, atomic number
- (1) changes (2) remains same
(3) changes and then is restored (4) changes alternately
4. For a reaction, $\text{Rate} = k[A][B]^2$, what factor will *not* change k ?
- (1) Raising temperature (2) Adding inhibitor
(3) Increasing $[A]$ (4) Adding catalyst
5. A nucleus of ${}_{92}\text{U}^{238}$ gets converted into a ${}_{91}\text{P}^{234}$ nucleus. The particles emitted during this decay are
- (1) one α -particle and one positron
(2) one α -particle and one electron
(3) one α -particle and one antineutrino
(4) one α -particle and one neutrino
6. A 50.0 mL sample of a 6.0 M NaOH solution is diluted with 250 mL of water. What is the final concentration of the diluted NaOH solution?
- (1) 6.0 M (2) 3.0 M (3) 1.2 M (4) 1.0 M
7. When a neutral metal sphere is charged by contact with a positively charged glass rod, the sphere
- (1) loses electrons (2) gains electrons
(3) loses protons (4) gains protons
8. Hydrogen and nitrogen react to form ammonia according to the reaction, $3\text{H}_2 + \text{N}_2 \rightarrow 2\text{NH}_3$. If 4.0 moles of H_2 with 2.0 mol of N_2 are reacted, how do you know this is a limiting reactant problem?
- (1) Mass is conserved in the problem
(2) Moles are not conserved in the problem
(3) The masses of two reactants are given
(4) More than one of the above are correct

9. Consider the following two statements :

(A) If heat is added to a system, its temperature must increase

(B) If positive work is done by a system in a thermodynamic process, its volume must increase

State which one of the following is correct

(1) Both A and B are correct

(2) A is correct and B is wrong

(3) B is correct and A is wrong

(4) Both A and B are wrong

10. The internal energy of an ideal gas decreases by the same amount as the work done by the system

(1) the process must be adiabatic

(2) the process must be isothermal

(3) the process must be isobaric

(4) the temperature must increase

11. All matters in motion have a wave-like nature was said by

(1) Schrodinger

(2) de Broglie

(3) Planck

(4) Thomson

12. A Carnot engine takes in 3000 kcal. Of heat from a reservoir at 627°C gives it to a tank at 27°C . The work done by the engine is

(1) $4.2 \times 10^6\text{J}$

(2) $8.4 \times 10^6\text{J}$

(3) $16.8 \times 10^6\text{J}$

(4) Zero

13. Visible light's wavelength ranges between

(1) 0.39-0.77 mm

(2) 0.39-0.77 μm

(3) 0.39-0.77 nm

(4) 0.39-0.77cm

14. A laser source gives light output of power P . If the wavelength of the laser is λ , the number of photons emitted in a time t in terms of the given parameters and fundamental constants is

(1) $P\lambda t/hc$

(2) $Phct/\lambda$

(3) $Ph t/\lambda c$

(4) $P\lambda/hc$

15. Although sunlight contains all colors of light, the brightest color is

(1) violet

(2) blue-violet

(3) yellow-green

(4) orange

- 23.** Light is composed of waves and particles called
(1) electrons (2) quarks (3) photons (4) neutrons
- 24.** How many electrons are required in the outermost shell of an element for it to be stable?
(1) 6 (2) 2 (3) 8 (4) 4
- 25.** Which of the following is a condensation reaction?
(1) Addition of H, O to a double bond
(2) Linking an acid and an alcohol to make an ester and water
(3) Addition of H to an alkene
(4) Oxidation of ethanol to acetaldehyde
- 26.** The dose unit of ionizing radiation is called the rad. The rad is defined in terms of
(1) the half-life of a radioisotope
(2) the energy deposited per kilogram of an object
(3) the biological damage produced
(4) accumulation of fission products
- 27.** A purified protein fraction containing buffer with salt can be desalted by one of the following techniques
(1) Gel filtration chromatography (2) Affinity chromatography
(3) Paper chromatography (4) Thin layer chromatography
- 28.** Assuming the developing solvent as *n*-butanol, water and acetic acid, predict the relative order of paper chromatography R_f values for the amino acids in the mixture containing Ser, Lys, Leu, Val, and Ala
(1) Ser, Lys, Ala, Val, Leu (2) Ala, Val, Ser, Leu, Lys
(3) Lys, Ser, Leu, Ala, Val (4) Ser, Leu, Val, Lys, Ala

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- 29.** A reaction is first order. If its initial rate is 0.0200 M/sec and 25.0 **days** later its reaction is 6.25×10^{-4} m/sec, then its half-life is
(1) 12.5 days (2) 5.0 days (3) 25.0 days (4) 50.0 days
- 30.** Photomultiplier tube (PMT) is a variation of the conventional
(1) photovoltaic cell
(2) phototube
(3) silicon photodiode
(4) combination of phototube and photovoltaic cell
- 31.** Which of the following does not determine the rate of a reaction?
(1) Value of ΔH° (2) Activation energy
(3) Presence of a catalyst (4) Temperature of reactants
- 32.** The anion exchanger resin is conjugated with a group having
(1) negative charge
(2) positive charge
(3) equal number of negative and positive charges
(4) metal ions
- 33.** The first life forms on earth were
(1) single-cellular (2) multi-cellular (4) plants (5) viruses
- 34.** The Miller-Urey experiment demonstrated
(1) how RNA could have been the first organic molecule
(2) that simple molecules could not have evolved spontaneously
(3) the kinds of molecules that could have been produced on the early earth
(4) that oxygen was required for the formation of molecules on early earth

(344)

- 35.** Which of the following organisms alive today is likely to be most similar to the first life forms that evolved on the earth?
- (1) Ethane-producing bacteria (2) Cyanobacteria
(3) Algae (4) Dinosaurs
- 36.** Colors of light most useful in photosynthesis are
- (1) green, yellow and orange (2) red, violet and blue
(3) infrared, red and yellow (4) red, white and blue
- 37.** Which of the following is the correct sequence for the movement of electrons during the light-dependent reactions of plants?
- (1) $P_{680} \rightarrow P_{700} \rightarrow \text{water} \rightarrow \text{NADP}^+$ (2) $\text{water} \rightarrow P_{700} \rightarrow \text{NADP}^+ \rightarrow P_{680}$
(3) $P_{700} \rightarrow P_{680} \rightarrow \text{NADP}^+ \rightarrow \text{water}$ (4) $\text{water} \rightarrow P_{680} \rightarrow P_{700} \rightarrow \text{NADP}^+$
- 38.** Which of the following is mismatched?
- (1) PGA — a 3-carbon compound
(2) Antenna complex — contains hundreds of pigment molecules
(3) CAM plants — open their stomata during the day and close them at night to avoid photorespiration
(4) Photosystem I — uses the P_{700} molecule in its photocenter
- 39.** Which instrument is best used to view the structure of viruses?
- (1) Single-lens microscope (2) Confocal microscope
(3) Scanning electron microscope (4) Transmission electron microscope
- 40.** Which of the following organisms is a primary consumer?
- (1) An autotroph (2) A horse parasite
(3) An oak tree parasite (4) A wolf

- 41.** Which of the following are producers?
(1) Termites (2) Algae (3) Bacteria (4) Grasshoppers
- 42.** The process of converting nitrate to nitrogen gas and nitrous oxide is called
(1) nitrogen fixation (2) ammonification
(3) denitrification (4) eutrophication
- 43.** Organisms in trophic level 3 are
(1) carnivores (2) herbivores (3) detritivores (4) producers
- 44.** The nitrogenase complex converts N_2 into NH_4^+ by the addition of electrons. Which of the following is *not* true of this complex?
(1) It requires Fe-S protein
(2) Pyruvate is always the source of electrons
(3) It requires ATP
(4) It requires Mo-Fe protein
- 45.** Which of the following is the proper summary equation for photosynthesis?
(1) $C_6H_{12}O_6 + CO_2$ in the presence of light and chlorophyll yields $H_2O + O_2$
(2) $H_2O + CO_2$ in the presence of light and chlorophyll yields $C_6H_{12}O_6 + O_2 + H_2O$
(3) $H_2O + CO_2$ yields $C_6H_{12}O_6 + O_2 + H_2O$
(4) CO_2 in the presence of light and chlorophyll yields $C_6H_{12}O_6 + O_2$
- 46.** If you wanted to retard the growth of a plant, then which color(s) of light would you most likely use?
(1) Green only (2) Purple and red
(3) Green and purple (4) Yellow and green

- 47.** In plant cells, the organelles that conduct photosynthesis and the organelles that conduct cellular respiration are the
- (1) leucoplasts and mitochondria
 - (2) chromoplasts and leucoplasts
 - (3) chloroplasts and mitochondria
 - (4) chloroplasts and chromoplasts
- 48.** The significance of a notochord in the evolution of chordates is that it
- (1) provided an internal attachment point for muscles
 - (2) allowed for the development of a more complex nervous system
 - (3) eliminated the need for segmentation
 - (4) allowed the organism to grow larger
- 49.** A radula is
- (1) a sharp structure that is injected into the prey of a mollusk
 - (2) a protective coating made of calcium carbonate on sponges
 - (3) a small, internal shell found in cephalopods
 - (4) a rasping, tongue-like organ in mollusks
- 50.** Cnidarians project a nematocyst to capture their prey by
- (1) ejecting it with a jet of water
 - (2) using a spring-like apparatus
 - (3) building up a high internal osmotic pressure
 - (4) coiling and releasing the tendrils on which the nematocysts are found
- 51.** Arthropods have not been able to achieve great size because
- (1) the type of organ systems they possess could not support such a development
 - (2) they would be unable to successfully reproduce
 - (3) chitin is brittle and must be thick to bear the pull of muscles
 - (4) their vision is not good enough to hunt larger prey

- 59.** Which one of these anterior pituitary hormones shows increased secretion in response to stress?
- (1) Thyroid-stimulating hormone (2) Adrenocorticotrophic hormone
(3) Luteinizing hormone (4) Prolactin
- 60.** Thyroid hormones are responsible for regulating metabolic rate and calcium and phosphate ion concentration in the blood. Which thyroid hormone lowers calcium and phosphate ion concentration in the blood?
- (1) Thyroxine (2) Triiodothyronine
(3) Calcitonin (4) Thyroid-stimulating hormone
- 61.** Which hormone causes excessive skeletal growth or gigantism?
- (1) Somatotropin (2) Testosterone
(3) Insulin (4) Somatostatin
- 62.** Cytotoxic T cells are called into action by the
- (1) presence of interleukin-1 (2) presence of interleukin-2
(3) presence of neutrophils (4) decrease in the number of antibodies
- 63.** Erythroblastosis fetalis can result if
- (1) the Rh⁺ mother is sensitized to the Rh⁻ antigen and the baby is Rh⁻
(2) the Rh⁻ mother is sensitized to the Rh⁺ antigen and the baby is Rh⁻
(3) the Rh⁻ mother is sensitized to the Rh⁺ antigen and the baby is Rh⁺
(4) the Rh⁺ mother is sensitized to the Rh⁻ antigen and the baby is Rh⁺
- 64.** Which type of surface marker is present on every nucleated cell in your body?
- (1) B receptor (2) T receptor
(3) MHC-I (4) MHC-II

- 65.** Erwin Chargaff studied DNA from various organisms and demonstrated that
- (1) DNA is the genetic material
 - (2) RNA is transcribed from DNA
 - (3) the amount of adenine in a given organism is equal to the amount of thymine (and guanine to cytosine)
 - (4) the double helix is held together by hydrogen bonding between the bases
- 66.** The degeneracy of the genetic code refers to which of the following?
- (1) Each codon can specify more than one amino acid
 - (2) Most amino acids have more than one codon
 - (3) There are several initiation codons
 - (4) The stop codon can also code for amino acids
- 67.** A temperature of 75°C will terminate DNA synthesis by *E. coli* DNA polymerase I. This is because
- (1) *E. coli* DNA polymerase I is denatured at this temperature
 - (2) The DNA is denatured at this temperature
 - (3) The primers are denatured at this temperature
 - (4) The temperature is too high for enzymatic reactions to occur
- 68.** PCR is advantageous to gene cloning for all of the following reasons, *except*
- (1) PCR does not require that the sequence of the gene be known
 - (2) PCR is a very rapid technique for the isolation of a gene
 - (3) PCR requires very small amount of starting DNA compared to gene cloning
 - (4) PCR is very useful for mapping DNA markers
- 69.** Which of the following sequences cannot be used as a sequence tagged sites?
- (1) Expressed sequence tags
 - (2) Random genomic sequences
 - (3) Simple sequence length polymorphism
 - (4) Restriction fragment length polymorphism

- 70.** The principle of genetic linkage is
- (1) the fact that the different alleles for a given gene will be located at the same position in a chromosome
 - (2) the discovery that multiple genes are responsible some traits
 - (3) the observation that some genes will be inherited together if they are located on the same chromosome
 - (4) the observation that darkly staining regions of chromosome do not contain genes
- 71.** Which phase of both mitosis and meiosis includes DNA replication from 2C to 4C?
- | | |
|----------------|---------------|
| (1) Interphase | (2) Anaphase |
| (3) Metaphase | (4) Telophase |
- 72.** Which of the following cell compartments is associated with a protein skeleton composed of lamins?
- | | |
|-------------------|-----------------------|
| (1) Chloroplast | (2) Basement membrane |
| (3) Mitochondrion | (4) Nucleus |
- 73.** The KDEL sequence, found on luminal proteins of the ER, is responsible for
- (1) translocation of proteins into the ER lumen
 - (2) retrieval of ER luminal proteins from the Golgi
 - (3) recognition by signal peptidase of the signal sequence
 - (4) insertion of proteins into the membrane of the ER
- 74.** Cyclins are proteins involved in regulation of
- (1) cell-cycle protein kinases
 - (2) synthesis of cAMP
 - (3) membrane circulation via exocytosis and endocytosis
 - (4) the cycling of tubulin subunits through microtubules

- 75.** Which of the following most accurately explains the cause for the abnormal numbers of chromosomes during human reproduction that can result in Down's syndrome, Turner's syndrome, or Klinefelter's syndrome?
- (1) The abnormal pairing of nonhomologous chromosomes during prophase of meiosis I
 - (2) The duplicative production of extra chromosomes during DNA replication
 - (3) The occurrence of nondisjunction of homologous chromosomes during meiosis
 - (4) The selective loss of particular chromosomes from the sex cells after formation of the mature gamete
- 76.** Polyacrylamide gel electrophoresis in the presence of sodium dodecyl sulphate separates protein on the basis of which of the following?
- (1) Charge-mass ratio
 - (2) Conformation
 - (3) Isoelectric oint
 - (4) Size
- 77.** The C-value paradox is defined as
- (1) the lack of correlation between the complexity of an organism and its genome size
 - (2) the lack of correlation between the complexity of an organism and its number of chromosomes
 - (3) the lack of correlation between the complexity of an organism and its number of genes
 - (4) the lack of correlation between the number of genes and number of chromosomes in organisms
- 78.** Heterochromatin and euchromatin are both used to describe
- (1) DNA structure and function
 - (2) DNA structure and length
 - (3) Chromosome number and function
 - (4) DNA function and protein products

- 79.** Transposable sequences fall into a unique group of repetitive DNA sequences that are identified by their ability to
- (1) interfere with DNA replication
 - (2) prevent proper chromosome segregation during meiosis
 - (3) move from place to place within the genome
 - (4) interfere with telomere function
- 80.** The pseudogene is
- (1) a gene that only expressed at certain developmental stages
 - (2) a nonfunctional gene
 - (3) a gene that contains a mutation but is still functional
 - (4) a sequence of DNA that is slowly evolving to become an active gene
- 81.** Which of the following sentences is true about the evolutionary process?
- (1) There is no real 'progress' in the idea of evolution
 - (2) Humans are unique, a totally new type of organism
 - (3) Progress is nature's religion
 - (4) Evolution of life forms was rapid in the beginning ages
- 82.** The difference between Homo sapiens and the Homo erectus was
- (1) Homo sapiens originated in Africa while Homo erectus was in Asia
 - (2) Homo erectus were much smaller in size than Homo sapiens
 - (3) Homo erectus stayed in Africa while Homo sapiens did not
 - (4) the size of their brain of Homo erectus was smaller to Homo sapiens
- 83.** Which of the following are not examples of analogous structures?
- (1) Wings of bat and butterfly
 - (2) Wings of bat and forelimb of cattle
 - (3) Thorn and spine
 - (4) Tendril of Lathyrus and tendril of Gloriosa

- 84.** Speciation is the evolutionary process by which
- (1) new gene pool is formed
 - (2) evolutionary paths of species converge
 - (3) hybrids species form
 - (4) shows up differences in physical traits
- 85.** The ostrich and the emu look very similar and live in similar habitats, although they are not closely related. This is an example of
- (1) divergent evolution
 - (2) convergent evolution
 - (3) adaptive radiation
 - (4) sympatric speciation
- 86.** When using a cladistic approach to systematics, which of the following is considered most important for classification?
- (1) Shared primitive characters
 - (2) Analogous primitive characters
 - (3) Shared derived characters
 - (4) The degree of evolutionary divergence
- 87.** Which of the following would be most useful for constructing a phylogenetic tree emphasizing evolutionary branching among several fish species?
- (1) Several analogous characteristics shared by all the fishes
 - (2) Single homologous characteristic shared by all the fishes
 - (3) The total degree of morphological similarity among various fish species
 - (4) Several characteristics thought to have evolved after different fishes diverged from one another
- 88.** Mendel's discovery that characteristics are inherited due to the transmission of hereditary factors resulted from his
- (1) careful microscopic examinations of genes and chromosomes
 - (2) dissections to determine how fertilization occurs in pea plants
 - (3) breeding experiments with many generations of fruit flies
 - (4) analysis of the offspring produced from many pea plant crosses

- 89.** All of the-following are cellular organelles in an eukaryotic cell, *except*
- (1) mitochondria
 - (2) endoplasmic reticulum
 - (3) ribosomes
 - (4) nucleus
- 90.** The final step in the process of cellular respiration is the electron transport chain (ETC). What best describes the first step in the electron transport chain?
- (1) Hydrogen ions diffuse through the membrane
 - (2) Energized electrons from NADH and FADH₂ activate transport proteins
 - (3) Electrons from NADH and FADH₂ bond with hydrogen ions to form water molecules
 - (4) Electrons in the inner membrane are energized by the Sun
- 91.** The plasma membrane is effective in isolating the cytoplasm from the extracellular fluid primarily because
- (1) peripheral proteins are attached to the inner or outer membrane surface
 - (2) integral proteins form channels that let water pass in and out of the cell
 - (3) the lipid 'tails' in the phospholipid bilayer form a sheet that repels water
 - (4) the rigid composition of the plasma membrane forms a waterproof barrier
- 92.** If the genetic code consisted of four bases per codon rather than three, the maximum number of unique amino acids that could be encoded would be
- (1) 16
 - (2) 64
 - (3) 256
 - (4) 128
- 93.** Which of the following lists only membrane-bound organelles?
- (1) Microtubules, nucleus, lysosomes, ribosomes, mitochondria, cilia
 - (2) Endoplasmic reticulum, Golgi apparatus, mitochondria, lysosomes, peroxisomes
 - (3) Lysosomes, ribosomes, peroxisomes, endoplasmic reticulum, Golgi apparatus
 - (4) Mitochondria, cilia, centrioles, Golgi apparatus, endoplasmic reticulum, nucleus

- 94.** Which series progresses from the thinnest to the thickest in diameter?
- (1) DNA > histone > chromosome > nucleosome
 - (2) Histone > chromosome > DNA > nucleosome
 - (3) Nucleosome > histone > DNA > chromosome
 - (4) DNA > histone > nucleosome > chromosome
- 95.** In an adult, which of the following usually have the longest G_0 phase?
- (1) Blood cells
 - (2) Nerve cells
 - (3) Epithelial skin cells
 - (4) The G_0 phase is the same length in all of these
- 96.** Which of the following organelles might function during or even after apoptosis of the cell that contains them?
- (1) Centrioles
 - (2) Golgi apparatus
 - (3) Rough endoplasmic reticulum
 - (4) Lysosomes
- 97.** The onset of menstruation is caused by decreasing levels of
- (1) LH
 - (2) FSH
 - (3) Estrogen
 - (4) Progesterone
- 98.** Which organelle modifies, packages and sorts proteins for secretion or use within the cell?
- (1) Golgi apparatus
 - (2) Lysosome
 - (3) Endoplasmic reticulum
 - (4) Nucleus
- 99.** The cells that produce the smallest formed elements of the blood are called
- (1) erythroblasts
 - (2) megakaryocytes
 - (3) myeloblasts
 - (4) thrombocytes

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- 105.** The DNA sequence that can be recognized by the restriction enzyme Eco RI is
- | | |
|--------------------------|--------------------------|
| (1) CTGCA [^] G | (2) G [^] AATTC |
| G [^] ACGTC | CTTAA [^] G |
| (3) GAGCT [^] C | (4) A [^] AGCTT |
| C [^] TCGAG | TTCGA [^] A |
- 106.** The factor required only for accurate initiation of transcription in prokaryotes is
- | | |
|------------------------|-------------------------------|
| (1) alpha (α) | (2) sigma (σ) |
| (3) rho (ρ) | (4) transcription factor II D |
- 107.** In which of the following inhibition of enzyme action, the K_m increases but V_{max} remains unchanged?
- | | |
|--------------------|------------------------------|
| (1) Competitive | (2) Uncompetitive |
| (3) Noncompetitive | (4) Irreversible competitive |
- 108.** The zymogen chymotrypsinogen is converted to active chymotrypsin by
- (1) binding of a necessary metal ion
 - (2) reduction of a disulfide bond
 - (3) proteolytic cleavage
 - (4) phosphorylation of an amino acid side chain
- 109.** Which of the following is an example of RNA editing?
- (1) Removal of introns from an RNA transcript
 - (2) Degradation of an RNA molecule by nucleases
 - (3) Alteration of the nucleotide sequence of an RNA molecule
 - (4) Capping of the 5' end of an RNA transcript

- 110.** Wobble occurs because of all of the following, *except*
- (1) the anticodon is in a loop of the tRNA molecule and does align uniformly with the codon
 - (2) an inosine nucleotide in the tRNA molecule can base-pair with A, C, and U in the mRNA
 - (3) an inosine nucleotide in the tRNA molecule can base-pair with A, C, and U in the tRNA
 - (4) guanine can base-pair with uracil
- 111.** Which *Drosophila* genes determine the identification of the segments of the fruit fly larva?
- (1) The gap genes
 - (2) The pair-rule genes
 - (3) The segment polarity genes
 - (4) The homeotic selector genes
- 112.** Okazaki fragments are
- (1) short segment of polynucleotide synthesized on the leading strand of DNA
 - (2) short segment of polynucleotide synthesized on the lagging strand of DNA
 - (3) the primers synthesized on the lagging strand that are required for DNA synthesis
 - (4) the proteolytic fragments of DNA polymerase
- 113.** Spontaneous mutations arise from
- (1) chemical mutagens
 - (2) errors in DNA replication
 - (3) heat
 - (4) radiation
- 114.** What is thought to be primary function of homologous recombination?
- (1) Crossing-over in meiosis
 - (2) Gene conversion
 - (3) Integration of lysogenic phage genomes
 - (4) Post-replicative DNA repair

- 115.** A female with Turner's syndrome is denoted by the genetic notation
 (1) 47, XX, +21 (2) 45, X (3) 47, XXX (4) 45, XX, -21
- 116.** A woman who has two brothers with hemophilia A and two normal sons is again pregnant. She requests counselling for the risk of her to have hemophilia. What is the risk that her next child will have hemophilia?
 (1) 1 (2) $\frac{1}{2}$ (3) $\frac{1}{4}$ (4) $\frac{1}{8}$
- 117.** The peptide bond has a backbone of atoms in which of the following sequences?
 (1) C-N-N-C (2) C-C-C-N (3) C-O-C-N (4) C-C-N-C
- 118.** All of the following forces may play a role in the formation of quaternary structure, *except*
 (1) hydrogen bonds (2) peptide bonds
 (3) electrostatic interaction (4) disulfide bridge
- 119.** A noncompetitive inhibitor of an enzyme does which of the following?
 (1) Decreases V_{\max}
 (2) Increases V_{\max}
 (3) Decreases K_m and decreases V_{\max}
 (4) Increases K_m and increases V_{\max}
- 120.** The DNA sequence shown below is the sense strands from a coding region known to be a mutational hot spot for a gene. It encodes amino acids 21 to 25. Given the genetic and amino acid codes CCC=proline, GCC=alanine, TTC=phenylalanine and TAG=stop codon, which of the following sequences is a frameshift mutation that causes termination of the encoded protein?
 5'-CCC-CCT-AGG-TTC-AGG-3'
- (1) -CCA-CCT-AGG-TTC-AGG- (2) -GCC-CCT-AGG-TTC-AGG-
 (3) -CCA-CCC-TAG-GTT-CAG- (4) -CCC-CCT-AGG-AGG-

- 121.** Which of the following is involved in the formation of hydroxyproline and hydroxylysine during collagen synthesis?
- (1) Pyridoxal phosphate (2) Ascorbic acid
(3) Biotin (4) Thiamine pyrophosphate
- 122.** What is meant by steady-state assumption that underlies the Michaelis-Menten relationship between substrate concentration and reaction velocity?
- (1) The rate of breakdown of the enzyme-substrate complex equals the rate of formation of the complex
(2) The reaction velocity is linearly related to substrate concentration
(3) The reaction velocity is independent of substrate concentration
(4) The amount of enzyme remains constant
- 123.** An allosteric modulator influences enzyme activity by
- (1) competing for the catalytic site with the substrate
(2) binding to a site on the enzyme molecule distinct from the catalytic site
(3) changing the nature of the product formed
(4) changing the specificity of the enzyme for its substrate
- 124.** The terminal sugar moiety in the blood group substance A is
- (1) N-acetylgalactosamine (2) Fucose
(3) Galactose (4) Glucose
- 125.** The glucose residues in maltose are in
- (1) α -1,1 linkage (2) α -1,2 linkage
(3) α -1,4 linkage (4) β -1,4 linkage
- 126.** If the cytosine content of double helical DNA is 20% of the bases, the adenine content would be
- (1) 10% (2) 20% (3) 30% (4) 50%

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- 127.** In glycocholic acid glycine is conjugated with the carboxylic moiety by
(1) ester bond (2) peptide bond
(3) phosphodiester bond (4) glucosidic bond
- 128.** The hormonal form of vit D is
(1) 1,25-dihydroxycholecalciferol (2) Retinol
(3) 17- β -androstenedione (4) Tocoferol
- 129.** Which of the following toxins inhibits eukaryotic protein synthesis through the depurination of a single adenine residue in 28S ribosomal RNA?
(1) α -Sarcin (2) Diphtheria toxin
(3) Ricin (4) Cycloheximide
- 130.** Which of the following compounds is a gratuitous inducer of β -galactosidase in *E. coli*?
(1) Glucose (2) Allolactose
(3) IPTG (4) Lactose
- 131.** A B cell is converted to produce IgM by which of the following method?
(1) Light chain formation
(2) Heavy chain formation
(3) Alternative splicing
(4) Heavy chain class switching
- 132.** The absorption of glucose in renal proximal tubule by Na⁺-Glucose transporter needs energy from
(1) Na⁺-K⁺ ATPase (2) H⁺-K⁺ ATPase
(3) Na⁺ ATPase (4) Na⁺-Ca⁺ ATPase

133. If a reaction is at equilibrium, the free energy change (ΔG) is
- (1) equal to $-RT \times \ln K_{eq}$
 - (2) equal to $-nF \times \Delta E_0$
 - (3) equal to ΔG under standard condition
 - (4) equal to zero
134. If an oxidation-reduction reaction with a two-electron transfer has a standard reduction potential of +0.3 volts, what is the free energy change under standard conditions?
- (1) +6.9 kcal/mol
 - (2) -13.8 kcal/mol
 - (3) +46.1 kcal/mol
 - (4) +13.8 kcal/mol
135. The disease scurvy is due to a deficiency of
- (1) vitamin B₆
 - (2) biotin
 - (3) vitamin C
 - (4) folic acid
136. The glycolytic pathway requires which of the following as allosteric regulatory enzymes?
- (1) Glucokinase, phosphofructokinase and pyruvate kinase
 - (2) Hexokinase, aldolase and pyruvate kinase
 - (3) Hexokinase, GAPDH and enolase
 - (4) Hexokinase, phosphofructokinase and pyruvate kinase
137. Hereditary fructose intolerance is a condition caused by a deficiency of
- (1) phosphofructokinase
 - (2) fructokinase
 - (3) Fructose-1-phosphate aldolase
 - (4) Fructose-1,6-bisphosphate aldolase

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- 138.** The enzyme that catalyzes an anaplerotic reaction in the citric acid cycle is
- (1) succinate dehydrogenase
 - (2) citrate lyase
 - (3) pyruvate carboxylase
 - (4) pyruvate dehydrogenase
- 139.** All of the following electron carriers are components of the mitochondrial electron transport chain, *except*
- (1) nicotinamide-adenine dinucleotide
 - (2) nicotinamide-adenine dinucleotide phosphate
 - (3) flavin mononucleotide
 - (4) coenzyme Q
- 140.** The uncoupling of oxidative phosphorylation in a mitochondrial system describes which of the following reaction?
- (1) The phosphorylation of ADP to ATP accelerates
 - (2) The phosphorylation of ADP continues but oxygen uptake stops
 - (3) The phosphorylation of ADP stops but oxygen uptake continues
 - (4) Oxygen uptake stops
- 141.** Which one of the following compounds is a positive regulator of pyruvate carboxylase?
- (1) ATP
 - (2) Acetyl CoA
 - (3) Biotin
 - (4) Phosphoenolpyruvate
- 142.** Each of the following substances is important substrate for gluconeogenesis during fasting, *except*
- (1) acetyl CoA
 - (2) glycerol
 - (3) lactate
 - (4) amino acids

- 143.** The greatest amount of body glycogen can be found in which of the following human tissues?
(1) Liver (2) Skeletal muscle
(3) Adipose tissues (4) Kidney
- 144.** The net yield of high-energy bonds from the complete oxidation of acetoacetate in the brain is
(1) 11 (2) 12 (3) 23 (4) 26
- 145.** The acetyl groups required for cytoplasmic fatty acid synthesis appear in the cytoplasm as a result of the activity of
(1) citrate lyase (2) thiolase
(3) isocitrate dehydrogenase (4) citrate synthase
- 146.** The release of arachidonate by phospholipase A₂ from membrane phospholipids is inhibited by
(1) aspirin
(2) linoleic acid
(3) a specific protein induced by glucocorticoids
(4) 2-acyl lysophosphatidylcholine
- 147.** By the end of____, distribution of cells into the three primary tissue types has been accomplished.
(1) cleavage (2) gastrulation
(3) the formation of the blastocyst (4) neurulation
- 148.** LDH is member of enzyme class
(1) kinase (2) oxidoreductase
(3) lyase (4) hydrolase

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- 149.** End product of β oxidation of an odd chain fatty acid is
- | | |
|------------------|---------------------|
| (1) acetyl CoA | (2) propionyl CoA |
| (3) succinyl CoA | (4) acetoacetyl CoA |
- 150.** Due to rise in the concentration of 2,3-bis-phosphoglycerate in RBC, the O_2 -Hb dissociation curve
- | | |
|-----------------------|----------------------|
| (1) shifts to left | (2) shifts to right |
| (3) remains unchanged | (4) becomes straight |

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अभ्यर्थियों के लिए निर्देश

(इस पुस्तिका के प्रथम आवरण-पृष्ठ पर तथा उत्तर-पत्र के दोनों पृष्ठों पर केवल नीली या काली बाल-प्वाइंट पेन से ही लिखें)

1. प्रश्न पुस्तिका मिलने के 10 मिनट के अन्दर ही देख लें कि प्रश्नपत्र में सभी पृष्ठ मौजूद हैं और कोई प्रश्न छूटा नहीं है। पुस्तिका दोषयुक्त पाये जाने पर इसकी सूचना तत्काल कक्ष-निरीक्षक को देकर सम्पूर्ण प्रश्नपत्र की दूसरी पुस्तिका प्राप्त कर लें।
2. परीक्षा भवन में लिफाफा रहित प्रवेश-पत्र के अतिरिक्त, लिखा या सादा कोई भी खुला कागज साथ में न लायें।
3. उत्तर-पत्र अलग से दिया गया है। इसे न तो मोड़ें और न ही विकृत करें। दूसरा उत्तर-पत्र नहीं दिया जायेगा, केवल उत्तर-पत्र का ही मूल्यांकन किया जायेगा।
4. अपना अनुक्रमांक तथा उत्तर-पत्र का क्रमांक प्रथम आवरण-पृष्ठ पर पेन से निर्धारित स्थान पर लिखें।
5. उत्तर-पत्र के प्रथम पृष्ठ पर पेन से अपना अनुक्रमांक निर्धारित स्थान पर लिखें तथा नीचे दिये वृत्तों को गाढ़ा कर दें। जहाँ-जहाँ आवश्यक हो वहाँ प्रश्न-पुस्तिका का क्रमांक तथा सेट का नम्बर उचित स्थानों पर लिखें।
6. ओ० एम० आर० पत्र पर अनुक्रमांक संख्या, प्रश्न-पुस्तिका संख्या व सेट संख्या (यदि कोई हो) तथा प्रश्न-पुस्तिका पर अनुक्रमांक सं० और ओ० एम० आर० पत्र सं० की प्रविष्टियों में उपरिलेखन की अनुमति नहीं है।
7. उपर्युक्त प्रविष्टियों में कोई भी परिवर्तन कक्ष निरीक्षक द्वारा प्रमाणित होना चाहिये अन्यथा यह एक अनुचित साधन का प्रयोग माना जायेगा।
8. प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार वैकल्पिक उत्तर दिये गये हैं। प्रत्येक प्रश्न के वैकल्पिक उत्तर के लिये आपको उत्तर-पत्र की सम्बन्धित पंक्ति के सामने दिये गये वृत्त को उत्तर-पत्र के प्रथम पृष्ठ पर दिये गये निर्देशों के अनुसार पेन से गाढ़ा करना है।
9. प्रत्येक प्रश्न के उत्तर के लिये केवल एक ही वृत्त को गाढ़ा करें। एक से अधिक वृत्तों को गाढ़ा करने पर अथवा एक वृत्त को अपूर्ण भरने पर वह उत्तर गलत माना जायेगा।
10. ध्यान दें कि एक बार स्याही द्वारा अंकित उत्तर बदला नहीं जा सकता है। यदि आप किसी प्रश्न का उत्तर नहीं देना चाहते हैं, तो सम्बन्धित पंक्ति के सामने दिये गये सभी वृत्तों को खाली छोड़ दें। ऐसे प्रश्नों पर शून्य अंक दिये जायेंगे।
11. रफ़ कार्य के लिये प्रश्न-पुस्तिका के मुखपृष्ठ के अन्दर वाले पृष्ठ तथा अंतिम पृष्ठ का प्रयोग करें।
12. परीक्षा के उपरान्त केवल ओ०एम०आर० उत्तर-पत्र परीक्षा भवन में जमा कर दें।
13. परीक्षा समाप्त होने से पहले परीक्षा भवन से बाहर जाने की अनुमति नहीं होगी।
14. यदि कोई अभ्यर्थी परीक्षा में अनुचित साधनों का प्रयोग करता है, तो वह विश्वविद्यालय द्वारा निर्धारित दंड का/की, भागी होगा/होगी।