

## Life Science Paper II

**Time Allowed : 75 Minutes]**

**[Maximum Marks : 100**

**Note :** This Paper contains **Fifty (50)** multiple choice questions, each question carrying **Two (2)** marks. Attempt *All* questions.

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| <p>1. Sex determination in mammals is governed by TDy. The most probable candidate gene for TDy is :</p> <p>(A) Zfy<br/>(B) Bkm<br/>(C) Sry<br/>(D) Sox 9</p> <p>2. How does homologous recombination play a role in replicative transposition ?</p> <p>(A) Replicative transposition can only occur between homologous sequences</p> <p>(B) Proteins involved in homologous recombination are required to initiate replicative transposition</p> <p>(C) After the transposon is replicated, free copy of sequence is integrated into genome at the new site via homologous recombination</p> <p>(D) Replication of transposon sequence converts the hybrid DNA molecule into a cointegrate, which is uncoupled via homologous recombination</p> | <p>3. Which of the following types of genes are <i>not</i> found in mitochondrial genome ?</p> <p>(A) <i>t</i>RNA genes<br/>(B) respiratory chain genes<br/>(C) <i>r</i>RNA genes<br/>(D) glycolytic genes</p> <p>4. Genes responsible for determining the identification of the segments in <i>Drosophila</i> are the :</p> <p>(A) Gap genes<br/>(B) Pair-rule genes<br/>(C) Segment polarity genes<br/>(D) Homeotic selector genes</p> <p>5. In garden peas, yellow seed colour (Y) is dominant to green (<i>y</i>), round seed shape (R) is dominant to wrinkled (<i>r</i>) and tall (T) is dominant to dwarf (<i>t</i>). These traits segregate independently. What phenotypes are expected from the cross TyRRT<i>t</i> and YyRRTT ?</p> <p>(A) Yellow-wrinkled-dwarf and green-round-tall<br/>(B) Yellow-round-tall only<br/>(C) Yellow-round-tall and green-round-tall<br/>(D) Yellow-round-tall and green-wrinkled-dwarf</p> |
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6. Damage encountered during replication is repaired by :
- (A) Nucleotide excision repair system
  - (B) Base excision repair system
  - (C) Recombination repair system
  - (D) Mismatch repair system
7. Transgenic plants expressing the *CryA1* genes will show the following phenotype :
- (A) Pathogen resistance
  - (B) Insect resistance
  - (C) Drought tolerance
  - (D) Oxidative stress tolerance
8. Why is actin used as a control for transcriptome studies in vertebrates ?
- (A) It is used as a negative control as the gene is not expressed in vertebrates
  - (B) It is used as a negative control as its *mRNA* is degraded rapidly
  - (C) It is used as a positive control as its expression is fairly constant in different cell types
  - (D) It is used as a positive control as it is the most highly expressed gene in all cell types
9. Which of the following codons code for two amino acids based on its context ?
- (A) AUG
  - (B) GUG
  - (C) UGA
  - (D) GUA
10. For efficient attachment of sister chromatids to the spindle, which one of the following processes is required :
- (A) Inhibition of Cdk
  - (B) Aggregation of lamins in nuclear membrane
  - (C) Breakdown of nuclear membrane
  - (D) Rapid synthesis of cyclin B
11. Which of the following enzymes is *not* found in lysosome ?
- (A) Collagenase
  - (B) Mannosidase
  - (C) Acetylcholine esterase
  - (D) Hyaluronidase
12. Which of the following is *not* a part of host defence mechanism :
- (A) Lipopolysaccharide
  - (B) Macrophage
  - (C) Skin
  - (D) Interferon

13. Which of the following components exhibits peptidyl transferase activity ?
- (A) 16S *r*RNA
  - (B) 23S *r*RNA
  - (C) One of the 30S ribosomal protein
  - (D) One of the 50S ribosomal protein
14. Which one of the following is *not* a molecular motor ?
- (A) Myosin
  - (B) Kinesin
  - (C) Dynein
  - (D) Dynamin
15. Which one of the following immune cells has both myeloid and lymphoid lineage ?
- (A) Natural killer cell
  - (B) Dendritic cell
  - (C) Mast cell
  - (D) Monocyte
16. Which of the following can be used for distinguishing an activated T lymphocyte from a naive T cell ?
- (A) Presence of T cell receptor
  - (B) Presence of co-receptor
  - (C) CD28
  - (D) IL-2 receptor
17. Paraquat inhibits photosynthesis by blocking :
- (A) PS I
  - (B) PS II
  - (C) ATPase
  - (D) Cyt bf
18. Which of the following is the donor of new glucose molecules in glycogen synthesis ?
- (A) UDP glucose 1 phosphate
  - (B) UDP glucose 6 phosphate
  - (C) Glucose 1 phosphate
  - (D) UDP glucose
19. Protein denaturation does *not* involve the breakage of :
- (A) Hydrogen bonds
  - (B) Peptide bonds
  - (C) Ionic bonds
  - (D) Disulphide bonds
20. The connecting link between HMP shunt and lipid synthesis is ?
- (A) Acetyl CoA
  - (B) NADPH
  - (C) Sedoheptulose 7-phosphate
  - (D) NADH

21. Cytochrome P<sub>450</sub> is a member of which family of oxidoreductases ?
- (A) Catalase
  - (B) Hydroperoxidase
  - (C) Oxidase
  - (D) Oxygenase
22. A sigmoidal plot of substrate concentration ([S]) *versus* reaction velocity (V) indicates which of the following ?
- (A) Cooperative binding
  - (B) Competitive inhibition
  - (C) Michaelis-Menten kinetics
  - (D) Non-competitive inhibition
23. Which of the following proteins is *not* absolutely required for growth of *Saccharomyces cerevisiae* in a medium containing glucose as the sole source of carbon ?
- (A) Phosphoglycerate kinase
  - (B) Cytochrome oxidase
  - (C) Hexokinase
  - (D) Glyceraldehyde 3 phosphate dehydrogenase
24. Purine synthesis differs from pyrimidine synthesis. Which of the following is *true* ?
- (A) Purine ring is synthesized on pentose sugar
  - (B) Purine ring is synthesized and then coupled to pentose sugar
  - (C) Pyrimidine ring is synthesized on pentose
  - (D) Pyrimidine ring is derived from purine ring
25. Which of the following statements about species and speciation is *true* ?
- (A) Hybrids are always selected against in nature
  - (B) Reproductive isolating mechanisms are usually selected against in nature
  - (C) A single species can evolve through undergoing adaptive radiation and produce a cluster of species
  - (D) Species usually have only one type of reproductive isolating mechanism

26. A classical example of micro-evolutionary process is :
- (A) development of penicillin resistant bacteria
  - (B) recurrence of pest
  - (C) appearance of six fingers in both left and right hand and in some human newborns
  - (D) occurrence of non-disjunction in population of dividing cell
27. Which of the following statements is most likely to be *true* about two species ?
- (A) They occupy different niches
  - (B) They can never hybridize naturally
  - (C) Their chromosome number will differ
  - (D) Their structural genes may show 25-50% sequence homology
28. A rare allele which is being selected against :
- (A) is found predominantly in heterozygotes
  - (B) has selection co-efficient of 0.01
  - (C) can be said to be in linkage disequilibrium
  - (D) is found to be a result of bottleneck
29. A similar feature (at the molecular level) occurring in different species whose ancestral lineages differ from each other is called :
- (A) parallelism
  - (B) convergent evolution
  - (C) divergent evolution
  - (D) homology
30. Which of the following processes is thought to underlie concerted evolution ?
- (A) Gene conversion
  - (B) Lateral gene transfer
  - (C) Programmed mutation
  - (D) Transposition
31. According to Stebbins :
- (A) Dicotyledons evolved before monocotyledons
  - (B) Dicotyledons evolved from monocotyledons
  - (C) Monocotyledons and dicotyledons evolved parallel
  - (D) Sporophyte evolution is independent of gametophyte

32. For each molecule of  $\text{ATP} \rightarrow \text{ADP} + \text{Pi}$ , the  $\text{Na}^+/\text{K}^+$  ATPase moves ..... across the plasma membrane.
- (A)  $2\text{K}^+$  and  $2\text{Na}^+$  ions  
(B)  $2\text{K}^+$  and  $3\text{Na}^+$  ions  
(C)  $3\text{K}^+$  and  $2\text{Na}^+$  ions  
(D)  $3\text{K}^+$  and  $3\text{Na}^+$  ions
33. Signal transduction does *not* involve :
- (A) Interaction of a molecule with cell surface receptor  
(B) Phosphorylation of membrane bound proteins  
(C) Production of secondary messengers  
(D) Activation of nuclear membrane proteins
34. Mutations that increase the yield of a microbial product are most likely to occur in :
- (A) Biosynthetic genes  
(B) Catabolic genes  
(C) Plasmid-encoded genes  
(D) Regulatory genes
35. Antimalarial drug primaquine causes side effects in some people leading to RBC lysis and jaundice. This is due to a deficiency in the enzyme :
- (A) Glucose 6P dehydrogenase  
(B) Fructose 6P dehydrogenase  
(C) Aldolase  
(D) Hexokinase
36. Intracellular concentration of the following ions in a plant cell are :
- (A)  $\text{K}^+ > \text{Ca}^{2+} > \text{Na}^+$   
(B)  $\text{Ca}^{2+} > \text{K}^+ > \text{Na}^+$   
(C)  $\text{K}^+ > \text{Na}^+ > \text{Ca}^{2+}$   
(D)  $\text{Na}^+ > \text{K}^+ > \text{Ca}^{2+}$
37. Which of the following chloroplastic proteins is rapidly turned over in the presence of light ?
- (A) Light harvesting chlorophyll binding proteins  
(B) Plastoquinone binding proteins  
(C) Plastocyanin binding protein  
(D) NADP reductase

38.  $Q_{10}$  is associated with one of the following specific processes :
- (A) Growth rate
  - (B) Photosynthesis
  - (C) Oxygen affinity of haemoglobin
  - (D) Breathing rate
39. The aortic valve :
- (A) Prevents mixing of auricular and ventricular blood
  - (B) Prevents back flow of blood from auricles to ventricles
  - (C) Prevents mixing of blood between right and left auricles
  - (D) Prevents back flow of blood from major arteries to ventricles
40. The centre of origin of maize is :
- (A) Tropical America
  - (B) Brazil
  - (C) Peru
  - (D) Central Asia
41. Field gene banks are least useful for :
- (A) Ornamental species
  - (B) Plantation crops
  - (C) Forest trees
  - (D) Wild relatives of crops
42. Remote sensing followed by broad scale sampling is used to assess :
- (A) genetic diversity
  - (B) taxonomic diversity
  - (C) species diversity
  - (D) ecosystem diversity
43. DNA barcoding for species identification involves the use of :
- (A) VNTRs
  - (B) Cytochrome oxidase gene
  - (C) *t*RNA gene family
  - (D) Actin and vimentin
44. Classification based on overall similarities and differences is :
- (A) Phylogenetic classification
  - (B) Phenetic classification
  - (C) Natural classification
  - (D) Artificial classification

45. Susceptibility to extinction of Blue Whale has been attributed to :
- (A) small population size
  - (B) low reproductive rate
  - (C) both (A) and (B)
  - (D) habitat loss
46. Conservation of cultivated plants has been mandated to the :
- (A) National Bureau of Plant Genetic Resources
  - (B) World Conservation Union
  - (C) Ministry of Environment and Forests
  - (D) National facility for plant tissue culture Repository
47. Mint oil is obtained from :
- (A) *Mentha spicata*
  - (B) *Mentha piperata*
  - (C) *Peperomia pallida*
  - (D) *Piper nigrum*
48. The ability of a genotype to modify its growth and development in response to changes in environment is known as :
- (A) Allelopathy
  - (B) Phenotypic plasticity
  - (C) Adaptability
  - (D) Mutatability
49. In uncrowded, resource-rich environment, natural selection would favour organisms which are able to achieve rapid population growth. Such organisms are termed as :
- (A) *k*-strategists
  - (B)  $\gamma$ -strategists
  - (C)  $\alpha$ -strategists
  - (D)  $\beta$ -strategists
50. The relative efficiency of scavenging of nutrients by rainwater is called :
- (A) Deposition velocity
  - (B) Carbonation
  - (C) Weathering
  - (D) Wash-out ratio



NOV - 34211/II

**ROUGH WORK**

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**ROUGH WORK**

Test Booklet No.

प्रश्नपत्रिका क्र.

**F**

Signature of Invigilators

1. ....

2. ....

Seat No.

(In figures as in Admit Card)

Seat No. (In words) .....

.....

Answer Sheet No.

[Maximum Marks : 100]

Time Allowed : 75 Minutes]

Number of Pages in this Booklet : 12

**Instructions for the Candidates**

- Write your Seat Number in the space provided on the top of this page. Write your Answer Sheet No. in the space provided for Answer Sheet No. on the top of this page.
- Write and darken Test Booklet No. on OMR Answer Sheet.
- This paper consists of **Fifty (50)** multiple choice type of questions.
- Each item has four alternative responses marked (A), (B), (C) and (D). You have to darken the responses as indicated below on the correct response against each item.  
**Example :** (A) (B) (C) (D)  
Where (C) is the correct response.
- Your responses to the items for this paper are to be indicated on the Answer Sheet only. Responses like (x) (□) (/) and **light shaded responses will not be considered/evaluated.**
- Read instructions given inside carefully.
- One Sheet is attached at the end of the booklet for rough work.
- You should return the test booklet and answer sheet **both** to the invigilator at the end of the paper and should not carry any paper with you outside the examination hall.
- Answers marked on the body of the question paper will not be evaluated.

**परीक्षार्थीसाठी सूचना**

- या पानावरील वरच्या कोपऱ्यात आपला आसन क्रमांक तसेच आपणास दिलेल्या उत्तरपत्रिकेचा क्रमांक त्याखाली लिहावा.
- प्रश्नपत्रिका क्रमांक OMR उत्तरपत्रिकेवर दिलेल्या रकान्यात लिहून त्याप्रमाणे काळा करावा.
- या प्रश्नपत्रिकेत **पन्नास** बहुनिवड प्रश्न आहेत.
- प्रत्येक प्रश्नासाठी (A), (B), (C) आणि (D) अशी चार विकल्प उत्तरे दिली आहेत. त्यातील योग्य उत्तराचा रकाना खाली दर्शविल्याप्रमाणे ठळकपणे काळा करावा.  
**उदा.** (A) (B) (C) (D)  
जर (C) हे योग्य उत्तर असेल तर.
- या प्रश्नपत्रिकेतील प्रश्नांची उत्तरे उत्तरपत्रिकेमध्येच द्यावीत. उत्तराच्या रकान्यामध्ये (x) (□) (/) व **अस्पष्टपणे काळे केलेले उत्तर ग्राह्य धरले जाणार नाही.**
- आत दिलेल्या सूचना काळजीपूर्वक वाचाव्यात.
- कच्च्या कामासाठी प्रश्नपत्रिकेच्या शेवटी कोरे पान जोडले आहे.
- या पेपरची परीक्षा संपल्यानंतर प्रश्नपत्रिका व उत्तरपत्रिका **दोन्ही** पर्यवेक्षकांना परत करावी. यातील कोणताही कागद तुमच्या बरोबर परीक्षा केंद्राबाहेर नेण्यास सक्त मनाई आहे.
- प्रश्नपत्रिकेवर दर्शविलेली उत्तरे तपासली जाणार नाहीत.