2017

M.Sc.

1st Semester Examination

HUMAN PHYSIOLOGY

PAPER—PHY-101

Subject Code—30

Full Marks : 40

Time : 2 Hours

The figures in the right-hand margin indicate full marks.

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

Illustrate the answers wherever necessary.

(Unit—01)

Answer *all* questions from the following :

1. (a) Write down the overall mode of action of mitochondrial electron transport chain.

(b) Write down the structural basis and reaction steps catalysed by NADH–Q–Oxidoreductase. 2+(1½+1½)

Or

(a) What is chemiosmotic hypothesis of generation of ATP ?

(b) What is F_1F_0 AT Pase ?

(c) Write down the coupled reaction of oxidative phosphorylation. 2+1+2

2. (a) How would you derive Michaelis-Menten equation ? What are the limitations of this equation ?

(b) An enzyme-catalyzed reaction has a km of 1 mM and a Vmax of 5 $nM.S^{-1}$. What is the reaction velocity when the substrate concentration is 0.25 mM ?

2½+2½

Or

(a) A T Case consists of separable catalytic and regulatory subunits — Justify it.

(b) Why transition-state analogue is better competitive inhibitor than product ? 3+2

3. (a) Write notes on : 2½+2½

(i) Ramachandran plot ;

(ii) Tertiary structure of protein.

Or

(a) What is signal peptide ? Describe the SRP cycle.

(b) Mention the name of different protein kinases with their specificity for different proteins. (1+2)+2

4. (a) Discuss critically the mechanism of formation of acetyl CoA by pyruvate dehydrogenase complex.

(b) Mention the main steps of eicosanoid production. 3+2

Or

Write down the role of cortisol in carbohydrate and protein metabolism. 2½+2½

(Unit—02)

Answer *all* questions from the following :

1. (a) Describe the detail Mechanism of compactional changes of Metaphase chromosome.

(b) What is Chargaff's Rule and mention its importance in base stacking. 3+2

Or

(a) Mention the configurational difference between A-DNA and Z-DNA.

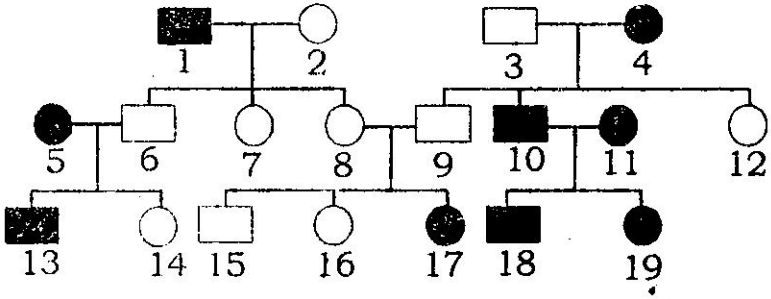
(b) Illustrate the structure and function of nucleosome. 2½+2½

2. (a) Briefly describe the replication process of chromosome termini with a suitable digram.

(b) A plant heterozygous for three independent assorting genes, Aa Bb Cc, is self-fertilized. Among the offspring, prediet the frequency of AaBbCc. 3+2

Or

(a) In the pedigrees below, determine whether the trait is more likely to be dominant or recessive allele? Mention the cause?



(b) Describe the structure and function of DNA polymerase III ? 2½+2½

3. (a) Which of the following nuclear pre-mRNA sequences potentially contains an intron.

I> 5′ UGACCAAUGCCAGGAGCCGCGGAAUCUGAACAGCAG 3′

II> 5′ UAGGAUCGGCACGUCCACCGGAAGCUUGUCAUGAC 3′

III> 5′ UAGACCGUGCACGUCCACCGCCUUCGUACUAUGACGA 3′

IV> 5′ UGACAGUGAAGUCACCGAACCACUGAGCAAGCAGAA 3′

(b) What m-RNA sequence would be expected after intron splicing ?

(c) A segment of DNA in *E. Coli* has the following sequence of nucleotide pairs :

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5′ TTGACATGCACGATGGAACGACCTATAATGAGCAATGGC
   |||||||||||||||||||||||||||||||||||||||
3′ A ACTGTACGTGCTACCTTGCTGGATATTAGTCGTTACCG

   TGTATGCGCGCCGTTACCA-3′
   ||||||||||||||||||||
  ACATACGCGCGGCAATGGT-5′
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When this sequence of DNA is transcribed by RNA polymerase, what will be the sequence of RNA transcript. 2+1+2

Or

(a) Describe the initiation of transcription by RNA polymerase II ?

(b) Which protein is essential for the termination of transcription in *E.Coli.* How this protein helps in termination of transcription ? 3+(½+1½)

4. (a) What is O-linked and N-linked glycosylation ?

(b) During N-glycosylation how does dolichol phosphate synthesize core oligosaccharide ? 2+3

Or

What is frameshift mutation ? Describe the mechanism of transposon induced mutation ? 2+3

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