

Question Booklet No. ....

*(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, Please ensure that you have got the correct booklet and it contains all the pages in correct sequence and 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.*
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 Roll No. and OMR sheet No. on the Question Booklet.*
7. *Any changes in the aforesaid-entries is to be verified by the invigilator, otherwise it will be taken as unfair means.*
8. *This Booklet contains 40 multiple choice questions followed by 10 short answer questions. For each MCQ, 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 pen as mentioned in the guidelines given on the first page of the Answer Sheet. For answering any five short Answer Questions use five Blank pages attached at the end of this Question Booklet.*
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 marks).
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 *both OMR Answer Sheet and Question Booklet* 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.

**Total No. of Printed Pages : 15**

**FOR ROUGH WORK**

# Research Entrance Test – 2014

No. of Questions : 50

**Time : 2 Hours**

**Full Marks : 200**

- Note:** (i) This Question Booklet contains **40** Multiple Choice Questions followed by **10** Short Answer Questions.
- (ii) Attempt as many MCQs as you can. Each MCQ carries **3 (Three)** marks. **1 (One)** mark will be deducted for each incorrect answer. Zero mark will be awarded for each unattempted question. If more than **one** alternative answers of MCQs seem to be approximate to the correct answer, choose the closest one.
- (iii) Answer only **5** Short Answer Questions. Each question carries **16 (Sixteen)** marks and should be answered in **150-200** words. Blank **5 (Five)** pages attached with this booklet shall only be used for the purpose. Answer each question on separate page, after writing Question No.

1. Decrease in biodiversity in tropical countries is mainly due to :  
(1) Urbanization (2) Deforestation  
(3) Pollution (4) Soil erosion
2. Where does glycolysis occur in a cell ?  
(1) Chloroplast (2) Mitochondria (3) Cytoplasm (4) Golgibody
3. The process that accounts for transfer of genetic information from DNA to RNA is called as :  
(1) Translocation (2) Translation (3) Transformation (4) Transcription
4. Leydig's cells produce :  
(1) Thyroxine (2) Growth hormone  
(3) Testosterone (4) Progesterone
5. A tumor suppressor gene which is known as "Guardian of the genome" is :  
(1) myc (2) P<sup>53</sup> (3) Sr C (4) H-Ras
6. Which is the function of interleukins ?  
(1) Stimulation of wound healing  
(2) Treatment of infertility  
(3) Dissolving blood clot  
(4) Enhancement of action of immune system
7. Which of the following is **not** an anticoagulant ?  
(1) Heparin (2) Protamine sulphate  
(3) Warfarin (4) Hirudin
8. Which of the following is **not** a part of triple response ?  
(1) White reaction (2) Red reaction (3) Wheal (4) Flare
9. Virus envelope is known as :  
(1) Capsid (2) Virion (3) Nucleoprotein (4) Core
10. Peptide synthesis inside a cell takes place in :  
(1) Mitochondria (2) Chloroplast (3) Ribosomes (4) Chromoplast

11. Which source has been particularly fruitful in finding novel antitumour agents such as bryostatins and dolostatins ?
- (1) Marine sources
  - (2) Venoms and toxins
  - (3) Combinatorial chemistry
  - (4) Animals
12. For sequence of 5'-AGGTCCG-3', there is a complementary sequence :
- (1) 5'-ACCGTAAG-3'
  - (2) 3'-TCCAGGC-5'
  - (3) 3'-TGGACCX-5'
  - (4) 5'-TCCAGGC-3'
13. Nucleic acids are polymers of the following monomers :
- (1) Nucleosides
  - (2) Nucleotides
  - (3) Pentose sugar
  - (4) Hexose-phosphate sugar
14. Centrosome is characterized by :
- (1) Two centrioles each one is made of 9 triplets of microtubules
  - (2) Two ceneriles each one is made of (9+2) pattern of microtubules
  - (3) One centriole made of 9 triplets of microtubules
  - (4) Not identical with the basal body
15. The typical temperature for an autoclave (operating at 15 pounds per square inch of pressure) is :
- (1) 121°C
  - (2) 100°C
  - (3) 63°C
  - (4) 200°C
16. Studying the presence of mRNAs in a sample is useful because :
- (1) It contains introns, which are the protein coding sequences
  - (2) It lacks exons, which do not code for proteins
  - (3) It reflects the genes that are being actively transcribed
  - (4) It reflects the total number of genes in the genome

17. The reverse transcriptase-polymerase chain reaction (RT-PCR) is useful because :
- (1) It can be used to measure protein levels in a cell population
  - (2) It can be used to study chromatin
  - (3) It can be used to detect the presence of specific transcripts in a tissue
  - (4) It can be used to visualize distribution of transcripts in a tissue section
18. Something that is *not* characteristic of cancer :
- (1) Apoptosis
  - (2) Limitless replication potential
  - (3) Metastasis
  - (4) Loss of both copies of a tumor suppressor gene
19. Cancers of epithelial origin are called :
- (1) Glioma                      (2) Sarcoma                      (3) Leukemia                      (4) Carcinoma
20. Microsatellites :
- (1) Are tandemly repeated sequences
  - (2) Are not very common in the human genome
  - (3) Are usually longer than 200 bp
  - (4) Are normally found at the end of chromosomes
21. Cloning vectors :
- (1) Are always plasmids
  - (2) Contain an origin of replication
  - (3) Have an average size of 20 kilobase pairs (kb)
  - (4) Contain always an antibiotics resistance gene
22. PET scan is done using radioisotopes emitting :
- (1)  $\alpha$ -rays    (2) positrons
  - (3)  $\beta$ -particles    (4) Thermal neutrons

- 23.** Immunoprecipitation involves the purification of :
- (1) Antigen (2) Antibody  
(3) Antigen only (4) Antigen-antibody complex
- 24.** What sequence is palindrome ?
- (1) 5'-ACGGATTCGC-3' (2) 5'-ATG-3'  
(3) 5'-CCATT-3' (4) 5'-AGGCCT-3'
- 25.** A 200  $\mu$ l of PCR mixture has 100 template DNA molecules and the reaction was performed for 10 cycles. How many molecules of amplicons will be generated ?
- (1)  $2.0 \times 10^5$  (2)  $1.024 \times 10^5$  (3)  $2.048 \times 10^4$  (4)  $1.0 \times 10^3$
- 26.** Cancer causing gene is called as a(n) :
- (1) Initiator (2) Promoter (3) Oncogene (4) Proto-oncogene
- 27.** Increase blood flow to a cancerous tumor is called :
- (1) Anaplasia (2) Metastasis (3) Malignancy (4) Vascularization
- 28.** Mature dendritic cells are capable for which of the following :
- (1) Activating antigen-specific T-cells  
(2) Removing red blood corpuscles  
(3) Producing bradykinin  
(4) Extracellular killing of target cells
- 29.** The oncoprotein Ras is a :
- (1) Kinase (2) GTPase (3) ATPase (4) Phosphatase
- 30.** Immunoglobulin G was fractionated by size exclusion chromatography and it was observed to have a molecular mass of 150 kDa. SDS-PAGE analysis under reducing conditions revealed bands of size 50 kDa and 25 kDa. The oligomeric status of the protein consists of :
- (1) 3 polypeptide chains of molecular mass 50 kDa  
(2) 6 polypeptide chains of molecular mass 25 kDa  
(3) 1 polypeptide chains of 50 kDa & 4 polypeptide chains of 25 kDa  
(4) 2 polypeptide chains of 50 kDa & 2 polypeptide chains of 25 kDa

31. During cell division, the level of cyclin A is increased in which of the following phase :
- (1) G<sub>1</sub>-Phase      (2) G<sub>2</sub>-Phase      (3) S-Phase      (4) M-Phase
32. Lumpectomy is a surgical procedure in which :
- (1) Brain tumor removed      (2) Small part of breast removal  
(3) Liver removed      (4) Large intestine removed
33. Incubation of cell line with DMEM culture media, the colour of media changes into yellowish orange colour because :
- (1) pH increase      (2) pH decrease  
(3) Death of cells      (4) Growth of cells
34. In tissues/cell culture technique, Fetal Bovine serum used as source of :
- (1) Vitamins      (2) Viscous material  
(3) Growth factor      (4) Minerals
35. The regulating authority for use of radiation in India is :
- (1) BARC      (2) DRDO      (3) ICRP      (4) AERB
36. In 2D Electrophoresis, first dimension is :
- (1) Isoelectric focusing      (2) SDS-PAGE  
(3) Molecular-Mass detection      (4) Molecular structure determination
37. The cell isolated from tumor and culture is known as :
- (1) Cell line      (2) Primary cell culture  
(3) Established culture      (4) Cancer cell line
38. Which is *not* related to RFLP :
- (1) Different length of fragment produced  
(2) Radioactivity  
(3) PCR  
(4) Restriction digestion enzyme

39. Which of the following is *not* a characteristic of cancer cells ?
- (1) Loss of cell cycle control                      (2) Transplantability  
(3) Loss of contact inhibition                      (4) Multipotency
40. Most popular anticancer Tamoifen used for Breast cancer treatment is a :
- (1) Targeted anti-endocrine therapy  
(2) Targeted anti-receptor tyrosine kinase therapy  
(3) Antibody against cancer  
(4) Non-targeted therapy

*Attempt any five questions. Write answer in 150-200 words. Each question carries 16 marks. Answer each question on separate page, after writing Question Number.*

1. What are epigenetics changes ? How is it related to cancer ?
2. Describe the different stages of mitosis with a suitable diagram.
3. Briefly describe the various stages of polymerase chain reaction (PCR).
4. Briefly describe the western blotting technique and discuss its applications.
5. What is Central Dogma ? Briefly discuss the procedures.
6. Discuss the various causes of cancer.
7. How micro RNA regulate gene expression ?
8. What is Immune surveillance ?
9. What do you understand by the terms nude/SCID mice and tissue/cell culture. Discuss their role in clinical research.
10. Describe briefly the basis behind Fluorescence Activated Cell sorting (FACS).

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**FOR ROUGH WORK**

