

**ENTRANCE EXAMINATION, 2017**  
**Int. M Sc/Ph.D Integrated Biotechnology**

**Time: 2 hours**

**Maximum Marks: 75**

**HALL TICKET NUMBER:**

**BOOKLET: I**

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**INSTRUCTIONS:**

1. Enter your Hall Ticket number in the OMR answer sheet given to you. Also write the Hall Ticket number in the space provided above
2. Please read carefully the instructions before answering the questions.
3. Answers are to be marked on the OMR answer.
4. Hand over the OMR answer sheet at the end of the examination to the Invigilator.
5. The question paper contains 75 questions of multiple choice types printed in 13 pages, including this page. OMR answer sheet provided separately.
6. The question paper consists of part A and part B. The marks obtained in part A will be taken into consideration in case of tie, when more than one student gets equal marks to prepare the merit list.
7. All questions carry one mark each.
8. There is negative marking, each wrong answer carries 0.33 negative mark.
9. Non-programmable scientific calculators are permitted.
10. Cell/Mobile Phones are strictly prohibited in the examination hall.

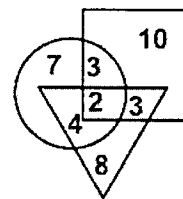
**PART-A**

- Which of the following is correct according to boiling point of the compounds?
  - HF > HCl > H<sub>2</sub>O > NH<sub>3</sub>
  - HF > H<sub>2</sub>O > HCl > NH<sub>3</sub>
  - H<sub>2</sub>O > HF > HCl > NH<sub>3</sub>
  - H<sub>2</sub>O > HF > NH<sub>3</sub> > HCl
- 250 J of heat is required to increase the temperature of an ideal gas by 10 K at constant pressure. If the same gas is heated at constant volume, the amount of heat required to increase the temperature by 10K will be
  - 126 J
  - 167 J
  - 250 J
  - 333 J
- The number of electrons in the outer orbital of semiconductors will be
  - Two
  - Four
  - Eight
  - Any of the above
- Which of the following the equation represents the line with a y-intercept of 70 and a slope of 15?
  - $Y=15x + 70$
  - $X=70y + 15$
  - $Y=70x + 15$
  - $X=15y + 70$
- What is the simple interest earned on Rs.50,000 invested for 6 months at a rate of 5% per annum?
  - Rs. 2,500
  - Rs. 750
  - Rs. 1,250
  - Rs. 625
- The sides of a rectangle are in the ratio of 4:3 and its area is 108 cm<sup>2</sup>. The perimeter of the rectangle in cm is
  - 22
  - 32
  - 42
  - 52

7. Which one of the following statements is correct?
- A) Cellulose is a homopolymer of glucose
  - B) Insulin is a heteropolymer of glycine and tryptophan
  - C) Lactose consists of glucose and fructose
  - D) Maltose consists of galactose and glucose
8. Which one of the following breaks an ester bond?
- A) Lipase
  - B) Hexokinase
  - C) Polymerase
  - D) Helicase
9. In the isolation of DNA, removal of protein and RNA is carried out by enzymes \_\_\_\_\_ and \_\_\_\_\_ respectively
- A) Protease and cellulose
  - B) Lysozyme and ribonuclease
  - C) Protease and ribonuclease
  - D) Ribonuclease and chitinase
10. Highest electropositive element is
- A) Cs
  - B) Fe
  - C) Au
  - D) Fr
11. MgO composed of
- A) Covalent bond
  - B) Ionic bond
  - C) Metallic bond
  - D) Coordinated covalent bond
12. The number of moles of solute present in 600 ml of 0.05 M solution is
- A) 0.003
  - B) 0.03
  - C) 0.30
  - D) 3.0
13. Absorption of dye solution on a blotting paper is due to
- A) Viscosity of the dye
  - B) Diffusion of the dye
  - C) Capillary force
  - D) All the above

14. Area of a circle of radius 5 cm is .... Sqcm  
A)  $3.14 \times 5$   
B)  $3.14 \times 5 \times 5$   
C)  $3.14 \times 5 \times 5 \times 5$   
D)  $14 \times 2 \times 5$
15. Raju and Ramu own two pieces of adjacent lands. The area of both the lands together in square meters is three times the area of Ramu's and is 750 square meters. What is the area of Raju's land?  
A) 500 square meters  
B) 450 square meters  
C) 300 square meters  
D) 750 square meters
16. Which of the following molecules does not have a net dipole moment?  
A)  $\text{H}_2\text{O}$   
B)  $\text{NH}_3$   
C)  $\text{BF}_3$   
D)  $\text{BrF}_5$
17. Atoms that have same number of protons but different number of neutrons are called  
A) Isotope  
B) Isobar  
C) Isotone  
D) Isomer
18. The orthocenter of the triangle formed by  $(-1, -3)$ ,  $(-1, 4)$ ,  $(5, -3)$  is  
A)  $(2, 7)$   
B)  $(-1, -3)$   
C)  $(-3, -4/3)$   
D)  $(4, 3)$
19. Which term of the AP: 5, 2, -1, .... is -22?  
A) 10<sup>th</sup>  
B) 12<sup>th</sup>  
C) 9<sup>th</sup>  
D) 8<sup>th</sup>
20. Which one of the following values will be positive?  
A)  $\sin(240)$   
B)  $\cosine(240)$   
C)  $\cos(240)$   
D)  $\tan(240)$

21. If circle represents guitarists, square represents singers and triangle represents dancers, the number of people who can sing and dance, but cannot play guitar are



- A) Five  
 B) Three  
 C) Two  
 D) One
- 
22. If a person standing on stationary boat throws a ball of 0.5 kg which travels with a speed of 10 m/s, what will be the speed of boat's movement after throwing the ball? Consider that the weight of the person and boat is 50 kg each and friction between the lake water and boat is insignificant.
- A) 0.05 m/s  
 B) 0.10 m/s  
 C) 0.20 m/s  
 D) 0.50 m/s
23. A light of wavelength traveling in air is 480 nm which incidents on glass having refractive index of 1.5. The wavelength of light inside the glass will
- A) 320 nm  
 B) 480 nm  
 C) 560 nm  
 D) 720 nm
24. The capacitance of a capacitor storing 0.5 C at 10 V is
- A) 20F  
 B) 10F  
 C) 0.1F  
 D) 0.05F
25. Bronze is an alloy of
- A) Copper and silver  
 B) Copper and mercury  
 C) Copper and tin  
 D) Copper and iron

**PART-B**

26. Glyceraldehyde-3-phosphate is an isomer of
- A) Fructose-6-phosphate
  - B) Dihydroxy acetone phosphate
  - C) Glucose-6-phosphate
  - D) Glycerol-3-phosphate
27. Codon bias and CpG islands are useful in eukaryotic genome to
- A) Find the DNA binding domains
  - B) Identify gene function
  - C) Identify open reading frame
  - D) Identify repeats in DNA
28. The dye used to track the migration of proteins in the polyacrylamide gel electrophoresis
- A) Xylene cyanol
  - B)  $\beta$ -mercaptoethanol
  - C) Bromophenol blue
  - D) Coomassie brilliant blue
29. Which technique can be used to detect the protein-protein interaction?
- A) Co-immunoprecipitation
  - B) Yeast- two hybrid system
  - C) FRET Microarray
  - D) All the above
30. 'Transversion' is a type of
- A) Chromosomal aberration
  - B) Point mutation
  - C) Suppressor mutation
  - D) None of the above
31. Which of the following methods could be most readily employed to identify tryptophan?
- A) Electrophoresis
  - B) Ultraviolet spectroscopy
  - C) Gel filtration chromatography
  - D) Analytical ultracentrifugation

32. Which vitamin is produced by the microorganisms present in normal microbiota?
- A) Vitamin A
  - B) Vitamin C
  - C) Vitamin D
  - D) Vitamin K
33. In cation exchange chromatography, the solid support should be
- A) Neutral
  - B) Zwitterion
  - C) Positively charged
  - D) Negatively charged
34. The term 'hyperglycemia' refers to
- A) Increased blood sugar
  - B) Decreased blood sugar
  - C) Inhibits the process of gluconeogenesis
  - D) Stimulation of cellular glucose uptake by glucagon
35. Chemically 'Agar' belongs to one of the following macromolecules
- A) Nucleic acids
  - B) Proteins
  - C) Carbohydrates
  - D) Lipids
36. Which of the following set of amino acids consists of only apolar/hydrophobic side chains?
- A) Ala, Leu, Ile, Phe
  - B) Ser, Gly, Pro, Leu
  - C) Gly, Lys, Asn, Arg
  - D) Ser, Glu, Asp, Thr
37. The chromatography in which the ligand is immobilized to the column matrix is
- A) Gel Filtration
  - B) Affinity
  - C) Ion exchange
  - D) Hydrophobic
38. The compound which cannot be metabolized to pyruvate is
- A) Alanine
  - B) Cysteine
  - C) Serine
  - D) Phenylalanine

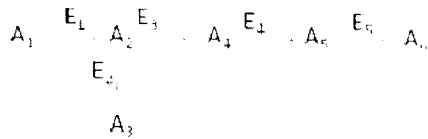
39. STRING is a database of
- A) Protein sequences
  - B) Protein structures
  - C) Protein-Protein interaction networks
  - D) DNA sequences
40. The immunoglobulin that results in the histamine release is
- A) IgG
  - B) IgM
  - C) IgE
  - D) IgD
41. The slope  $K_m/V_{max}$  indicate
- A) Competitive inhibition
  - B) Un-Competitive inhibition
  - C) Non-Competitive inhibition
  - D) Allosteric Inhibition
42. Gene bank is a nucleic acid sequence database which is maintained by
- A) DNA database Japan
  - B) National Centre for Biotechnology Information (NCBI)
  - C) European Molecular Biology Laboratory
  - D) Sanger Institute
43. Characteristic feature of allosteric protein is
- A)  $K_{cat}$  is very high
  - B) Cooperativity
  - C) Aggregation
  - D) Helix-coil transition
44. .... has very restricted conformational freedom
- A) Pro
  - B) Gly
  - C) His
  - D) Trp
45. Hoogsteen hydrogen bonding is present in
- A) Z-DNA
  - B) RNA
  - C) Triplex DNA
  - D) B-DNA



46. If a heterogenous offspring is crossed with homogenous recessive parent, such activity is called
- A) Back cross
  - B) Reciprocal cross
  - C) Test cross
  - D) Dihybrid cross
47. Aneuploidy refers to
- A)  $2n$
  - B)  $2n+1$
  - C)  $4n$
  - D)  $4n+1$
48. Following is associated with breast cancer
- A) BRCA1
  - B) BRCA2
  - C) Both
  - D) Neither
49. SOS response involves
- A) Thymidine dimer formation
  - B) DNA strand breaks
  - C) Lex A cleavage
  - D) All the above
50. Hydrogen bond is formed between
- A) An uncharged hydrogen atom with an uncharged atom
  - B) A partially positively charged hydrogen atom with a partially negatively charged electronegative atom
  - C) A partially positively charged hydrogen atom with an uncharged electronegative atom
  - D) An uncharged hydrogen atom with a partially negatively charged electronegative atom
51. The severely affected people who possesses most common form having more than 1000 repeats of the CTG triplet is
- A) Myotonic dystrophy
  - B) Fragile X syndrome
  - C) Retinoblastoma
  - D) None of the above

52. Protein surface is predominantly comprises of ..... amino acid residues
- A) Polar
  - B) Apolar/hydrophobic
  - C) Neutral
  - D) Charged
53. In an ideal  $\alpha$ -helix every carbonyl oxygen of an amino acid residue "i" is hydrogen bonded to an amide hydrogen of amino acid residue "....."
- A) i+1
  - B) i+2
  - C) i+3
  - D) i+4
54. Which of the following statements concerning proteins is CORRECT?
- A) Alpha helices are stabilized by hydrogen bonding between the carbonyl oxygen and the amide hydrogen of amino acids.
  - B) Proteins are the only molecules that can catalyze reactions in the cell.
  - C) The peptide bond is formed through a hydrolysis reaction.
  - D) Disulfide bonds are formed from ionic interactions between charged amino acids.
55. Which statement about mitochondrial genomes is FALSE?
- A) They use a genetic code different from the standard eukaryotic genetic code.
  - B) Their genes do NOT have introns.
  - C) They probably arose as a result of a symbiotic event with formerly free living organisms.
  - D) They contain genes necessary for all mitochondrial functions.
56. Which of the following has the highest percentage of modified bases?
- A) hnRNA
  - B) mRNA
  - C) rRNA
  - D) tRNA

57. Which of the following enzymes in the anabolic pathway given below is most likely to catalyze the rate limiting step in the biosynthesis of A<sub>6</sub>?



- A) E<sub>1</sub>  
 B) E<sub>2</sub>  
 C) E<sub>3</sub>  
 D) E<sub>5</sub>
58. Which one is a common compound shared by the TCA cycle and the urea cycle?  
 A) α-keto glutarate  
 B) Argino succinic acid  
 C) Fumarate  
 D) Aspartic acid
59. Which of the following statements best describe an allosteric binding site?  
 A) It is a binding site containing amino acids with aliphatic side chains.  
 B) It is a binding site that can accept a wide variety of differently shaped molecules.  
 C) It is a binding site, which is separate from the active site, and affects the activity of an enzyme when it is occupied by a ligand.  
 D) It is a description of an active site which has undergone an induced fit.
60. BCG vaccine is used for  
 A) TB  
 B) Cholera  
 C) Plague  
 D) Influenza
61. Chemical mediated introduction of DNA into a bacterial cell termed as  
 A) Transformation  
 B) Transcription  
 C) Transduction  
 D) Conjugation
62. The antibiotic that does not bind to the ribosome is  
 A) Streptomycin  
 B) Tetracycline  
 C) Erythromycin  
 D) Penicillin

63. Monoclonal antibodies are against
- A) Single antigen
  - B) Single epitope
  - C) Single paratope
  - D) Single antibody
64. The cell wall of the following is not rigid in
- A) Fungus
  - B) Archaea
  - C) Protozoa
  - D) Bacteria
65. The amino acid that shows characteristic absorbance at 280 nm is
- A) Methionine
  - B) Lysine
  - C) Valine
  - D) Tryptophan
66. The codon UAA codes for
- A) Methionine
  - B) Threonine
  - C) Tryptophan
  - D) Termination
67. 'Toxemia' means
- A) A disease caused by toxins
  - B) Circulation of toxins in the blood
  - C) Secretion of toxins by microbes
  - D) Inactivation of toxins
68. Collagen has -----
- A) Single helical structure
  - B) Double helical structure
  - C) Triple helical structure
  - D) No defined structure and is disordered
69. Rapid but non-antigen specific immune responses are produced by the
- A) Adaptive immune response
  - B) Innate immune system
  - C) Leukocytes
  - D) Lymphatic system

70. Deficiency of thymus results in increased infections in humans, such a condition is called
- A) Thymectomy
  - B) Graves disease
  - C) DiGeorges syndrome
  - D) All the above
71. In Krebs cycle two moles of glucose produces
- A) 1 mole of ATP
  - B) 2 moles of ATP
  - C) 4 moles of ATP
  - D) 8 moles of ATP
72. A 'bioreactor' is a
- A) Analyzer
  - B) Fermenter
  - C) Radiator
  - D) Coolater
73. Prokaryotic translation elongation factor G (EF-G) requires----- for its activity
- A) GTP
  - B) ATP
  - C) CTP
  - D) UTP
74. Viroids consists of
- A) Only proteins
  - B) Only envelops
  - C) Only capsids
  - D) Only nucleic acids
75. During the bacterial growth, the primary metabolites will be produced during
- A) Lag phase
  - B) Log phase
  - C) Stationary phase
  - D) Decline phase