

Section 1 - M.Sc. - Biotechnology

1) For generating single stranded clones which of the vectors will be used

- A) Cosmid
 - B) phagemid
 - C) Lambda gt10
 - D) Lambda gt11
-

2) Antibodies are

- A) produced by Bacteria
 - B) Both A and B
 - C) proteins
 - D) None of the above
-

3) The formula for conversion of temperature between Degree Fahrenheit ' F ' and Degree Celsius ' C ' is given by

$$F(C) = \frac{9}{5}C + 32.$$

Considering ' F ' as a function of ' C ', choose the correct statement regarding the inverse function

F^{-1}

- A) $F^{-1}(t) = \frac{9}{5}(t - 32)$
 - B) $F^{-1}(t) = \frac{5}{9}(t + 32)$
 - C) $F^{-1}(t) = \frac{5}{9}(t - 32)$
 - D) F^{-1} does not exist
-

4) Which of following has highest ionization potential?

- A) Beta ray
 - B) All have same
 - C) Gamma ray
 - D) Alpha rays
-

5) A circular coil of 'n' turns and radius 'r' carries a current 'I'. The magnetic field at the centre is

A) $\frac{\mu_0 n I}{r}$

B) $\frac{\mu_0 n I}{2r}$

C) $\frac{2\mu_0 n I}{r}$

D) $\frac{\mu_0 n I}{4r}$

6) A wheel makes 360 revolutions in one minute. Through how many radians does it turn in 2 seconds?

- A) 60°
- B) 2π radians
- C) 180°
- D) 120°

7) Match the terms given in the Column I with the units given in the column II.

Column I

- i. Λ_m
- ii. κ
- iii. E_{cell}^o
- iv. G^*

Column II

- (A) $S\ cm^{-1}$
- (B) m^{-1}
- (C) $S\ cm^2\ mol^{-1}$
- (D) V

- A) i-(C), ii-(A), iii-(D), iv-(B)
 - B) i-(D), ii-(C), iii-(B), iv-(A)
 - C) i-(C), ii-(D), iii-(A), iv-(B)
 - D) i-(A), ii-(B), iii-(C), iv-(D)
-

8) Histotypic culture

- A) None of the above
 - B) Mixed lineage cells grown in high density
 - C) Single lineage grown in high density
 - D) Primary culture
-

9) Inulin is a type of

- A) Hormone
- B) Carbohydrate
- C) Enzyme
- D) Amino acid

10) Which of the antigens listed below is likely to be least immunogenic

- A) A protein with a molecular weight of 50,000 daltons
 - B) A protein with a molecular weight of 5,000 daltons
 - C) BSA in Freund's incomplete adjuvant
 - D) BSA in Freund's complete adjuvant
-

11) Gamma rays are

- A) Electromagnetic wave
 - B) Radiation
 - C) Both A and B
 - D) None of the above
-

12) Western blotting is used to detect which of the following

- A) RNA
 - B) DNA
 - C) Protein
 - D) Sugars
-

13) CDRs for antigen binding on antibody are present on

- A) None of the above
- B) Carboxy terminal of Fc portion
- C) Hinge portion of antibody
- D) Amino terminal of Fc portion

14) Which one of the following orders is correct for the bond dissociation enthalpy of halogen molecule?

- A) $F_2 > Cl_2 > Br_2 > I_2$
 - B) $Br_2 > I_2 > F_2 > Cl_2$
 - C) $I_2 > Br_2 > Cl_2 > F_2$
 - D) $Cl_2 > Br_2 > F_2 > I_2$
-

15) Which of the following restriction enzyme cleavage sites would you expect to occur most often in DNA?

- A) GC GC
 - B) AAA TTTA
 - C) GGG CGCCCC
 - D) GGG CCC
-

16) One of the following antibodies is expressed on naïve B Cells

- A) IgE
 - B) IgM
 - C) IgG
 - D) IgA
-

17) Two electric bulbs of 40 watt each are connected in series. The power consumed by the combination will be

- A) 60 watt
- B) 20 watt
- C) 100 watt
- D) 80 watt

18) If you did six cycles of PCR starting with one double stranded DNA template, how many (double-stranded) DNAs would result?

- A) 32
 - B) 16
 - C) 62
 - D) 5
-

19) The SI unit of conductance is

- A) mho
 - B) mho m^{-1}
 - C) Ohm
 - D) ohm-m
-

20) The negative charge (at neutral pH) on DNA is:

- A) On the oxygen atoms at the 3' position on the ribose sugars
 - B) On the nitrogen atoms in the pyrimidine and purine rings
 - C) On the oxygen atoms attached to the phosphate groups in the sugar-phosphate backbone
 - D) On the hydrogen atoms at the 2'-position of deoxy-ribose
-

21) Torque acting on a magnet held at angle ' θ ' with a magnetic field is maximum, when $\theta =$

- A) 0°
- B) 180°
- C) 360°
- D) 90°

22) A manufacturer has 600 litres of a 12% solution of acid. How many litres of a 30% acid solution must be added to it so that the acid content in the resulting mixture is between 15% and 18%?

- A) Between 120-300 litres
 - B) Between 300-420 litres
 - C) Between 20-30 litres
 - D) Between 100-120 litres
-

23) Equation of a straight line perpendicular to the line $2x + 3y = 4$ and passing through the point (1,2) is given by

- A) $2y - 3x = 1$
 - B) $2x + 3y = 8$
 - C) $2x + 3y = 4$
 - D) $2x - 3y = 4$
-

24) Monoclonal antibodies recognize a single

- A) Bacterium
 - B) Antigen
 - C) Paratope
 - D) None of the above
-

25) Which of the following is most stable in aqueous solution?

- A) Ti^{3+}
- B) V^{3+}
- C) Mn^{2+}
- D) Cr^{3+}

26) For a paramagnetic substance

- A) $\mu_r = 0$
 - B) $\mu_r > 1$
 - C) $\mu_r = \text{infinity}$
 - D) $\mu_r = 1$
-

27) The half-life period of first order reaction is 1386 seconds. The specific rate constant of the reaction is

- A) $5.0 \times 10^{-2} \text{ s}^{-1}$
 - B) $5.0 \times 10^{-3} \text{ s}^{-1}$
 - C) $0.5 \times 10^{-3} \text{ s}^{-1}$
 - D) $0.5 \times 10^{-2} \text{ s}^{-1}$
-

28) Lymphoid lineage does not give rise to

- A) Basophils
 - B) T cells
 - C) B cell
 - D) NK Cells
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29) Which of the following is a true statement about a *CRYPTIC PLASMID*?

- A) It is often used as a reporter gene in cloning reactions
- B) It renders bacteria resistant to antibiotic
- C) It encodes for a toxin
- D) Its function is not known

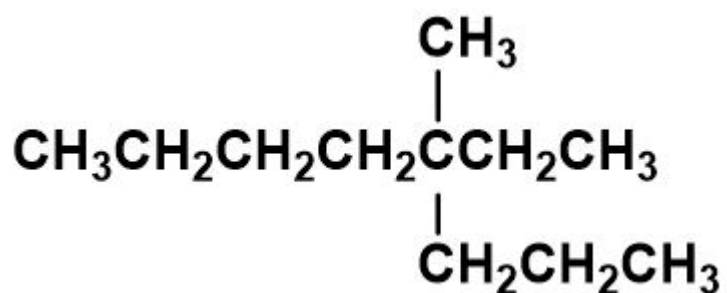
30) The number of moles of NaCl in 3 liters of 3M solution is

- A) 3
 - B) 9
 - C) 1
 - D) 27
-

31) Active immunity is acquired through which of the following processes?

- A) Natural birth
 - B) Antibodies
 - C) Drinking colostrum
 - D) Vaccination
-

32) Select the correct IUPAC name for:



- A) 5 – methyl - 5 - propylheptane
- B) 5 – methyl – 5 - ethyloctane
- C) 4 – ethyl - 4 - methyloctane
- D) 3 – methyl – 3 - propyloctane

33) Which is favorable for physical adsorption?

- A) High T and low P
 - B) High T and high P
 - C) T and P do not affect
 - D) Low T and high P
-

34) Why don't restriction enzymes cleave bacterial DNA in the strain that make the enzymes?

- A) The restriction enzymes are not synthesized until long after foreign DNA enters the cell
 - B) The bacterial DNA is modified at the restriction sites
 - C) The restriction enzymes are synthesized in a different cellular compartment than that which contains the genomic DNA
 - D) Bacterial DNA repair mechanisms can repair the DNA faster than it can be cut by enzymes
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35) Electric potential 'V' and electric flux ' Φ ' are

- A) Both vectors
 - B) Both scalars
 - C) V is vector, Φ is scalar
 - D) V is scalar, Φ is vector
-

36) The sequence of mRNA is 5'AUGCCGG 3'. What will be the sequence of non-coding DNA strand for this sequence

- A) 5'TACGGCC3'
- B) 5'CCGGCAT3'
- C) 5'TACGCCC3'
- D) 3'TACGGCC3'

37) Which of the following is a non-coding RNA

- A) snoRNA
 - B) All of the above
 - C) rRNA
 - D) snRNA
-

38) Mature RBC lacks

- A) Both A and B
 - B) Cell wall
 - C) Nucleus
 - D) None of the above
-

$$\frac{a^n + b^n}{a^{n-1} + b^{n-1}}$$

39) If _____ is the arithmetic mean between the positive numbers a and b , then

- A) $n = 1$
 - B) $n = 0$
 - C) $n = -1$
 - D) None of the above
-

40) In a survey of 500 students in a school, 100 were listed as taking guava juice, 150 as taking orange juice, and 75 were listed as taking both guava as well as orange juice. Then the number of students taking neither guava juice nor orange juice is equal to

- A) 175
- B) 325
- C) 250
- D) 225

41) One of the following Microscopes is essential for Animal Cell Culture

- A) Fluorescent Microscope
 - B) Phase contrast upright microscope
 - C) Bright field upright microscope
 - D) Inverted Microscope
-

42) Which of the following would be preferable for use in cloning very large (200 kb or more) fragments of DNA?

- A) BAC
 - B) Phagemid
 - C) Plasmid
 - D) Cosmid
-

43) Which of the following chemical bond is not present in protein structure

- A) Phosphodiester bond
 - B) Disulfide bond
 - C) Peptide bond
 - D) Covalent bond
-

44) Which of the following is the optimal temperature for DNA synthesis by Taq DNA polymerase in polymerase chain reaction?

- A) 37°C
- B) 45°C
- C) 72°C
- D) 93°C

45) Percentage of free space in the body centered cubic unit cell is

- A) 20%
 - B) 28%
 - C) 32%
 - D) 34%
-

46) Electric field intensity (E) due to an electric dipole varies with distance (r) of the point from the centre of dipole as

- A) $E \propto 1/r$
 - B) $E \propto 1/r^4$
 - C) $E \propto 1/r^3$
 - D) $E \propto 1/r^2$
-

47) Which of the following is not an application of eddy currents?

- A) Speedometers
 - B) Magnetic brakes
 - C) Induction furnace
 - D) Transformers
-

48) Which of the following equipment is not essential to maintain animal cell cultures

- A) Laminar Hood
- B) Inverted Microscope
- C) CO₂ Incubator
- D) BOD

49) The force between two parallel current carrying wires is independent of

- A) The radii of wires
 - B) The medium in which they are placed
 - C) The length of wires
 - D) Their distance of separation
-

50) Which of the following will you use for separating the yeast chromosomes

- A) 2D electrophoresis
 - B) Disc electrophoresis
 - C) Denaturing electrophoresis
 - D) Pulse field gel electrophoresis
-

51) Which of the following ore is best concentrated by the froth floatation process?

- A) Malachite
 - B) Magnetic
 - C) Siderite
 - D) Galena
-

52) Which of the following cell type is likely to grow as suspension culture

- A) None of the above
- B) Glial cells
- C) Epithelial cells
- D) B-Lymphocytes

53) 27°C is equal to

- A) 78 F
 - B) 81.6 F
 - C) 80.6 F
 - D) 81 F
-

54) Choose the incorrect statement.

- A) $\frac{1}{3 \times 5} + \frac{1}{5 \times 7} + \dots + (\text{up to } n \text{ terms}) = \frac{n+1}{3(2n+5)}$
 - B) $\tan^{-1}(x - y) = \tan^{-1}\left(\frac{x-y}{1-xy}\right)$ for all real numbers x and y
 - C) $\sin 75^\circ = \frac{1+\sqrt{3}}{2\sqrt{2}}$
 - D) If $\sin a = \sin b$, then $a - b = n\pi$ for $n = 0, \pm 1, \pm 2, \dots$
-

55) Both *Plasmodium falciparum* and *Plasmodium vivax* belong to

- A) None of the above
- B) Both A and B
- C) Same genus
- D) Same species

56) If for real number θ , the number $\frac{3+2i \cos \theta}{1-2i \cos \theta}$ is purely real, then

A) $\theta = (2n-1)\frac{\pi}{2}$ for $n = 0, \pm 1, \pm 2, \dots$

B) $\theta = n\pi$ for $n = 0, \pm 1, \pm 2, \dots$

C) $\theta = \frac{\pi}{3}$

D) $\theta = \frac{\pi}{12}$

57) If $C(n, r) = \frac{n!}{r!(n-r)!}$, then $\frac{C(n,0)}{1} + \frac{C(n,1)}{2} + \dots + \frac{C(n)}{n+1}$ is equal to

A) $\frac{2^{n+1}-1}{n}$

B) $\frac{2^n-1}{n}$

C) $\frac{2^{n+1}-n+1}{n+1}$

D) $\frac{2^{n+1}-1}{n+1}$

58) The property that an amino acid can have more than one codon is called

- A) Degeneracy
 - B) Overlapping codon
 - C) Universality
 - D) Non overlapping codon
-

59) The total number of ways in which 4 cards can be chosen from a pack of 52 playing cards such that cards are of the same colour is

A) $2 \times \frac{26!}{4!22!}$

B) $\left(\frac{26!}{4!22!} \right)^2$

C) $\frac{26!}{4!22!}$

D) None of these

60) Kirchhoff's second law is based on law of conservation

- A) Sum of mass and energy
- B) Charge
- C) Momentum
- D) Energy

Answer keys**Question Paper No: 60866_7**

1	B	31	D	
2	C	32	C	
3	C	33	D	
4	D	34	B	
5	B	35	B	
6	D	36	B	
7	A	37	B	
8	C	38	A	
9	A	39	A	
10	B	40	B	
11	C	41	D	
12	C	42	A	
13	A	43	A	
14	D	44	C	
15	A	45	C	
16	B	46	C	
17	B	47	D	
18	C	48	D	
19	A	49	A	
20	C	50	D	
21	D	51	D	
22	A	52	D	
23	A	53	C	
24	D	54	A	
25	D	55	C	
26	B	56	A	
27	C	57	D	
28	A	58	A	
29	D	59	A	
30	B	60	D	