



# Aakash

Medical | IIT-JEE | Foundations

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## FINAL TEST SERIES for NEET-2024

MM : 720

**Test-7**

Time : 3 Hrs. 20 Mins.

### Topics covered :

**Physics** : Alternating Current, Electromagnetic Waves, Ray Optics and Optical Instruments, Wave Optics

**Chemistry** : Haloalkanes and Haloarenes, Alcohols, Phenols and Ethers, Aldehydes, Ketones and Carboxylic Acids

**Botany** : Microbes in Human Welfare, Organisms and Populations

**Zoology** : Human Health and Disease

### Instructions :

- There are two sections in each subject, i.e. Section-A & Section-B. You have to attempt all 35 questions from Section-A & only 10 questions from Section-B out of 15.
- Each question carries 4 marks. For every wrong response 1 mark shall be deducted from the total score. Unanswered / unattempted questions will be given no marks.
- Use blue/black ballpoint pen only to darken the appropriate circle.
- Mark should be dark and completely fill the circle.
- Dark only one circle for each entry.
- Dark the circle in the space provided only.
- Rough work must not be done on the Answer sheet and do not use white-fluid or any other rubbing material on the Answer sheet.

## PHYSICS

### Choose the correct answer :

#### SECTION - A

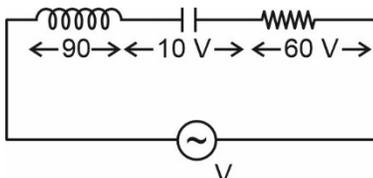
- An alternating emf is given by  $E = (40 \sin \omega t)$  V. The average value of emf in the time interval  $t = 0$  to  $\frac{\pi}{\omega}$  is
 

(1) $\frac{20}{\pi}$ V	(2) $40\sqrt{2}$ V
(3) $\frac{80}{\pi}$ V	(4) Zero
- An inductor of inductance  $L$  has reactance  $X$ . If inductance and frequency become double then reactance will be
 

(1) $X$	(2) $2X$
(3) $3X$	(4) $4X$
- A series LCR circuit having emf 50 V operating at frequency  $\frac{50}{\pi}$  Hz has resistance  $300 \Omega$ , capacitance  $20 \mu\text{F}$  and inductance 1 H. The effective value of current in the circuit is
 

(1) $0.1\sqrt{2}$ A	(2) 0.1 A
(3) $\sqrt{2}$ A	(4) $\frac{1}{\sqrt{2}}$ A
- An LCR circuit has  $L = 2$  H,  $C = 2 \mu\text{F}$  and  $R = 10 \Omega$ . Its quality factor at resonance will be
 

(1) 10	(2) 100
(3) 1000	(4) 2000

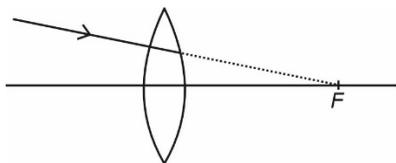
5. A step-down transformer  
 (1) Increases alternating voltage  
 (2) Increases alternating current  
 (3) Increases average power  
 (4) Both (2) and (3)
6. An LR circuit operating at 50 V, 50 Hz has a resistor of  $10 \Omega$  attached to an inductor having inductive reactance  $10 \Omega$ . The power dissipated in the circuit is  
 (1) 62.5 W (2) 125 W  
 (3) 250 W (4) 500 W
7. If primary coil of an ideal transformer has 100 turns while the secondary coil has 1000 turns. If an alternating voltage of 100 V is applied across primary coil it, then output voltage across secondary coil will be  
 (1) 100 V (2) 10 V  
 (3) 0.1 V (4) 1000 V
8. The quantity  $\epsilon_0 \frac{d\phi_E}{dt}$  has SI unit (symbols have their usual meanings)  
 (1) Ampere  
 (2) Ampere per second  
 (3) Ampere per metre  
 (4) Ampere metre square
9. If the total energy transferred to a surface by electromagnetic wave in time  $t$  is  $U$  and speed of electromagnetic wave is  $c$ , then magnitude of total momentum delivered to surface by electromagnetic wave is  
 (1)  $\frac{U}{c}$  (2)  $\frac{U^2}{c}$   
 (3)  $\frac{c}{U}$  (4)  $\frac{c^2}{U}$
10. Which of the following electromagnetic wave has highest penetrating power?  
 (1) X-rays (2) Microwaves  
 (3) Infra-red rays (4) Radio waves
11. An inductor of inductance  $L$ , a capacitor of capacitance  $C$  and a resistor of resistance  $R$  are connected in series to an ac source of potential difference  $V$  volts as shown in figure. Potential difference across  $L$ ,  $C$  and  $R$  is 90 V, 10 V and 60 V, respectively. The current flowing through LCR series circuit is 20 A. The impedance of the circuit is
- 
- (1)  $5\sqrt{2} \Omega$  (2)  $5 \Omega$   
 (3)  $\frac{5}{\sqrt{2}} \Omega$  (4)  $4 \Omega$
12. Electric flux between the plates of a capacitor varies as  $\phi_E = 4t$ . The displacement current between the plate is  
 (1)  $\frac{4}{\epsilon_0}$  (2)  $4\epsilon_0$   
 (3)  $2\epsilon_0$  (4)  $\frac{2}{\epsilon_0}$
13. Electric field variation of an electromagnetic wave is given by  $E = 20\sin(100\pi t - 2\pi x) \hat{j}$ . The variation of magnetic field will be along  
 (1) x-axis (2) z-axis  
 (3) y-axis (4) x-y plane
14. A converging lens ( $n = 1.5$ ) having both radii of curvature 20 cm is surrounded by a liquid of refractive index 2. Its focal length in the liquid is  
 (1) -40 cm  
 (2) 20 cm  
 (3) -20 cm  
 (4) 80 cm

Space for Rough Work

15. A convex mirror is dipped into water ( $\mu = \frac{4}{3}$ ). If its focal length is 20 cm in air then its focal length in water will be

- (1) 20 cm                      (2) 15 cm  
 (3)  $\frac{80}{3}$  cm                      (4) 40 cm

16. A ray is approaching the convex lens of focal length  $F$  as shown.



After refraction from lens it will intersect with principle axis at

- (1)  $F$                               (2)  $\frac{F}{2}$   
 (3)  $2F$                               (4)  $\infty$

17. A medium has refractive index ' $\mu$ ' with respect to air and its critical angle  $i_c$ . The correct relation for  $\mu$  and  $i_c$  is

- (1)  $i_c = \sin^{-1}(\mu)$                       (2)  $i_c = \frac{1}{\sin^{-1}(\mu)}$   
 (3)  $i_c = \sin^{-1}\left(\frac{1}{\mu}\right)$                       (4)  $i_c = \sin\left(\frac{1}{\mu}\right)$

18. A small telescope has an objective lens of focal length 140 cm and an eye-piece of focal length 5 cm. Its magnifying power in normal adjustment is

- (1) 14                              (2) 28  
 (3) 50                              (4) 25

19. In a compound microscope, the image formed by the objective lens is

- (1) Real, inverted and magnified  
 (2) Real, erect and magnified  
 (3) Virtual, erect and magnified  
 (4) Virtual, inverted and magnified

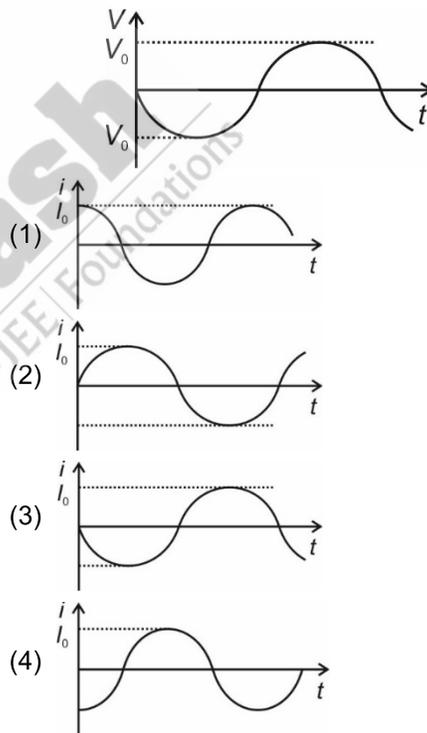
20. A tank is filled with water upto a height of 12 cm. The apparent depth of the needle lying at the bottom of a tank as measured by a travelling microscope is 9.0 cm. If water is replaced by a liquid of refractive index 1.5 upto same height, by what distance would the microscope be moved to focus on the needle again?

- (1) 2.0 cm                      (2) 1.5 cm  
 (3) 2.5 cm                      (4) 1.0 cm

21. A complex current wave is given by  $i = (8 + 12 \sin 100\pi t)$  A. Its average value over one time period will be

- (1) 14 A                              (2) 10 A  
 (3) 8 A                              (4) Zero

22. The voltage across a capacitor is represented as shown in figure. Which one of the following curves in the given options will represent the corresponding current?

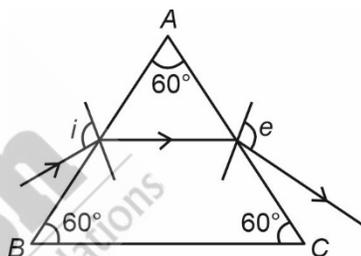


Space for Rough Work

23. Among the following set of values of resistance ( $R$ ), inductance ( $L$ ) and capacitance ( $C$ ), the quality factor is minimum for
- (1)  $R = 4 \Omega, L = 1 \mu\text{H}, C = 64 \mu\text{F}$
  - (2)  $R = 4 \Omega, L = 1 \mu\text{H}, C = 1 \mu\text{F}$
  - (3)  $R = 8 \Omega, L = 1 \mu\text{H}, C = 64 \mu\text{F}$
  - (4)  $R = 8 \Omega, L = 1 \mu\text{H}, C = 1 \mu\text{F}$
24. The velocity of electromagnetic radiation in a medium of permittivity  $\epsilon_0$  and permeability  $\mu_0$  is given by
- (1)  $\sqrt{\frac{\mu_0}{\epsilon_0}}$
  - (2)  $\sqrt{\mu_0 \epsilon_0}$
  - (3)  $\frac{1}{\sqrt{\mu_0 \epsilon_0}}$
  - (4)  $\frac{1}{\mu_0 \epsilon_0}$
25. An alternating voltage  $V = 60 \sin 50t + 80 \cos 50t$  is applied to a resistor of resistance  $10 \Omega$ . The r.m.s. value of current through the resistor is
- (1)  $5\sqrt{2} \text{ A}$
  - (2)  $10 \text{ A}$
  - (3)  $\frac{5}{\sqrt{2}} \text{ A}$
  - (4)  $10\sqrt{2} \text{ A}$
26. An ac source rated  $50 \text{ V}$  (rms) supplies a current of  $10 \text{ A}$  (rms) to a circuit. The average power dissipated in the circuit
- (1) Must be  $500 \text{ W}$
  - (2) Must be less than  $500 \text{ W}$
  - (3) May be greater than  $500 \text{ W}$
  - (4) May be less than  $500 \text{ W}$
27. Which among the following is true for gamma rays?
- (1) They show fluorescence on fluorescent material
  - (2) They are used in cancer therapy
  - (3) They have a high penetrating power
  - (4) All of the above
28. The charge on a parallel plate capacitor varies as  $q = q_0 \sin 2\pi ft$ . The plates are very large and close to each other (area =  $A$ , separation =  $d$ ). Neglecting the edge effects. The displacement current through the capacitor will be
- (1)  $I_d = 2\pi f q_0 \cos 2\pi ft$
  - (2)  $I_d = -2\pi f q_0 \sin 2\pi ft$
  - (3)  $I_d = -2\pi f q_0 \cos 2\pi ft$
  - (4)  $I_d = 2\pi f q_0 \sin 2\pi ft$
29. About 10% of the power of  $110 \text{ W}$  light bulb is converted to visible radiation. The average intensity of visible radiation at a distance of  $1 \text{ m}$  from bulb is (nearly)
- (1)  $0.55 \frac{\text{W}}{\text{m}^2}$
  - (2)  $0.44 \frac{\text{W}}{\text{m}^2}$
  - (3)  $0.66 \frac{\text{W}}{\text{m}^2}$
  - (4)  $0.88 \frac{\text{W}}{\text{m}^2}$
30. The refractive indices of a glass prism for red, yellow and violet colours are,  $1.690$ ,  $1.696$  and  $1.705$  respectively. The dispersive power of the glass will be (nearly)
- (1)  $\frac{1}{46.33}$
  - (2)  $\frac{1}{92.66}$
  - (3)  $\frac{1}{23.33}$
  - (4)  $\frac{1}{33.33}$
31. A light ray is travelling in a medium having refractive index  $1.5$ . The distance travelled by the wavefront in this medium in  $2 \text{ s}$  will be
- (1)  $4 \times 10^8 \text{ m}$
  - (2)  $2 \times 10^8 \text{ m}$
  - (3)  $6 \times 10^8 \text{ m}$
  - (4)  $8 \times 10^8 \text{ m}$
32. An unpolarised light ray having intensity  $I_0$ . It passes through polarizer and analyser one by one. If the angle between polarizer and analyser axis is  $30^\circ$  then intensity of light after passing through analyser will be
- (1)  $I_0 \frac{\sqrt{3}}{4}$
  - (2)  $\frac{I_0}{8}$
  - (3)  $\frac{3I_0}{8}$
  - (4)  $I_0$

Space for Rough Work

33. In a YDSE it is found that the distance between  $n^{\text{th}}$  and  $(n - 1)^{\text{th}}$  fringe is 0.5 mm. If distance between the slit is 0.1 mm then separation between slit and screen will be (wavelength of light used is 500 nm)
- (1) 1 m (2) 2 m  
(3) 0.1 m (4) 0.6 m
34. The SI unit of resonant angular frequency of an LCR circuit is
- (1) Radian per second square  
(2) Radian  
(3) Hertz  
(4) Radian per second
35. The angle of polarisation for a medium is  $53^\circ$ . The critical angle for this medium will be
- (1)  $\sin^{-1}\left(\frac{2}{3}\right)$  (2)  $\sin^{-1}\left(\frac{3}{4}\right)$   
(3)  $\cos^{-1}\left(\frac{3}{4}\right)$  (4)  $\sin^{-1}\left(\frac{4}{5}\right)$
38. The amplitude of magnetic field in a region carried by an electromagnetic wave is  $0.2 \mu\text{T}$ . The average intensity of the wave is nearly
- (1)  $2.4 \text{ W/m}^2$  (2)  $4.8 \text{ W/m}^2$   
(3)  $1.2 \text{ W/m}^2$  (4)  $3.6 \text{ W/m}^2$
39. In a series LCR circuit the phase difference between voltage across capacitor and current through inductor is
- (1)  $\frac{\pi}{2}$  (2)  $\frac{\pi}{3}$   
(3)  $\pi$  (4)  $\frac{\pi}{4}$
40. A ray of light passes through an equilateral prism having refractive index  $\sqrt{2}$  as shown. If the angle of incidence is  $45^\circ$  then angle of emergence ( $e$ ) of light will be



- SECTION - B**
36. For light diverging from a point source, choose the correct option(s).
- (1) Wave front is cylindrical  
(2) Wave front is spherical  
(3) Intensity increases in proportional to the square of distance from point source  
(4) Both (2) and (3)
37. Electromagnetic radiation with intensity  $50 \text{ W/cm}^2$  is incident on totally reflecting surface normally. If the surface has area of  $0.05 \text{ m}^2$ , Then the average force due to the radiation pressure, on it is
- (1)  $8.3 \times 10^{-5} \text{ N}$   
(2)  $16.7 \times 10^{-5} \text{ N}$   
(3)  $1.2 \times 10^{-7} \text{ N}$   
(4)  $12.4 \times 10^{-7} \text{ N}$
- (1)  $90^\circ$  (2)  $45^\circ$   
(3)  $30^\circ$  (4)  $60^\circ$
41. There are two media A and B of refractive indices 1.5 and 2 respectively. If wavefront of light ray travels 30 m in medium B, then the distance travelled by wavefront in medium A in same time will be
- (1) 15 m (2) 20 m  
(3) 40 m (4) 22.50 m
42. E.M. waves used for medical radiography among the following are
- (1) Microwave (2) X-rays  
(3) Visible radiation (4) UV rays

Space for Rough Work

43. In Young's double slit experiment, the fringe width is found to be 0.6 mm. If the whole apparatus is immersed in a liquid having refractive index 1.5, without disturbing the geometrical arrangement, then the new fringe width will be

- (1) 0.6 mm (2) 0.9 mm  
(3) 0.4 mm (4) 0.3 mm

44. A bi-convex lens of radius of curvature 40 cm is placed in a liquid of refractive index  $\mu$  and it is found that its focal length becomes 80 cm. If refractive index of the material of lens is 1.5 then refractive index of liquid ( $\mu$ ) will be

- (1) 1.5 (2) 1.8  
(3) 1.7 (4) 1.2

45. A bulb is 1 m below the surface of a pond. If the refractive index of water in pond is  $\sqrt{2}$ , then the maximum area of surface of water from which light will come out is

- (1) 3.14 m<sup>2</sup> (2) 6.28 m<sup>2</sup>  
(3) 4.71 m<sup>2</sup> (4) 1.57 m<sup>2</sup>

46. In a series LCR circuit an inductor of 50  $\mu$ H, a resistance of 10  $\Omega$  and a unknown capacitor C is connected in series to a 220 V and 50 Hz source. If the circuit is in resonance then value of C is [use  $\pi^2 = 10$ ]

- (1) 0.2 F (2) 1 mF  
(3) 20 mF (4) 2 mF

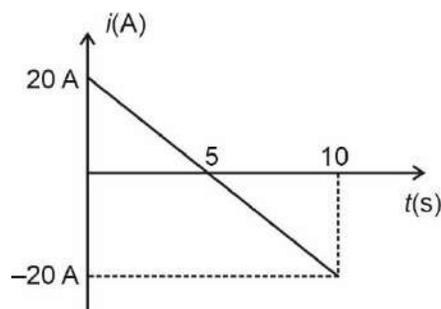
47. The electric current in the circuit is given by

$$i = i_0 \left( \frac{t}{\tau} \right)^{\frac{3}{2}} \quad (\tau \text{ is positive constant}).$$

The r.m.s. current for the period  $t = 0$  to  $t = \tau$  will be

- (1)  $\frac{i_0}{\sqrt{2}}$  (2)  $\frac{i_0}{2}$   
(3)  $\frac{i_0}{\sqrt{3}}$  (4)  $\frac{i_0}{3}$

48. The average value of current from 0 to 10 seconds for the current ( $i$ ) versus time ( $t$ ) curve given below will be



- (1)  $\frac{20}{\sqrt{3}}$  A  
(2) 20 A  
(3)  $\frac{40}{\pi}$  A  
(4) Zero

49. The Ampere-Maxwell law is given by the equation (where symbols have usual meaning)

- (1)  $\oint \vec{B} \cdot d\vec{l} = \mu_0 i_c + \mu_0 \epsilon_0 \frac{d\phi_E}{dt}$   
(2)  $\oint \vec{B} \cdot d\vec{l} = \mu_0 \frac{d\phi_E}{dt} + \mu_0 \epsilon_0 i_c$   
(3)  $\oint \vec{B} \cdot d\vec{l} = \mu_0 i_c - \mu_0^2 \epsilon_0^2 \frac{d\phi_E}{dt}$   
(4)  $\oint \vec{B} \cdot d\vec{l} = \mu_0 \frac{d\phi_E}{dt} - \mu_0 \epsilon_0 i_c$

50. The microwaves are majorly produced by

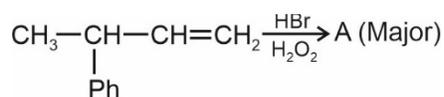
- (1) Accelerated motion of charge in conducting wire  
(2) Hot bodies and molecules  
(3) Special vacuum tube such as magnetrons  
(4) Special lamps and very hot bodies

Space for Rough Work

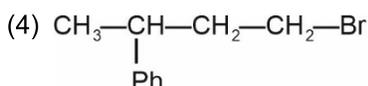
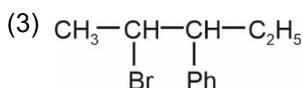
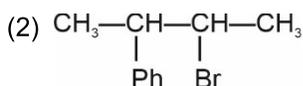
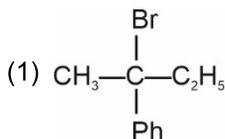
## CHEMISTRY

### SECTION - A

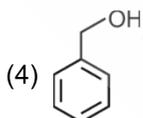
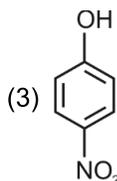
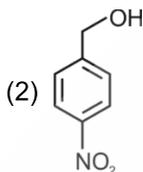
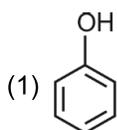
51. Consider the following reaction.



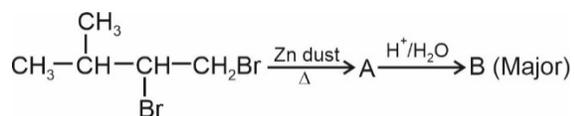
Major product A is



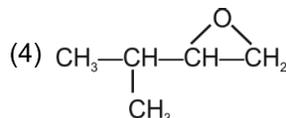
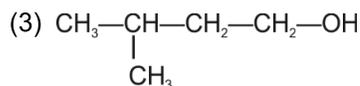
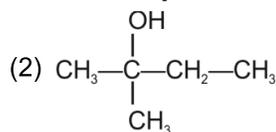
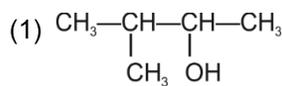
52. The most acidic compound among the following is



53. Consider the following reaction.



Major product B is

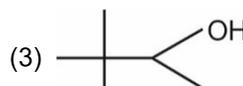
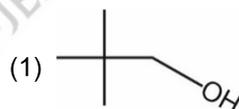


54. Choose the correct statement(s) from the following.

- Benzoic acid gives para substituted nitro product on nitration in maximum extent.
- Benzyl alcohol gives benzoic acid on oxidation in presence of alkaline  $\text{KMnO}_4$  followed by  $\text{H}^+/\text{H}_2\text{O}$ .
- Cresol and anisole are functional group isomers.

- (1) b only                      (2) a and c only  
 (3) b and c only              (4) a, b and c

55. Which alcohol does not give colour in Victor Meyer test?



Space for Rough Work

56. Given below are two statements

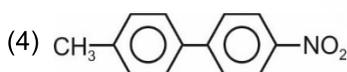
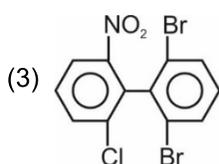
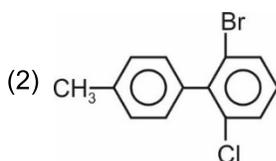
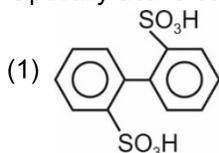
**Statement I:** Reaction of benzaldehyde with mixture of nitric acid and sulphuric acid will give p-nitrobenzaldehyde as major product.

**Statement II:** -CHO is deactivating group for electrophilic aromatic substitution reaction.

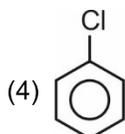
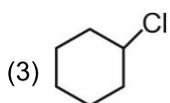
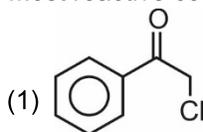
In the light of above statements, choose the most appropriate answer from the options given below.

- (1) Statement (I) is correct but statement (II) is incorrect
- (2) Statement (I) is incorrect but statement (II) is correct
- (3) Both statement (I) and statement (II) are correct
- (4) Both statement (I) and statement (II) are incorrect

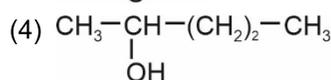
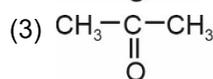
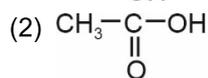
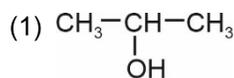
57. Optically active compound among the following is



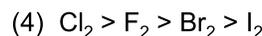
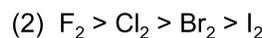
58. Most reactive compound towards  $S_N2$  reaction is



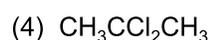
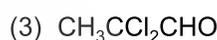
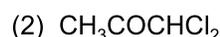
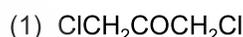
59. Which of the following does not respond to haloform reaction?



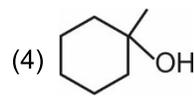
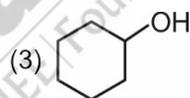
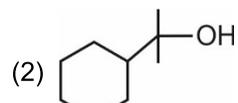
60. The reactivity order of halogens towards halogenation of ethane is



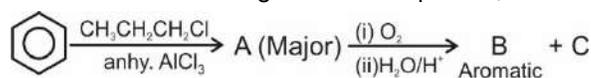
61. The major product obtained by the action of  $\text{PCl}_5$  on acetone is



62. Which among the following alcohol vapours on passing over heated copper at 573 K forms ketone?



63. Consider the following reaction sequence,



Select the incorrect statement among the following.

(1) The degree of unsaturation of B is 4

(2) In presence of air, B is slowly oxidised to coloured mixture

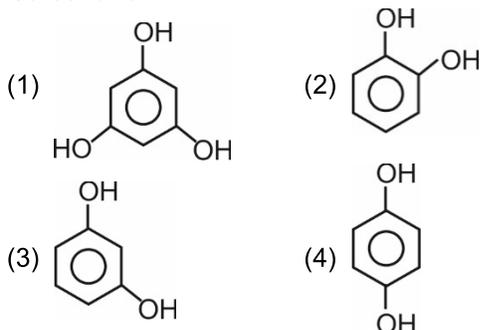
(3) C does not react with Tollen's reagent

(4) B liberates  $\text{CO}_2$  on reaction with  $\text{NaHCO}_3$

Space for Rough Work

64. Alkyl fluoride are generally prepared by  
 (1) Swarts reaction (2) Sandmeyer reaction  
 (3) Gatterman reaction (4) Finkelstein reaction

65. Catechol is

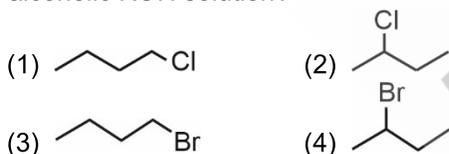


66. Given below are two statements

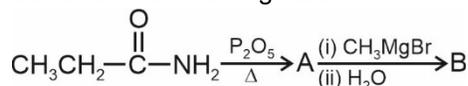
**Statement I:** Aliphatic tertiary alcohol gives turbidity with Lucas reagent most easily.

**Statement II:** Benzyl alcohol is a primary alcohol. In the light of above statements, choose the most appropriate answer from the options given below.

- (1) Statement I is correct but statement II is incorrect  
 (2) Statement I is incorrect but statement II is correct  
 (3) Both statement I and statement II are correct  
 (4) Both statement I and statement II are incorrect
67. Which among the following alkyl halide will give slowest elimination reaction in presence of alcoholic KOH solution?



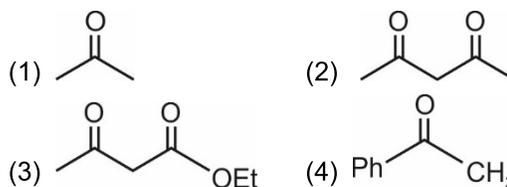
68. Consider the following reaction



Product B is

- (1) (2)   
 (3) (4)

69. The compound having highest percentage of enol content is



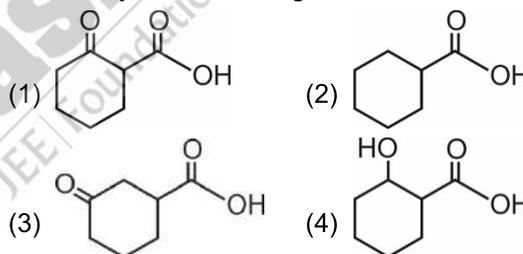
70. Given below are two statements

**Statement I:**  $\text{C}_6\text{H}_5\text{CHO}$  is more reactive than  $\text{CH}_3\text{CHO}$  towards nucleophilic addition reaction.

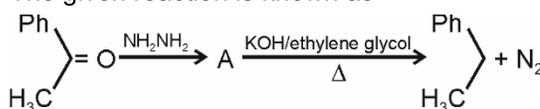
**Statement II:** Aldehydes give easier nucleophilic addition reactions than ketones due to steric and electronic reasons.

In the light of above statements, choose the most appropriate answer from the options given below.

- (1) Statement I is correct but statement II is incorrect  
 (2) Statement I is incorrect but statement II is correct  
 (3) Both statement I and statement II are correct  
 (4) Both statement I and statement II are incorrect
71. The compound which is most easily decarboxylate on heating is



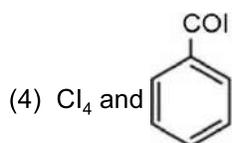
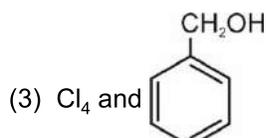
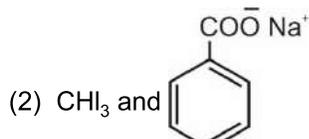
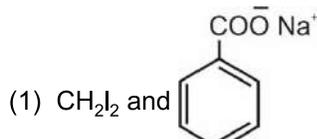
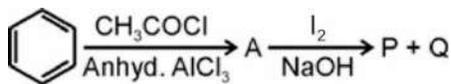
72. The given reaction is known as



- (1) Stephen reaction  
 (2) HVZ reaction  
 (3) Wolff-Kishner reduction  
 (4) Rosenmund reduction

Space for Rough Work

73. In the given reaction sequence, products P and Q are



74. Correct statement(s) among the following is/are
- Formaldehyde is gas at room temperature
  - Alcohols has higher boiling point than that of alkyl halide with same number of carbon.
  - Allyl halide has partial double bond character between carbon and halogen.
- (1) a and b only                      (2) b only  
(3) a, b and c                        (4) c only

75. Given below are two statements.

**Statement I:** Chlorobenzene will give ortho and para products on reaction with conc.  $\text{HNO}_3$  in presence of conc.  $\text{H}_2\text{SO}_4$ .

**Statement II:** In case of chlorobenzene '-I' effect is more effective than '+R' effect.

In the light of above statements, choose the most appropriate answer from the options given below.

- (1) Statement I is correct but statement II is incorrect  
(2) Statement I is incorrect but statement II is correct  
(3) Both statement I and statement II are correct  
(4) Both statement I and statement II are incorrect

76. Given below are two statement one is labelled as **Assertion (A)** other is labelled as **Reason (R)**.

**Assertion (A):** Phenol has five resonance structures.

**Reason (R):** Lone pair of oxygen does not get involved in resonance in phenol.

In the light of above statements, choose the most appropriate answer from the options given below.

- (1) (A) is correct but (R) is incorrect  
(2) (A) is incorrect but (R) is correct  
(3) Both (A) and (R) are correct and (R) is the correct explanation of (A)  
(4) Both (A) and (R) are correct but (R) is not the correct explanation of (A)

77. Match List-I with List-II and choose the correct answer from options.

	List-I (Compounds)		List-II (Common name)
(a)	$\text{HCOOH}$	(i)	Wood spirit
(b)	$\text{CH}_3\text{OH}$	(ii)	Formic acid
(c)	$\text{HCHO}$	(iii)	Acetic acid
(d)	$\text{CH}_3\text{COOH}$	(iv)	Formaldehyde

- (1) (a)  $\rightarrow$  (ii), (b)  $\rightarrow$  (i), (c)  $\rightarrow$  (iv), (d)  $\rightarrow$  (iii)  
(2) (a)  $\rightarrow$  (iii), (b)  $\rightarrow$  (iv), (c)  $\rightarrow$  (i), (d)  $\rightarrow$  (ii)  
(3) (a)  $\rightarrow$  (ii), (b)  $\rightarrow$  (i), (c)  $\rightarrow$  (iii), (d)  $\rightarrow$  (iv)  
(4) (a)  $\rightarrow$  (iii), (b)  $\rightarrow$  (i), (c)  $\rightarrow$  (iv), (d)  $\rightarrow$  (ii)

Space for Rough Work

78. Given below are two statements one is labelled as **Assertion (A)** other is labelled as **Reason (R)**.

**Assertion (A):** Acetic acid exist as dimer in benzene.

**Reason (R):** Acetic acid forms intermolecular hydrogen bonding in benzene.

In the light of above statements, choose the most appropriate answer from the options given below.

- (1) (A) is correct but (R) is not correct  
 (2) (A) is not correct but (R) is correct  
 (3) Both (A) and (R) are correct and (R) is the correct explanation of (A)  
 (4) Both (A) and (R) are correct but (R) is not the correct explanation of (A)
79. IUPAC name of  $\text{HOOCCH}_2\text{CH}(\text{COOH})\text{CH}_2\text{COOH}$  is  
 (1) 3-Carboxypentanoic acid  
 (2) 1, 2, 3- tricarboxylic acid  
 (3) 3, 4-Dicarboxybutanoic acid  
 (4) Propane-1, 2, 3- tricarboxylic acid
80. The alkane that will give three monochloro product on chlorination with  $\text{Cl}_2$  in diffused sunlight is  
 (1) Isobutane (2) Neopentane  
 (3) Propane (4) n-Butane

81. Given below are two statements

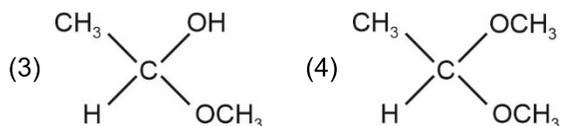
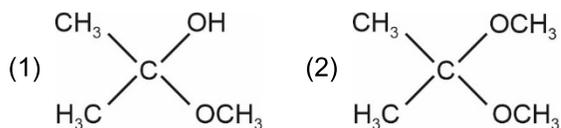
**Statement I:**  $\text{S}_{\text{N}}2$  reactions of optically active halides are accompanied by retention of configuration.

**Statement II:** In case of optically active alkyl halides,  $\text{S}_{\text{N}}1$  reactions are accompanied by racemisation.

In the light of above statements, choose the most appropriate answer from the options given below.

- (1) Statement I is correct but statement II is incorrect  
 (2) Statement I is incorrect but statement II is correct  
 (3) Both statement I and statement II are correct  
 (4) Both statement I and statement II are incorrect

82. Which among the following is a hemiketal?



83. When ethyl magnesium chloride reacts with phenol, the product obtained is

- (1) Benzene (2) Ethane  
 (3) Ethylbenzene (4) Ethanol

84. Carboic acid is

- (1)  $\text{CH}_3\text{COOH}$  (2)  $\text{C}_6\text{H}_5\text{OH}$   
 (3)  $\begin{array}{c} \text{CH}_3-\text{CH}-\text{COOH} \\ | \\ \text{CH}_3 \end{array}$  (4)  $\begin{array}{c} \text{CH}_3-\text{CH}-\text{CH}_3 \\ | \\ \text{OH} \end{array}$

85. Butan-1-ol will not react with

- (1) Na (2)  $\text{PCl}_5$   
 (3) Conc.  $\text{H}_2\text{SO}_4$  (4) dil. NaOH

### SECTION - B

86. Select the incorrect statement regarding  $\text{E}_2$  elimination reaction?

- (1) It is a single step bimolecular reaction  
 (2) The two leaving groups align in the same plane at  $180^\circ$  to each other  
 (3) The reaction passes through an alkene like transition state  
 (4) Polar protic solvent are most suitable for this reaction

87. Terminal gem dihalides on hydrolysis gives

- (1) Ketones  
 (2) Aldehydes  
 (3) Carboxylic acids  
 (4) Halohydrins

Space for Rough Work

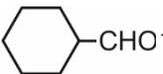
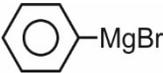
88. The most suitable reaction for the preparation of t-butylethyl ether is

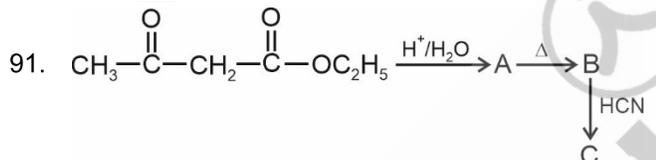
- (1)  $C_2H_5ONa + (CH_3)_3CCl \rightarrow$
- (2)  $C_2H_5ONa + (CH_3)_3CBr \rightarrow$
- (3)  $(CH_3)_3CONa + CH_3Br \rightarrow$
- (4)  $(CH_3)_3CONa + CH_3CH_2Br \rightarrow$

89. Which among the following is an optically active molecule?

- (1)  $CH_2=C=C=CH-Br$  (2)  $ClCH=C=CHCl$
- (3)  $Cl_2C=C=CHCl$  (4)  $Cl_2C=C=C=CCl_2$

90. In which of the following reactions,  $1^\circ$  alcohol is obtained as major product?

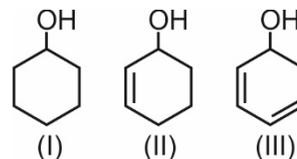
- (1)  $CH_3CHO \xrightarrow{(i) CH_3MgBr(excess)} \xrightarrow{(ii) H_2O}$
- (2)   $\xrightarrow{(i) CH_3MgBr} \xrightarrow{(ii) H_2O}$
- (3)  $CH_3COC_2H_5 \xrightarrow{(i) CH_3MgBr(excess)} \xrightarrow{(ii) H_2O}$
- (4)   $\xrightarrow{(i) CH_2O} \xrightarrow{(ii) H_2O}$



Major products B and C in above reaction are

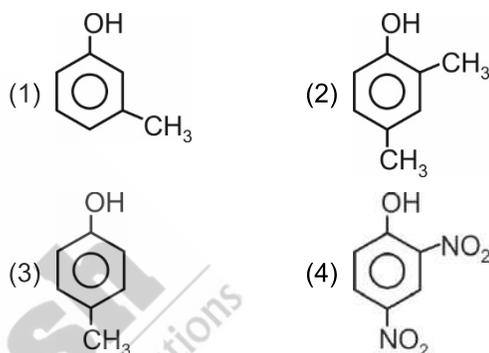
- (1)  $CH_3CH(OH)-CH_2COOH$ ,  $CH_3-CH(CN)-CH_2-COOH$
- (2)  $CH_3-C(=O)-CH_3$ ,  $H_3C-C(OH)(CN)-CH_3$
- (3)  $CH_3-C(=O)-CH_2COOH$ ,  $CH_3-C(OH)(CN)-CH_2-COOH$
- (4)  $CH_3CH=CH-COOH$ ,  $CH_3-CH_2-CH(CN)-COOH$

92. The correct order of ease of dehydration in acidic medium for the following alcohols is

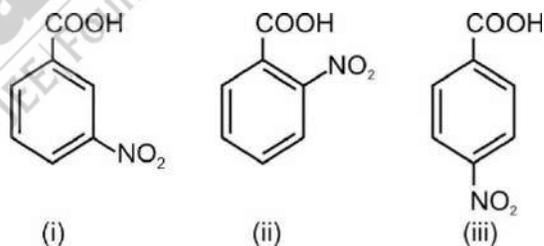


- (1) III > II > I
- (2) II > III > I
- (3) I > II > III
- (4) II > I > III

93. Which of the following compounds evolves  $CO_2$  on treatment with  $NaHCO_3$ ?



94. Consider the following compounds



The correct acidity order is

- (1) (ii) > (i) > (iii)
- (2) (iii) > (ii) > (i)
- (3) (ii) > (iii) > (i)
- (4) (i) > (iii) > (ii)

Space for Rough Work

95. Given below are two statements

**Statement I:** Vinyl alcohol and acetaldehyde are tautomers.

**Statement II:** Carbonyl compounds with  $\alpha$ -Hydrogen may show tautomerism.

In the light of above statements, choose the most appropriate answer from the options given below.

- (1) Statement I is correct but statement II is incorrect
- (2) Statement I is incorrect but statement II is correct
- (3) Both statement I and statement II are correct
- (4) Both statement I and statement II are incorrect

96. Match List I with List II and choose the correct option.

	List I (Alcohol)		List II (Classification)
a.	$C_2H_5OH$	(i)	Tertiary alcohol
b.	$CH_3CHOHCH_3$	(ii)	Allylic alcohol
c.	$CH_2CHCH_2OH$	(iii)	Saturated primary alcohol
d.	$(CH_3)_3COH$	(iv)	Secondary alcohol

- (1) a(ii), b(iv), c(iii), d(i)
- (2) a(iii), b(iv), c(ii), d(i)
- (3) a(iii), b(ii), c(iv), d(i)
- (4) a(iii), b(ii), c(i), d(iv)

97. Given below are two statements one is labelled as **Assertion (A)** other is labelled as **Reasons (R)**.

**Assertion (A):** Acetaldehyde and acetone can be distinguished by ammoniacal silver nitrate solution.

**Reason (R):** Acetaldehyde gives a bright silver mirror on reaction with Tollens' reagent while acetone does not.

In the light of above statements, choose the most appropriate answer from the options given below.

- (1) (A) is correct but (R) is not correct
- (2) (A) is not correct but (R) is correct
- (3) Both (A) and (R) are correct and (R) is the correct explanation of (A)
- (4) Both (A) and (R) are correct but (R) is not the correct explanation of (A)

98. Given below are two statements

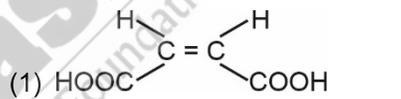
**Statement I:** Maleic acid and Fumaric acid are structural isomers of each other.

**Statement II:** Maleic acid is an optically active compound.

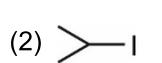
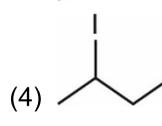
In the light of above statements, choose the most appropriate answer from the options given below.

- (1) Statement I is correct but statement II is incorrect
- (2) Statement I is incorrect but statement II is correct
- (3) Both statement I and statement II are correct
- (4) Both statement I and statement II are incorrect

99. Succinic acid is

- (1) 
- (2)  $HOOC - CH_2 - COOH$
- (3)  $HOOC - CH_2 - CH_2 - COOH$
- (4)  $CH_3 - \underset{\substack{| \\ OH}}{CH} - COOH$

100. Glycerol on treatment with excess of HI finally gives

- (1) 
- (2) 
- (3) 
- (4) 

Space for Rough Work

**BOTANY****SECTION - A**

101. Which among the given statements is **not** true for the stenothermal organisms?
- (1) These organisms can tolerate large temperature variations
  - (2) Vast majority of organisms belong to this category
  - (3) They live in areas where the temperature is uniform throughout the year
  - (4) Polar bears and lizards are stenothermal organisms
102. Browsers do not feed on *Calotropis* plant because
- (1) Of the presence of long spines and thorns
  - (2) It has sweet taste
  - (3) It produces highly poisonous cardiac glycosides
  - (4) It produces opium and caffeine
103. Which of the following statements is **true** for the most ecologically relevant environmental factor?
- (1) Heliophytes require low intensity of light
  - (2) Amount of light and its intensity vary with latitude and season
  - (3) Salt concentration for inland water body is 30-35 ppt
  - (4) Temperature decreases progressively from the equator towards the poles
104. A stage of suspended development found in zooplanktons is called
- (1) Hibernation
  - (2) Aestivation
  - (3) Diapause
  - (4) Migration
105. It is believed by evolutionary biologists that the success of mammals to thrive in different environmental conditions is because of their ability to
- (1) Move away temporarily from stressful habitat to a more hospitable area
  - (2) Maintain a constant body temperature
  - (3) Change their body temperature with the ambient temperature
  - (4) Reduce their metabolic activity and going into state of dormancy
106. Exponential growth
- (1) Model is considered a more realistic one than logistic growth model
  - (2) Is affected by environmental resistance rather than biotic potential
  - (3) Results in J shaped growth curve
  - (4) Occurs under limited resources condition
107. Select the **odd** one out w.r.t. adaptations of xerophytic plants
- (1) Modification of stems into leaf like structure for photosynthesis
  - (2) Presence of large air spaces and aerenchyma
  - (3) Presence of sunken stomata
  - (4) Presence of thick cuticle on leaf and stem epidermis
108. A human population is said to be mature when
- (1) Age pyramid for the population appears to be triangular in shape
  - (2) Age pyramid of a population has small number of pre-reproductive individuals than reproductive individuals
  - (3) Growth rate for population become almost zero
  - (4) Population shows declined growth

Space for Rough Work

109. The number of births during a given period in the population that are added to the initial density is  
 (1) Natality (2) Emigration  
 (3) Immigration (4) Mortality
110. Which of the following organisms is capable of meeting all its water requirements through its internal oxidation of fats?  
 (1) Antarctic fish (2) Kangaroo rat  
 (3) Desert lizard (4) Seal
111. **Statement A** : Many animals use the diurnal and seasonal variations in light intensity and photoperiod as cues for timing their foraging activities  
**Statement B** : All the colour components of the visible spectrum are available for marine plants living at different depths of the ocean.  
 In the light of above statements choose the **correct** option.  
 (1) Only statement A is correct  
 (2) Both statements A and B are correct  
 (3) Only statement B is correct  
 (4) Both statements A and B are incorrect
112. Choose the **incorrect** statement w.r.t. response to abiotic factor.  
 (1) Small animals lose body heat very fast  
 (2) Some species have evolved the ability to regulate but over a limited range of environmental conditions  
 (3) Nearly all plants cannot maintain a constant internal environment  
 (4) All birds are conformers
113. A person facing altitude sickness compensates low oxygen availability by  
 (1) Decreasing RBCs production  
 (2) Opting for morphological adaptations  
 (3) Increasing breathing rate  
 (4) Minimising heat loss
114. The age pyramid of a young population is  
 (1) Expanding (2) Bell shape  
 (3) Stable (4) Urn-shape
115. Match the species-A and species-B and name of interaction then select the **correct** one w.r.t. population interactions.
- |     | Species-A | Species-B | Interaction  |
|-----|-----------|-----------|--------------|
| (1) | +         | +         | Commensalism |
| (2) | +         | -         | Predation    |
| (3) | +         | 0         | Mutualism    |
| (4) | -         | 0         | Parasitism   |
116. A states that two species with very similar niches cannot survive together because they compete so intensely that one species eliminate the other.  
 Here 'A' represents  
 (1) Resource partitioning  
 (2) Competition release  
 (3) Competitive exclusion  
 (4) Competitive co-existence
117. Capturing of insects by the venus fly trap, a flowering plant, exhibits  
 (1) Mutualism (2) Predation  
 (3) Parasitism (4) Amensalism
118. In recent years, gradually increasing average global temperature has resulted into all, **except**  
 (1) Changed species thermal and salt tolerance  
 (2) Pushing of tropics into temperate areas  
 (3) Pushing of temperate areas towards poles  
 (4) Pushing of higher altitude in mountains
119. If 5 individuals of a population of 50 fruit flies died in an interval of one week, the death rate of the population during this period (in terms of individuals per fruit fly per week) will be  
 (1) 0.2 (2) 0.1  
 (3) 0.01 (4) 0.16

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120. During logistic growth of population, asymptote is obtained when  
 (1)  $K = 0$  (2)  $N = K$   
 (3)  $N > K$  (4)  $K > N$
121. A chemical which is produced by LAB that coagulate and partially digest the milk proteins is  
 (1) An alkali (2) Acids  
 (3) Statins (4) Streptokinase
122. The Roquefort cheese is ripened by \_\_\_\_\_ for a particular flavour.  
 Select an option which **correctly** fill in the blank.  
 (1) An algae (2) Bacterium  
 (3) A fungus (4) Yeast
123. Read the following statements and choose the **correct** option.  
**Statement A** : Brewer's yeast is used for fermenting malted cereals and fruit juices to produce methanol during fermentation.  
**Statement B** : Wine and beer are produced by distillation of fermented broth.  
 (1) Both statements A and B are correct  
 (2) Only statement A is correct  
 (3) Only statement A is incorrect  
 (4) Both statements A and B are incorrect
124. **Assertion (A)** : Antibiotics have greatly improved our capacity to treat deadly diseases such as Diphtheria, Leprosy, Whooping cough etc.  
**Reason (R)** : Antibiotics are chemical substances which are produced by some microbes and can kill or retard the growth of disease causing microbes.  
 In the light of above statements, choose the **correct** option.  
 (1) Both A and R are true but R is not the correct explanation of A  
 (2) Both A and R are true and R is the correct explanation of A  
 (3) Only A is true  
 (4) Both A and R are false
125. Match the following columns and select the **correct** option.
- | Column-I          | Column-II                                  |
|-------------------|--|
| (a) Pectinase     | (i) It is employed in preservation of food |
| (b) Lipases       | (ii) Used to clarify fruit juices          |
| (c) Streptokinase | (iii) Used in detergent formulations       |
| (d) Citric acid   | (iv) Used to treat myocardial infarction   |
- | a       | b   | c  | d   |
|---------|-----|----|-----|
| (1) iv  | iii | i  | ii  |
| (2) iii | ii  | i  | iv  |
| (3) ii  | iii | iv | i   |
| (4) iv  | i   | ii | iii |
126. Which among the following statements is true for Bt cotton?  
 (1) It is a wild variety of cotton  
 (2) It is useful to get rid of aphids and mosquitoes  
 (3) Plants are sensitive to insect pests  
 (4) Bt. toxin genes are present in the crop
127. *Nucleopolyhedrovirus* are/have  
 (1) Non species specific  
 (2) Broad spectrum insecticidal applications  
 (3) No negative impacts on plants  
 (4) Negative impact on non-target insects
128. *Trichoderma*  
 (1) Are effective against all fungal pathogens  
 (2) Are free living fungi  
 (3) Is usually found in shoot of plants  
 (4) Produces spores that kill larvae of bollworm

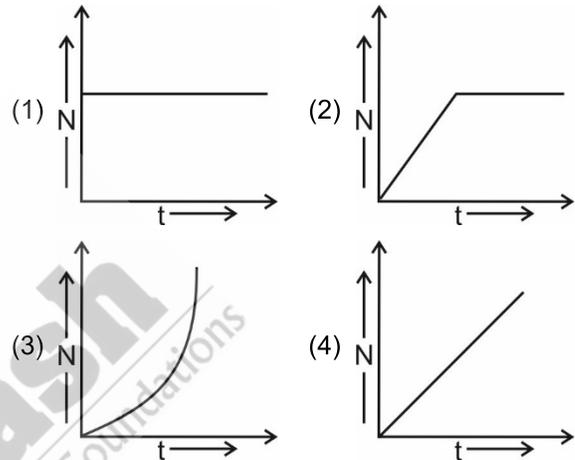
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139. The mycorrhizal association of fungi with roots of higher plants shows the following advantages to plants, **except**
- (1) Fixes atmospheric N<sub>2</sub> for plants
  - (2) Resistance to root borne pathogens
  - (3) Helps in absorption of minerals like phosphorus from soil
  - (4) Tolerance to salinity and drought
140. Choose the **incorrect** match.
- (1) *B. thuringiensis* – butterfly caterpillar
  - (2) Ladybird – Aphids
  - (3) Adenovirus – Cause respiratory infections
  - (4) TMV – spherical shaped
141. Preparation of some fermented beverages requires the process of distillation. It is done for
- (1) Preventing them from denaturation
  - (2) Increasing alcohol percentage in them
  - (3) Improving the flavour of the beverages
  - (4) Destroying the microbes present in alcohol
142. The fermented preparation of rice and black gram is used for idli formation. This fermentation is done by a/an
- |               |              |
|---------------|--------------|
| (1) Protozoan | (2) Virus    |
| (3) Alga      | (4) Bacteria |
143. Grit from sewage is removed by
- (1) Sedimentation
  - (2) Sequential filtration
  - (3) Tertiary treatment
  - (4) Anaerobic sludge digester
144. Read the following statements and choose the **correct** option.
- Assertion:** MacArthur showed that five closely related species of warblers living on the same tree were able to avoid competition and co-exist.
- Reason:** The five closely related species of warblers considered by MacArthur in his experiment had differences in their foraging activities.

- (1) Both Assertion and Reason are true and Reason is the correct explanation of Assertion
- (2) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion
- (3) Assertion is true and Reason is false statement
- (4) Both Assertion and Reason are false statements

145. Equation  $\frac{dN}{dt} = rN$  results in which type of below given growth curve?



146. Vital index for a population is represented as

- |                              |                              |
|------------------------------|------------------------------|
| (1) $\frac{B}{D} \times 100$ | (2) $\frac{D}{B} \times 100$ |
| (3) $B \times D = 1$         | (4) $B + D = 100$            |

147. Which among the following biomes have lowest temperature and least precipitation?

- (1) Coniferous forest
- (2) Arctic and Alpine tundra
- (3) Grassland
- (4) Temperate forest

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148. Consider the following statements and choose the option for **incorrect** ones.
- Populations evolve to maximise their reproductive fitness in the habitat in which they live.
  - Population of any species in nature has unlimited resources to permit exponential growth.
  - Pacific salmon fishes breed many times during their life time.
  - The value of intrinsic rate of natural increase of a population does not depend upon the birth rate and death rate in that population.
  - In a graph for population growth curve, the line of carrying capacity is perpendicular to the population density axis.
- (b), (d) and (e)
  - (a) and (e)
  - (b), (c) and (d)
  - Only (b) and (c)
149. The tiger census in our national parks and tiger reserves is often based on
- Pug marks and fecal pellets
  - Culture density
  - Their hunting habits
  - Measuring percent cover
150. Select the **correct** sequence w.r.t. levels of ecological organisation.
- Organisms → Ecosystem → Community → Biosphere
  - Organisms → Population → Community → Biome
  - Population → Landscape → Community → Organisms
  - Community → Biome → Population → Biosphere

## ZOOLOGY

### SECTION - A

151. Polio vaccine contains attenuated pathogens while anti-tetanus serum contains
- Preformed antigens
  - Attenuated pathogens
  - Interferons
  - Preformed antibodies
152. Which of the following does not act as physiological barrier of innate immunity?
- Acid in the stomach
  - Macrophages in the tissues
  - Saliva in the mouth
  - Tears from eyes
153. Which of the following drugs is not administered to quickly reduce the symptoms of allergy?
- |               |                    |
|---------------|--------------------|
| (1) Histamine | (2) Adrenaline     |
| (3) Steroid   | (4) Anti-histamine |
154. All of the following are hallucinogenic in nature, **except**
- |              |                  |
|--------------|------------------|
| (1) Charas   | (2) Marijuana    |
| (3) Atropine | (4) Amphetamines |
155. Read the statements given below w.r.t. HIV/AIDS.
- HIV is a retrovirus having an envelope enclosing the RNA genome.
  - Treatment of AIDS with anti-retroviral drugs is very effective and can completely cure it.
  - The RNA genome of HIV replicates in the host, forming viral DNA by reverse transcriptase.
  - The incubation period may vary from few months to many years.
- How many of the above given statements is/are incorrect?
- |           |          |
|-----------|----------|
| (1) One   | (2) Two  |
| (3) Three | (4) Four |

Space for Rough Work

156. The causative agent of which of the following sets of diseases are transmitted through the members belonging to the largest class of the phylum Arthropoda?

- (1) Small pox, Dengue
- (2) AIDS, Malaria
- (3) Polio, Filariasis
- (4) Filariasis, Malaria

157. Which of the following diseases is caused by a bacterium and is characterised by fluid filled alveoli of the lungs?

- (1) Common cold
- (2) Pneumonia
- (3) Amoebic dysentery
- (4) Plague

158. Select the **incorrect** statement.

- (1) Cancer cells appear to have lost the property of contact inhibition.
- (2) Cancer cells starve the normal cells by competing for vital nutrients.
- (3) The benign tumors are the mass of proliferating cells called neoplastic cells that invade surrounding tissues.
- (4) Metastasis is the most feared property of malignant tumors.

159. Choose the **odd** one w.r.t. diseases that involves faeco-oral transmission of pathogen.

- (1) Amoebic dysentery
- (2) Ascariasis
- (3) Typhoid fever
- (4) Chikungunya

160. All of the following are cannabinoids, **except**

- (1) Hashish
- (2) Charas
- (3) Heroin
- (4) Ganja

161. In humans, smoking increases \_\_\_\_\_ content in blood which reduces the concentration of haembound oxygen.

Select the most appropriate option to fill in the blank.

- (1) Carbon dioxide
- (2) Carbon monoxide
- (3) Hydrogen
- (4) Nitrogen

162. Consider the following statements and select the correct option.

**Statement I** : Tobacco chewing is associated with increased risk of cancer of the oral cavity.

**Statement II** : Nicotine stimulates adrenal cortex to release catecholamines.

- (1) Statement I is true but statement II is false
- (2) Statement I is false but statement II is true
- (3) Both statements I and II are false
- (4) Both statements I and II are true

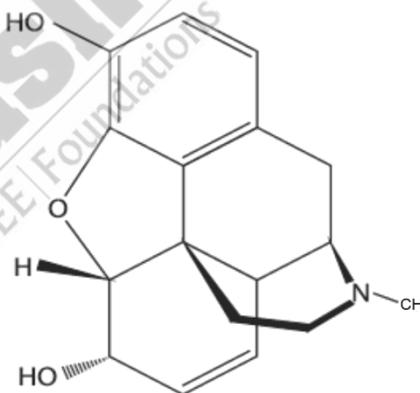
163. The most serious and fatal form of malaria is caused by the members of which genus?

- (1) *Plasmodium*
- (2) *Wuchereria*
- (3) *Salmonella*
- (4) *Epidermophyton*

164. Choose the option with only **correct** statements.

- (a) Barbiturates help the patients cope with depression.
  - (b) NK cells are large specialised erythrocytes.
  - (c) Morphine is an effective sedative.
- (1) a and b only
  - (2) b and c only
  - (3) a and c only
  - (4) a, b and c

165. Identify the chemical structure given below.



Select the **incorrect** option w.r.t. it.

- (1) It is extracted from the latex of poppy plant.
- (2) Smack is obtained by acetylation of this chemical.
- (3) It is generally taken by snorting and injection.
- (4) Its receptors are present only in brain.

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166. Which of the following techniques uses strong magnetic fields and non-ionising radiations to accurately detect pathological and physiological changes in the living tissue?
- (1) Radiography           (2) MRI  
(3) CT scan               (4) Biopsy
167. Read the statements (a – d) carefully.
- (a) Adolescence is a bridge linking childhood and adulthood.
- (b) Cell growth and differentiation is highly controlled and regulated in cancer cells.
- (c) Those who take drugs intravenously are more likely to acquire hepatitis-B
- (d) Benign tumors are always life-threatening.
- How many of the above statements is/are **wrong**?
- (1) Two                      (2) Three  
(3) Four                     (4) One
168. Which of the following is **not** used as a treatment to destroy/remove cancer cells?
- (1) Surgery  
(2) Radiotherapy  
(3) Computed tomography  
(4) Chemotherapy
169. Withdrawal syndrome is seen in the human body when
- (1) Drugs produce a sense of euphoria and increased energy.
- (2) Regular dose of drugs/alcohol is abruptly discontinued.
- (3) Biological response modifiers such as  $\alpha$ -interferons are administered.
- (4) A person is excessively taking drugs.
170. Choose the **incorrect** statement w.r.t. allergy.
- (1) Allergy is the exaggerated response of the immune system to certain antigens.
- (2) Pollens, animal dander, mites in dust, etc., are common examples of allergens.
- (3) For determining the cause of allergy, the patient is exposed to high doses of possible allergens for a longer period
- (4) Modern day life style has resulted in lowering of immunity and more sensitivity to allergens.
171. All of the following statements are true, **except**
- (1) Healthy people are more efficient at work.
- (2) Good health leads to productivity and brings economic prosperity.
- (3) Good health increases longevity of people.
- (4) Good health increases infant and maternal mortality.
172. Which of the following is not considered as recommended parameter to achieve good health?
- (1) Awareness about diseases and their effects on different bodily functions
- (2) Proper disposal of wastes
- (3) Consumption of contaminated food and water
- (4) Control of vectors
- 173.

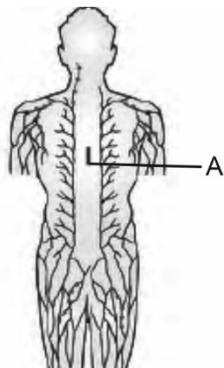
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175. HIV infection can be transmitted by
- (1) Shaking hands
  - (2) Sharing the food
  - (3) Sexual contact with multiple partners
  - (4) Mosquito bite
176. All of the following provide passive immunity, **except**
- (1) Vaccine against diphtheria
  - (2) Antitoxin against tetanus
  - (3) Colostrum produced in initial period of lactation
  - (4) Injection of antivenom after snake bite
177. **Assertion (A)** : PMNLs provide innate immunity.  
**Reason (R)** : Cellular barriers are present at the time of birth.  
 In the light of above statements, select the most appropriate option.
- (1) Both (A) and (R) are true and (R) explains (A) correctly
  - (2) Both (A) and (R) are true but (R) does not explain (A) correctly
  - (3) (A) is true but (R) is false
  - (4) Both (A) and (R) are false
178. When the property of differentiating 'self' and 'non-self' is lost in humans, the body attacks self cells and results in
- (1) Graft rejection only
  - (2) Auto-immune disease
  - (3) Innate immunity
  - (4) Allergic response only
179. Select the **incorrect** match.
- |                 |                     |
|-----------------|---------------------|
| (1) Plague      | – Bacterial disease |
| (2) Diphtheria  | – Viral disease     |
| (3) NK cells    | – Innate immunity   |
| (4) Common cold | – Rhino virus       |
180. Which of the following does not hold true for lymph nodes?
- (1) These are small solid structures located at different points along the lymphatic system
  - (2) They serve to trap the micro-organisms or antigens that enter into the lymph.
  - (3) Along with thymus, they form the primary lymphoid organ.
  - (4) They are classified as the secondary lymphoid organs.
181. The number of interchain disulphide bonds in an IgG molecule is
- |            |           |
|------------|-----------|
| (1) Twelve | (2) Six   |
| (3) Four   | (4) Eight |
182. Which type of immune response is primarily responsible for the non-acceptance of transplanted tissue/organ?
- (1) Auto-immune response
  - (2) Humoral immune response
  - (3) Antibody mediated immune response
  - (4) Cell-mediated immune response
183. **Assertion (A)** : Immature lymphocytes differentiate into antigen-sensitive lymphocytes in bone marrow and thymus.  
**Reason (R)** : Bone marrow and thymus along with spleen are secondary lymphoid organs.  
 In the light of above statements, choose the correct option.
- (1) Both (A) and (R) are true and (R) explains (A) correctly
  - (2) Both (A) and (R) are true but (R) does not explain (A) correctly
  - (3) (A) is true but (R) is false
  - (4) Both (A) and (R) are false
184. *Cannabis* plant is used to produce
- |                  |                  |
|------------------|------------------|
| (1) Morphine     | (2) Marijuana    |
| (3) Amphetamines | (4) Barbiturates |

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185. In the given picture, identify the structure labelled as 'A' and select the correct option w.r.t. it.



- (1) It keeps on reducing in size with age
- (2) It has a large reservoir of erythrocytes
- (3) It is also called graveyard of RBCs
- (4) It constitutes about 50% of the lymphoid tissue in humans

**SECTION - B**

186. A healthy person acquires the infection by inhaling the droplets released by an infected person in the case of

- (1) Amoebiasis and common cold
- (2) Pneumonia and common cold
- (3) Pneumonia and ringworms
- (4) Plague and amoebiasis

187. Match column I with column II and select the correct option.

Column I		Column II	
(a)	Psoriasis	(i)	Bacterial disease
(b)	Typhoid	(ii)	Viral disease
(c)	Hepatitis-B	(iii)	Auto-immune disorder
		(iv)	Genetic disorder

- (1) a-iii; b-iv; c-ii
- (2) a-iv; b-ii; c-i
- (3) a-iv; b-iii; c-i
- (4) a-iii; b-i; c-ii

188. An allergic disorder among the following is

- (1) Dysentery
- (2) Rheumatoid arthritis
- (3) Asthma
- (4) Osteoporosis

189. Which of the following cells are considered as HIV factory in humans?

- (1) Macrophages
- (2) T-helper cells
- (3) T-killer cells
- (4) B-lymphocytes

190. All of the following infectious diseases have been controlled to a large extent by the use of vaccine, **except**

- (1) AIDS
- (2) Diphtheria
- (3) Polio
- (4) Pneumonia

191. The use of vaccines and immunisation programmes have enabled us to completely eradicate which of the following diseases?

- (1) Tetanus
- (2) Small pox
- (3) Hepatitis-B
- (4) Ringworms

192. Interferons are X secreted from virus Y cells.

Choose the option that **correctly** fill the blanks X and Y.

- |                     |              |
|---------------------|--------------|
| <b>X</b>            | <b>Y</b>     |
| (1) Polysaccharides | Non-infected |
| (2) Glycoproteins   | Infected     |
| (3) Lipids          | Infected     |
| (4) Steroids        | Non-infected |

193. *Wuchereria* lodges and accumulates most likely in

- (1) Lungs
- (2) Liver
- (3) Intestine
- (4) Lymphatic vessels

194. Which of the following is not **true** w.r.t the side-effects due to use of anabolic steroids in human male?

- (1) Mood swings
- (2) Decreased sperm production
- (3) Reduction in size of the testicles
- (4) Decrease in the size of the prostate gland

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195. Select the **correct** statement from the options given below.
- (1) Chewing tobacco lowers the blood pressure
  - (2) Cocaine is very useful in patients who have undergone surgery
  - (3) *Trichophyton* can cause ringworms in humans
  - (4) Cocaine has a potent inhibiting action on CNS producing a sense of euphoria
196. *Plasmodium* reproduces asexually in
- (1) Small intestine of humans
  - (2) RBCs of humans
  - (3) Salivary gland of mosquito
  - (4) Gut lumen of mosquito
197. Colostrum contains abundant amount of
- (1) IgG
  - (2) IgA
  - (3) IgE
  - (4) IgM
198. The infective stage of malarial parasite for human is
- (1) Sporozoite
  - (2) Gametocyte
  - (3) Gamete
  - (4) Trophozoite
199. Complete the analogy by selecting the correct option.
- Interferons : Cytokine barrier :: \_\_\_\_\_ : Physical barrier
- (1) Monocytes
  - (2) Skin
  - (3) PMNL
  - (4) Saliva
200. Read the statements 'A' and 'B' carefully and select the **correct** option.
- Statement A** : Yoga has been practised since time immemorial to achieve physical and mental health.
- Statement B** : Mind and mental health can affect our health.
- (1) Both statements 'A' and 'B' are true
  - (2) Both statements 'A' and 'B' are false
  - (3) Only statement 'A' is false
  - (4) Only statement 'B' is false

□ □ □

**Scan the QR Code for Detailed Video Solutions**

(\*Video will be available to access post 8 p.m. on 13<sup>th</sup> April, 2024 onwards)



**Scan the QR Code to know "How FTS Helps to Boost the NEET Score"**



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## FINAL TEST SERIES for NEET-2024

MM : 720

**Test - 7**

Time : 3 Hrs. 20 Mins.

### Answers

1. (3)	41. (3)	81. (2)	121. (2)	161. (2)
2. (4)	42. (2)	82. (1)	122. (3)	162. (1)
3. (2)	43. (3)	83. (2)	123. (4)	163. (1)
4. (2)	44. (4)	84. (2)	124. (2)	164. (3)
5. (2)	45. (1)	85. (4)	125. (3)	165. (4)
6. (2)	46. (1)	86. (4)	126. (4)	166. (2)
7. (4)	47. (2)	87. (2)	127. (3)	167. (1)
8. (1)	48. (4)	88. (4)	128. (2)	168. (3)
9. (1)	49. (1)	89. (2)	129. (4)	169. (2)
10. (1)	50. (3)	90. (4)	130. (3)	170. (3)
11. (2)	51. (4)	91. (2)	131. (4)	171. (4)
12. (2)	52. (3)	92. (1)	132. (3)	172. (3)
13. (2)	53. (2)	93. (4)	133. (2)	173. (3)
14. (1)	54. (3)	94. (3)	134. (4)	174. (2)
15. (1)	55. (4)	95. (3)	135. (3)	175. (3)
16. (2)	56. (2)	96. (2)	136. (1)	176. (1)
17. (3)	57. (1)	97. (3)	137. (2)	177. (1)
18. (2)	58. (1)	98. (4)	138. (3)	178. (2)
19. (1)	59. (2)	99. (3)	139. (1)	179. (2)
20. (4)	60. (2)	100. (2)	140. (4)	180. (3)
21. (3)	61. (4)	101. (1)	141. (2)	181. (3)
22. (4)	62. (3)	102. (3)	142. (4)	182. (4)
23. (3)	63. (4)	103. (4)	143. (1)	183. (3)
24. (3)	64. (1)	104. (3)	144. (1)	184. (2)
25. (1)	65. (2)	105. (2)	145. (3)	185. (1)
26. (4)	66. (3)	106. (3)	146. (1)	186. (2)
27. (4)	67. (1)	107. (2)	147. (2)	187. (4)
28. (1)	68. (1)	108. (3)	148. (3)	188. (3)
29. (4)	69. (2)	109. (1)	149. (1)	189. (1)
30. (1)	70. (2)	110. (2)	150. (2)	190. (1)
31. (1)	71. (1)	111. (1)	151. (4)	191. (2)
32. (3)	72. (3)	112. (4)	152. (2)	192. (2)
33. (3)	73. (2)	113. (3)	153. (1)	193. (4)
34. (4)	74. (1)	114. (1)	154. (4)	194. (4)
35. (2)	75. (3)	115. (2)	155. (1)	195. (3)
36. (2)	76. (1)	116. (3)	156. (4)	196. (2)
37. (2)	77. (1)	117. (2)	157. (2)	197. (2)
38. (2)	78. (3)	118. (1)	158. (3)	198. (1)
39. (1)	79. (4)	119. (2)	159. (4)	199. (2)
40. (2)	80. (4)	120. (2)	160. (3)	200. (1)



# Aakash

Medical | IIT-JEE | Foundations

Corporate Office: Aakash Tower, 8, Pusa Road, New Delhi-110005, Ph.011-47623456

## FINAL TEST SERIES for NEET-2024

MM : 720

### Test - 7

Time : 3 Hrs. 20 Mins.

### Answers and Solutions

#### PHYSICS

##### SECTION - A

- Answer (3)  
We know,  
From 0 to  $\frac{\pi}{\omega}$  is half cycle of a sinusoidal a.c.  
 $\therefore E_{av} = \frac{2E_0}{\pi} = \frac{80}{\pi} \text{ V}$
- Answer (4)  
 $X_L = \omega L$   
 $X = 2\pi fL$   
Now,  $f' = 2f$  and  $L' = 2L$   
 $X'_L = 2\pi(2f)(2L)$   
 $= 2\pi \times 4fL$   
 $= 4X$
- Answer (2)  
We know,  
 $Z = \sqrt{(X_L - X_C)^2 + R^2}$   
 $Z = \sqrt{\left[2\pi\left(\frac{50}{\pi}\right) - \frac{10^6}{2\pi\left(\frac{50}{\pi}\right)(20)}\right]^2 - (300)^2}$   
 $Z = \sqrt{(100 - 500)^2 + (300)^2} \Rightarrow Z = 500 \Omega$   
 $\therefore I_{rms} = \frac{V_{rms}}{Z} = \frac{50}{500} = 0.1 \text{ A}$
- Answer (2)  
 $Q = \frac{1}{R} \sqrt{\frac{L}{C}} = \frac{1}{10} \sqrt{\frac{2}{2 \times 10^{-6}}}$   
 $Q = 100$
- Answer (2)  
Power output cannot be increased as per conservation of energy  
Considering an ideal transformer  
 $P_{out} = P_{in}$   
 $\therefore$  A step-down transformer decreases alternating voltage but increases alternating current.
- Answer (2)  
 $\therefore I_v = \frac{50}{z} = \frac{50}{10\sqrt{2}}$   
 $I_v = \frac{5}{\sqrt{2}} \text{ A}$   
We know,  
 $P_{av} = I_v^2 R$   
 $P_{av} = \left(\frac{5}{\sqrt{2}}\right)^2 (10)$   
 $\therefore P_{av} = 125 \text{ W}$
- Answer (4)  
 $\frac{E_{out}}{E_{in}} = \frac{N_s}{N_p}$   
 $\frac{E_{out}}{100} = \frac{1000}{100}$   
 $E_{out} = 1000 \text{ V}$
- Answer (1)  
 $\epsilon_0 \frac{d\phi_E}{dt}$  is displacement current  
 $\therefore$  Its SI unit is 'Ampere'.

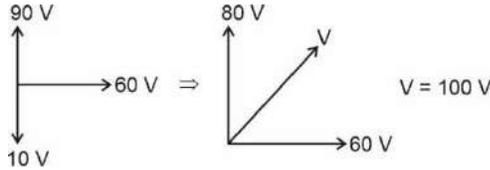
9. Answer (1)

Momentum carried by em wave is given by  $p = \frac{U}{C}$

10. Answer (1)

Among the given EM waves, X-rays have highest frequency and thus have highest penetrating power.

11. Answer (2)



$$z = \frac{V}{I} = \frac{100}{20} = 5 \Omega$$

12. Answer (2)

We know,

Displacement current,  $I_d = \epsilon_0 \frac{d\phi_E}{dt}$

$$\therefore I_d = \epsilon_0(4) = 4\epsilon_0$$

13. Answer (2)

We know,

$\vec{E} \times \vec{B}$  gives the direction of propagation of EM wave that is along x-axis. So  $\vec{B}$  is along z-axis.

14. Answer (1)

We know

$$\begin{aligned} \frac{1}{f} &= \frac{\mu_2 - \mu_1}{\mu_1} \left( \frac{1}{R_1} - \frac{1}{R_2} \right) \\ &= \frac{1.5 - 2}{2} \left( \frac{1}{20} - \frac{1}{-20} \right) \\ &= -\frac{1}{4} \left( \frac{1}{10} \right) \end{aligned}$$

$$f = -40 \text{ cm}$$

15. Answer (1)

Focal length of mirror does not change with the change in surrounding medium.

16. Answer (2)

$$\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$$

$$\frac{1}{v} - \frac{1}{f} = \frac{1}{f}$$

$$\frac{1}{v} = \frac{2}{f}$$

$$v = \frac{f}{2}$$

17. Answer (3)

We know,

$$\mu = \frac{1}{\sin i_c} \Rightarrow \sin i_c = \frac{1}{\mu}$$

$$i_c = \sin^{-1} \left( \frac{1}{\mu} \right)$$

18. Answer (2)

We know,

$$M = \frac{f_o}{f_e} = \frac{140}{5} = 28$$

19. Answer (1)

The intermediate image is real, inverted and magnified.

20. Answer (4)

$$\text{New apparent height } h = \frac{12.0}{1.5} = 8 \text{ cm}$$

$$\therefore \text{Displacement of microscope} = (9 - 8) \text{ cm} = 1 \text{ cm}$$

21. Answer (3)

$$I_{\text{avg}} = \frac{\int_0^T (8 + 12 \sin 100\pi t) dt}{\int_0^T dt}$$

$$\begin{aligned} &= \frac{\int_0^T 8 dt}{T} + \frac{12}{T} \int_0^T \sin 100\pi t dt \\ &= 8 \text{ A} \end{aligned}$$

22. Answer (4)

$$V = -V_0 \sin \omega t$$

$$I = -I_0 \sin \left( \omega t + \frac{\pi}{2} \right)$$

$$I = -I_0 \cos \omega t$$

23. Answer (3)

$$Q = \frac{1}{R} \sqrt{\frac{L}{C}}$$

For minimum value of Q, R and C should be maximum and L should be minimum.

24. Answer (3)

$$\text{Velocity of E.M. wave } v = \frac{1}{\sqrt{\mu_0 \epsilon_0}}$$

25. Answer (1)

$$V = 60 \sin 50t + 80 \cos 50t$$

$$V = 100 \sin(50t + \phi)$$

$$I_0 = \frac{100}{10} = 10 \text{ A}$$

$$\begin{aligned} I_{\text{r.m.s}} &= \frac{I}{\sqrt{2}} \\ &= 5\sqrt{2} \text{ A} \end{aligned}$$

26. Answer (4)

$$P = V_{rms} I_{rms} \cos \phi$$

27. Answer (4)

All statements are true about  $\gamma$  rays.

28. Answer (1)

$$q = q_0 \sin 2\pi ft$$

$$I_d = \frac{dq}{dt}$$

$$= q_0 2\pi f \cos 2\pi ft$$

29. Answer (4)

$$I = \frac{P}{4\pi r^2}$$

$$I = \frac{11}{4\pi} = \frac{11}{4 \times \frac{22}{7}} = \frac{7}{8} \frac{W}{m^2}$$

$$\approx 0.88 \frac{W}{m^2}$$

30. Answer (1)

$$\text{Dispersive power } \omega = \frac{\mu_V - \mu_R}{\mu_Y - 1}$$

$$\omega = \frac{1.705 - 1.690}{1.695 - 1} = \frac{1}{46.33}$$

31. Answer (1)

$$v = \frac{c}{\mu}$$

$$= \frac{3 \times 10^8}{1.5} = 2 \times 10^8 \text{ m/s}$$

$$\text{then distance travelled} = 2 \times 10^8 \times 2$$

$$= 4 \times 10^8 \text{ m}$$

32. Answer (3)

$$I = \frac{I_0}{2} \cos^2 \phi = \frac{3I_0}{8}$$

33. Answer (3)

$$\beta = \frac{\lambda D}{d}$$

$$5 \times 10^{-4} = \frac{500 \times 10^{-9} \times D}{1 \times 10^{-4}}$$

$$D = 0.1 \text{ m}$$

34. Answer (4)

$$\omega = \frac{2\pi}{T}$$

∴ Its unit is rad/s

35. Answer (2)

$$\tan i_p = \mu$$

$$\mu = \tan 53^\circ = \frac{4}{3}$$

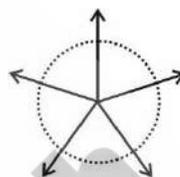
$$\sin \theta_c = \frac{1}{\mu} = \frac{3}{4}$$

$$\theta_c = \sin^{-1} \left( \frac{3}{4} \right)$$

## SECTION - B

36. Answer (2)

Due to point source light propagates in all directions symmetrically and hence wavefront will be spherical



$I \propto \frac{1}{r^2} \Rightarrow$  Intensity decreases inversely proportional with the square of distance from source.

37. Answer (2)

$$F = \frac{2I}{c} A$$

$$= \frac{2 \times 50 \times 10^4 \times 5 \times 10^{-2}}{3 \times 10^8}$$

$$= \frac{2 \times 5 \times 5}{3} \times 10^{-5} = 16.6 \times 10^{-5} \text{ N}$$

38. Answer (2)

$$I = \frac{B_0^2 c}{2\mu_0}$$

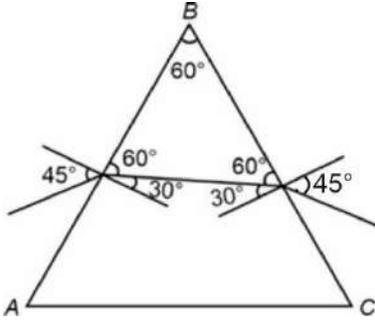
$$= \frac{(0.2 \times 10^{-6})^2 \times 3 \times 10^8}{2 \times 4\pi \times 10^{-7}}$$

$$= 4.8 \text{ W/m}^2$$

39. Answer (1)

In series circuit the current in inductor and capacitor is same. The phase difference between voltage and current in capacitor is  $\frac{\pi}{2}$

40. Answer (2)



For refraction at surface AB

$$\mu_1 \sin i = \mu_2 \sin r_1$$

$$\sin 45 = \sqrt{2} \sin r_1$$

$$\sin r_1 = \frac{1}{2} = 30^\circ \Rightarrow r_1 = 30^\circ$$

$$r_1 = r_2 = 30^\circ$$

$$\text{So, } i = e = 45^\circ$$

41. Answer (3)

$$\frac{d_A}{d_B} = \frac{\mu_B}{\mu_A}$$

$$\frac{d_A}{30} = \frac{2}{1.5}$$

$$d_A = \frac{2 \times 30}{1.5} = \frac{60}{1.5}$$

$$d_A = 40 \text{ m}$$

42. Answer (2)

X-ray are used in medical application.

43. Answer (3)

$$\beta = \frac{\lambda D}{d}$$

$$\beta' = \frac{\lambda' D}{d}$$

$$\frac{\beta'}{\beta} = \frac{\lambda'}{\lambda} = \frac{\mu}{\lambda} = \frac{1}{\mu}$$

$$\beta' = \frac{\beta}{\mu} = \frac{0.6 \text{ mm}}{1.5} = 0.4 \text{ mm}$$

44. Answer (4)

$$\frac{1}{f} = \left( \frac{\mu_2 - \mu_1}{\mu_1} \right) \left( \frac{1}{R_1} - \frac{1}{R_2} \right)$$

$$\frac{1}{80} = \left( \frac{1.5 - \mu}{\mu} \right) \left( \frac{2}{40} \right)$$

$$\frac{1}{4} = \frac{1.5 - \mu}{\mu}$$

$$6 - 4\mu = \mu$$

$$\mu = \frac{6}{5} = 1.2$$

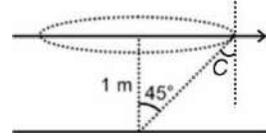
45. Answer (1)

$$\sin C = \frac{1}{\sqrt{2}}$$

$$C = 45^\circ$$

$$r = h \tan C$$

$$= 1 \tan 45^\circ = 1 \text{ m}$$



$$\text{Area} = \pi r^2 = \pi \text{ m}^2$$

46. Answer (1)

At resonance,

$$2\pi fL = \frac{1}{2\pi fc}$$

$$C = \frac{1}{4\pi^2 f^2 L} = \frac{1}{4 \times (\pi)^2 \times (50)^2 \times 50 \times 10^{-6}}$$

$$= 0.2 \text{ F}$$

47. Answer (2)

$$i_{rms} = \sqrt{\frac{\int_0^\tau i^2 dt}{\int_0^\tau dt}}$$

$$= \sqrt{\frac{\frac{i_0^2}{\tau^3} \int_0^\tau t^3 dt}{\tau}}$$

$$= \frac{i_0}{\tau^2} \sqrt{\frac{\tau^4}{4}} = \frac{i_0}{2}$$

48. Answer (4)

$$i = -4t + 20$$

$$i_{av} = \frac{\int idt}{\int dt} = \frac{1}{T} [\text{area under the curve of } i \text{ as } t]$$

$$= \frac{1}{2} \times 5 \times 20 - \frac{1}{2} \times 5 \times 20$$

$$i_{av} = 0$$

49. Answer (1)

$$\text{Correct equation is } \oint \vec{B} \cdot d\vec{l} = \mu_0 i_c + \mu_0 \epsilon_0 \frac{d\phi_E}{dt}$$

50. Answer (3)

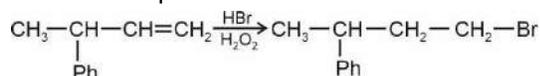
Microwaves are produced by special vacuum tubes like klystrons or magnetrons and Gunn diodes.

## CHEMISTRY

## SECTION - A

51. Answer (4)

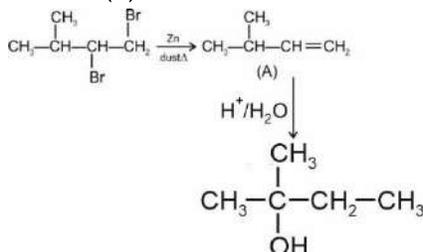
In presence of  $\text{H}_2\text{O}_2$ , anti-Markovnikov addition of  $\text{HBr}$  will take place



52. Answer (3)

Presence of electron withdrawing group ( $-\text{NO}_2$  group) increases the acidity of phenol

53. Answer (2)



54. Answer (3)

$-\text{COOH}$  group is electron withdrawing group ( $-M$  effect) that is why nitration takes place on meta position.

55. Answer (4)

$3^\circ$  alcohol does not give any colour in Victor Meyer test.

56. Answer (2)

$-\text{CHO}$  is deactivating and meta directing group for electrophilic aromatic substitution reaction

Hence,

m-nitrobenzaldehyde will be major product.



57. Answer (1)

Presence of  $-\text{SO}_3\text{H}$  at ortho position of biphenyl makes it optically active due to high steric hindrance.

58. Answer (1)

Order of reactivity

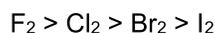


59. Answer (2)

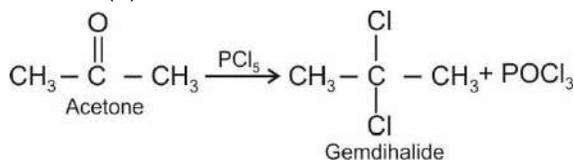
Aldehyde and ketone having  $\left(\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\right)$  group and alcohols with  $\left(\text{CH}_3-\underset{\text{OH}}{\text{CH}}-\right)$  group will give haloform reaction.

60. Answer (2)

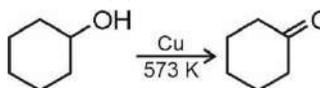
Reactivity order of halogens towards halogenation of ethane is



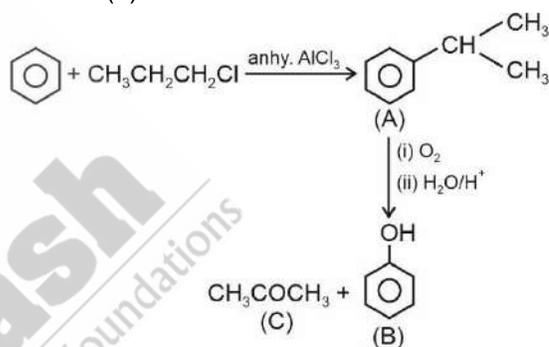
61. Answer (4)



62. Answer (3)



63. Answer (4)

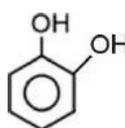


64. Answer (1)



65. Answer (2)

Catechol is



66. Answer (3)

Order of reactivity of alcohol with Lucas reagent is  $3^\circ > 2^\circ > 1^\circ$

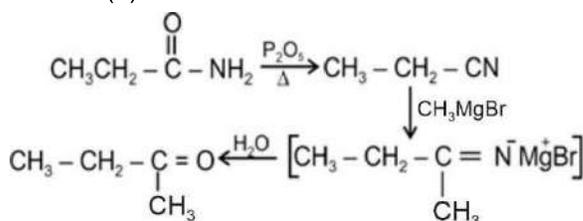
Benzyl alcohol  $\text{C}_6\text{H}_5\text{CH}_2\text{OH}$  is a primary alcohol.

67. Answer (1)

Order of reactivity towards elimination

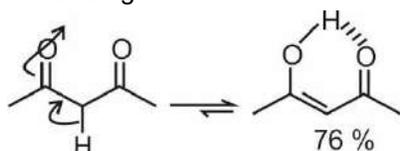


68. Answer (1)



69. Answer (2)

Acidity of methylene proton is maximum in option (2) and enol form is stabilised by H-bonding.

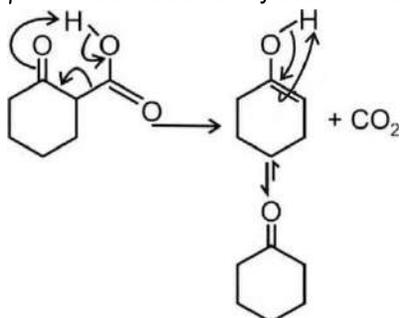


70. Answer (2)

$\text{CH}_3\text{CHO}$  will give faster nucleophilic addition reaction than  $\text{C}_6\text{H}_5\text{CHO}$  due to less steric hindrance.

71. Answer (1)

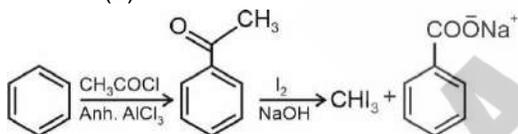
$\beta$ - ketoacid decarboxylates on heating



72. Answer (3)

Reduction of aldehyde and ketone to alkane by  $\text{NH}_2 - \text{NH}_2$  in presence of  $\text{KOH}$ /ethylene glycol is Wolff-Kishner reaction

73. Answer (2)



74. Answer (1)

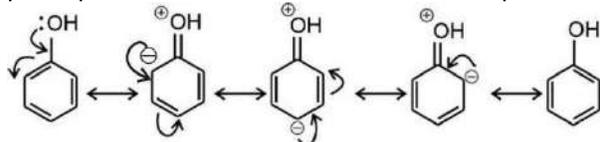
Allyl halide has C-X single bond

75. Answer (3)

Chlorobenzene give ortho and para product during aromatic electrophilic substitution reaction.

76. Answer (1)

Lone pair of electrons present on oxygen atom participates in resonance in case of phenol.



77. Answer (1)

Some compounds are well known for their common names as following

$\text{HCOOH} \rightarrow$  Formic acid

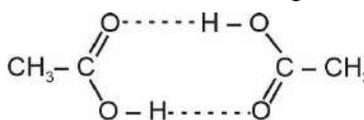
$\text{CH}_3\text{OH} \rightarrow$  Wood spirit

$\text{HCHO} \rightarrow$  Formaldehyde

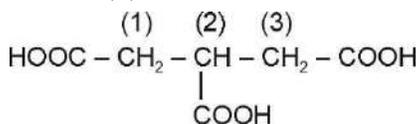
$\text{CH}_3\text{COOH} \rightarrow$  Acetic acid

78. Answer (3)

Acetic acid forms dimer in benzene due to intermolecular H-bonding.

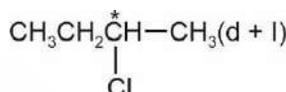


79. Answer (4)



Propane -1, 2, 3-tricarboxylic acid

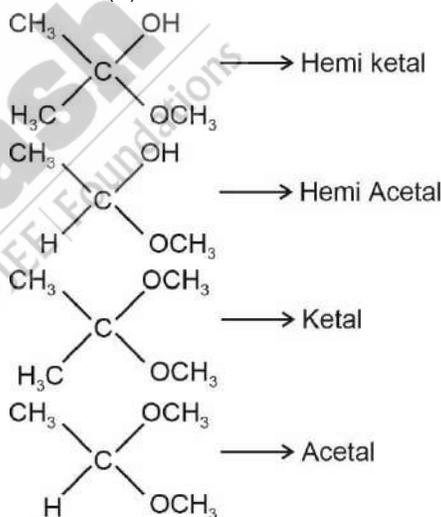
80. Answer (4)



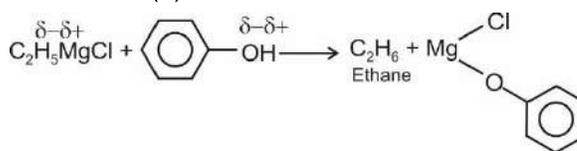
81. Answer (2)

In  $\text{S}_{\text{N}}2$  inversion in configuration takes place

82. Answer (1)



83. Answer (2)



84. Answer (2)

Phenol ( $\text{C}_6\text{H}_5\text{OH}$ ) is also known as carboic acid

85. Answer (4)

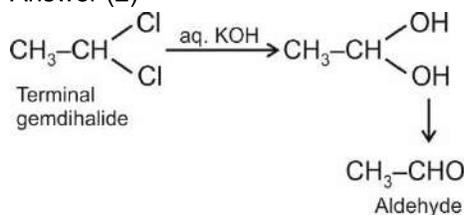
Butoxide ion is a stronger base than  $\text{OH}^-$  hence acid base reaction will not take place.

### SECTION - B

86. Answer (4)

$\text{E}_2$  mechanism is suitable in polar aprotic solvent.

87. Answer (2)



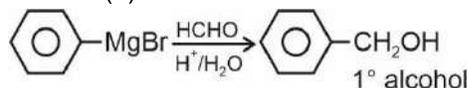
88. Answer (4)

Tertiary alkoxide is used to obtain tertiary ether.

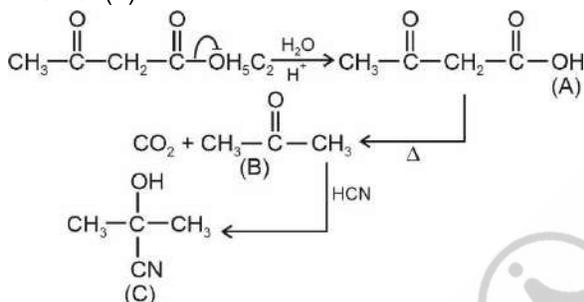
89. Answer (2)

$\text{ClCH}=\text{C}=\text{CHCl}$  is an asymmetric molecule.

90. Answer (4)



91. Answer (2)



92. Answer (1)

As stability of alkene increases ease of dehydration increases.

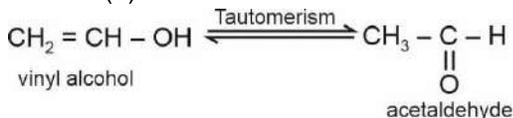
93. Answer (4)

Acids which are more acidic than  $\text{H}_2\text{CO}_3$  can evolve  $\text{CO}_2$  on reaction with  $\text{NaHCO}_3$ .

94. Answer (3)

o-Nitrobenzoic acid is strongest acid among the given options both because of strong -I effect of  $\text{NO}_2$  and ortho-effect. p-Nitrobenzoic acid is stronger than m-nitrobenzoic acid because of strong -R effect.

95. Answer (3)

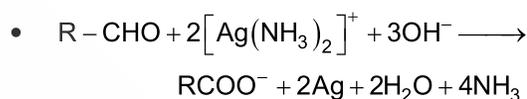


96. Answer (2)

a.	$\text{CH}_3-\text{CH}_2-\text{OH}$	→	Saturated Primary alcohol
b.	$\text{CH}_3-\overset{\text{OH}}{\text{C}}-\text{CH}_3$	→	Secondary alcohol
c.	$\text{CH}_2=\text{CH}-\underset{\text{OH}}{\text{CH}_2}$	→	Allyl alcohol
d.	$\text{CH}_3-\overset{\text{OH}}{\text{C}}(\text{CH}_3)-\text{CH}_3$	→	Tertiary alcohol

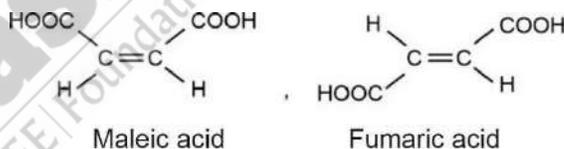
97. Answer (3)

Acetaldehyde gives positive Tollens' test whereas acetone does not.



98. Answer (4)

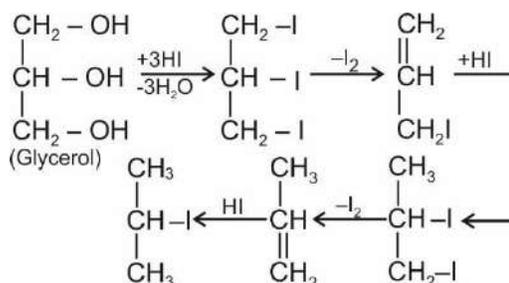
Maleic acid and Fumaric acid are geometrical isomers of each other.



99. Answer (3)

$\text{HOOC}-\text{CH}_2-\text{CH}_2-\text{COOH}$  is succinic acid

100. Answer (2)



## BOTANY

### SECTION - A

101. Answer (1)

Eurythermal organisms can tolerate and thrive in a wide range of temperatures.

102. Answer (3)

Browsers do not feed on *Calotropis* plant because it produces poisonous cardiac glycosides.

103. Answer (4)

Temperature is the most ecologically relevant environmental factor.

Temperature decreases progressively from equator towards the poles and from plains to mountain tops.

104. Answer (3)  
Under unfavourable conditions many zooplanktons species in lakes and ponds are known to enter diapause, a stage of suspended development.
105. Answer (2)  
Mammals can regulate constant body temperature and concentration of body fluids. Evolutionary biologists believe that the 'success' of mammals is largely due to their ability to maintain a constant body temperature and thrive whether they live in Antarctica or in Sahara desert.
106. Answer (3)  
Exponential growth is represented by the equation  $\frac{dN}{dt} = rN$ , resulting in J-shaped growth curve
107. Answer (2)  
Presence of large air spaces and aerenchyma are feature of hydrophytes.
108. Answer (3)  
A population is said to be mature or stable when there is no increase or decrease in its size due to growth rates being almost zero.
109. Answer (1)  
Natality refers to the number of births during a given period in the population that are added to the initial density.
110. Answer (2)  
Kangaroo rat in North American deserts is capable of meeting all of its water requirement through its internal fat oxidation.
111. Answer (1)  
The UV component of the spectrum is harmful to many organisms while not all the colour components of the visible spectrum are available for marine plants living at different depths of the ocean.
112. Answer (4)  
All birds and mammals are regulators.
113. Answer (3)  
Increasing RBCs production and decreasing the binding affinity of haemoglobin and increasing breathing rate are physiological adaptations of altitude sickness.
114. Answer (1)  
The age pyramid of a young or growing population is triangular in shape *i.e.* expanding.
115. Answer (2)  
'+' for beneficial, '-' for detrimental and '0' for neutral interaction
- |              |   | Species A | Species B |
|--------------|---|-----------|-----------|
| Commensalism | → | +         | 0         |
| Mutualism    | → | +         | +         |
| Parasitism   | → | +         | -         |
116. Answer (3)  
Competitive exclusion states that the two closely related species competing for the same resource cannot co-exist indefinitely and the competitively inferior one will be eventually eliminated.
117. Answer (2)  
Capturing of insects by the venus fly trap is predation which is a negative interaction.
118. Answer (1)  
Global warming is not affecting thermal and salt tolerance of species.
119. Answer (2)  
Death rate =  $\frac{\text{Number of individuals died}}{\text{Initial population} \times \text{time}}$
- $$= \frac{5}{50}$$
- = 0.1 is the death rate of population.
120. Answer (2)  
A population growing in a habitat with limited resources show asymptote when the population density reaches the carrying capacity.
121. Answer (2)  
The LAB produces acids that coagulate and partially digest the milk proteins.
122. Answer (3)  
Ripening of Roquefort cheese is done by fungi *Penicillium roqueforti*.
123. Answer (4)  
Brewer's yeast is used for commercial production of ethanol.  
Wine and beer are produced without distillation of fermented broth.
124. Answer (2)  
Antibiotics are most effective against bacterial infections. Antibiotics have greatly improved our capacity to treat deadly diseases such as plague, whooping cough, diphtheria and leprosy.
125. Answer (3)  
Citric acid is employed in dyeing, flavouring and preservation of food. Lipases are used in detergent formulations and helpful in removing oily stains.  
Pectinases helps in clarifying fruit juices.  
Streptokinase is used as clot buster for removing clots from blood vessels of patients.
126. Answer (4)  
Bt cotton, the transgenic plants developed by genetic engineering, have *B. thuringiensis* toxin genes into plants. Such plants are resistant to attack of insect pests.

127. Answer (3)  
The majority of baculoviruses used as biocontrol agents are in the genus *Nucleopolyhedrovirus*. These viruses have species-specific, narrow spectrum insecticidal applications. They have no negative impacts on plants.
128. Answer (2)  
*Trichoderma* are free living fungi and are very common in root ecosystems and are effective against several plant pathogens.
129. Answer (4)  
Biogas is formed by anaerobic respiration of cellulose
130. Answer (3)  
Primary treatment involves physical removal of large and small particles through filtration and sedimentation.
131. Answer (4)  
Biogas includes CH<sub>4</sub>, CO<sub>2</sub>, H<sub>2</sub> and N<sub>2</sub>.
132. Answer (3)  
Methanogens are found in the rumen of cattles. Technology of biogas production was developed due to efforts of IARI and KVIC.
133. Answer (2)  
For the discovery of antibiotics, Chain and Florey were awarded Nobel prize in 1945.
134. Answer (4)  
Tertiary treatment of waste water is done for domestic purpose. It is a physico-chemical process in which chlorine gas, ozone gas, UV rays or reverse osmosis etc, are used to remove DDT, pesticides and turbidity in waste water.
135. Answer (3)  
Cattle dung is available in large quantities in rural areas where cattle are used for a variety of purposes.
- SECTION - B**
136. Answer (1)  
*Monascus purpureus* is used to produce statins and it is commercialised as blood cholesterol lowering agent.
137. Answer (2)  
Aeration tank allows growth of masses of aerobic bacteria associated with fungal filaments to form flocs.
138. Answer (3)  
Citric acid is obtained from fungus *Aspergillus niger*.
139. Answer (1)  
In Mycorrhiza, symbiotic partner of plant is fungus which is heterotrophic. The fungal symbiont in these association absorbs phosphorus from soil and passes it to the plants.
140. Answer (4)  
Tobacco Mosaic virus is a rod shaped virus.
141. Answer (2)  
The process of distillation increases the percentage of alcohol in the fermented broth.
142. Answer (4)  
The fermented preparation of rice and black gram for dosa and idli is prepared by using bacteria.
143. Answer (1)  
Grit of sewage is removed by sedimentation.
144. Answer (1)  
MacArthur in an experiment showed that five closely related species of Warblers living on the same tree were able to avoid competition and co-exist due to behavioural differences in their foraging activities.
145. Answer (3)  
J-shaped growth curve is seen in exponential/geometric growth model.
146. Answer (1)  
Vital index for a population is represented as  $\frac{B}{D} \times 100$   
Here B is number of births  
D is number of deaths
147. Answer (2)  
Lowest temperature and least precipitation is recorded in arctic and alpine tundra.
148. Answer (3)  
No population of any species in nature has unlimited resources to permit exponential growth. Since resources for growth of most animal populations are finite, the logistic growth model is considered a more realistic one. For calculating the value of intrinsic rate of natural increase, we need to know the birth rates and death rates.
149. Answer (1)  
Mostly population sizes are estimated indirectly. The tiger census in our national parks and tiger reserves is often based on pug marks and fecal pellets.
150. Answer (2)  
Organisms → Population → Community → Ecosystem → Landscape → Biome → Biosphere

## ZOOLOGY

### SECTION - A

151. Answer (4)  
Anti-tetanus serum contains preformed antibodies or antitoxin which provides passive immunity. Administration of attenuated pathogens provide active immunity. Interferon is a cytokine barrier of innate immunity.
152. Answer (2)  
Macrophages in tissues, PMNL, monocytes and natural killer cells in the blood are cellular barriers of innate immunity.
153. Answer (1)  
Allergy is due to the release of chemicals like histamine, serotonin from the mast cells. The use of drugs like anti-histamine, adrenaline and steroids quickly reduce the symptoms of allergy.
154. Answer (4)  
Amphetamine is not a hallucinogen. It is a stimulant.
155. Answer (1)  
HIV infection once caught, can never be cured. Medicines can only prolong the survival.
156. Answer (4)  
Filariasis is transmitted by female *Culex* mosquito and malaria is transmitted by infected female *Anopheles* mosquito, which are insects. Small pox, polio and AIDS are viral diseases. Dengue is transmitted by infected *Aedes* mosquitoes.
157. Answer (2)  
Pneumonia is caused by bacteria *Streptococcus pneumoniae* and *Haemophilus influenzae*.  
In humans, it infects the alveoli of lungs. As a result the alveoli get filled with fluid leading to severe problems in respiration. Common cold is a viral disease whereas amoebic dysentery is a protozoan disease. Plague is a bacterial disease.
158. Answer (3)  
Benign tumors normally remain confined to their original location and do not spread to other parts of the body. The malignant tumors are a mass of proliferating cells called neoplastic or tumor cells.
159. Answer (4)  
Amoebic dysentery caused by *E. histolytica*, ascariasis by *Ascaris*, typhoid fever by *Salmonella typhi*, are transmitted through faeco-oral route. Chikungunya is a vector borne disease transmitted by infected female *Aedes* mosquito.
160. Answer (3)  
Heroin (Smack), is obtained by the acetylation of morphine, which is extracted from the latex of poppy plant.
161. Answer (2)  
Smoking increases carbon monoxide content in blood and reduces the concentration of haembound oxygen. This causes oxygen deficiency in the body.
162. Answer (1)  
Nicotine stimulates adrenal medulla to release adrenaline and noradrenaline into blood circulation, both of which raise blood pressure and increase heart rate.
163. Answer (1)  
*P. falciparum* causes malignant tertian malaria which is considered as the most serious form of malaria.
164. Answer (3)  
NK cells are specialised lymphocytes.
165. Answer (4)  
The chemical structure given is of morphine which is an opioid. Smack is obtained by acetylation of morphine. Opioid receptors are present in our CNS and GIT.
166. Answer (2)  
MRI uses strong magnetic fields and non-ionising radiations to accurately detect pathological and physiological changes in the living tissue.  
In biopsy, a piece of the suspected tissue cut into thin sections is stained and examined under microscope.
167. Answer (1)  
Cancer cells do not show contact inhibition. Malignant tumors exhibit metastasis while benign tumors remain confined to their site of origin.
168. Answer (3)  
Detection and diagnosis of cancer may be done by blood and bone marrow tests (e.g. for increased cell counts in the case of leukemia).  
Common treatments prescribed for different types of cancer are : Surgery, Radiotherapy/ Radiation therapy, Chemotherapy, Immunotherapy, etc.
169. Answer (2)  
Dependence is the tendency of the body to manifest a characteristic and unpleasant withdrawal syndrome if regular dose of drugs/alcohol is abruptly discontinued. This is characterised by anxiety, shakiness, nausea and sweating, which may be relieved when its use is resumed again.
170. Answer (3)  
For determining the cause of allergy, the patient is exposed to or injected with very small doses of possible allergens and the reactions are studied.

171. Answer (4)

When people are healthy, they are more efficient at work. This increases productivity and brings economic prosperity. Health also increases longevity of people and reduces infant and maternal mortality.

172. Answer (3)

Awareness about diseases and their effects on different bodily functions, vaccination against infectious diseases, proper disposal of wastes, control of vectors and maintenance of hygienic food and water resources are necessary for achieving good health.

173. Answer (3)

Pathogens have to adapt to life within the environment of the host. For example, the pathogens that enter the gut must know a way of surviving in the stomach at low pH and resisting the various digestive enzymes.

174. Answer (2)

Coca alkaloid or cocaine is obtained from *Erythroxylum coca*. Plants with hallucinogenic properties are *Atropa belladonna* and *Datura*.

175. Answer (3)

HIV infections are generally transmitted by blood and sexual contact.

176. Answer (1)

Vaccination provides artificial active immunity.

177. Answer (1)

Innate immunity is a non-specific type of defence that is present at the time of birth. Innate immunity consists of four types of barriers.

178. Answer (2)

In higher vertebrates including humans, the immune system can differentiate self cells and non-self cells. If this property is lost and body attacks self cells, it will result in damage to the body and is called auto-immune disease.

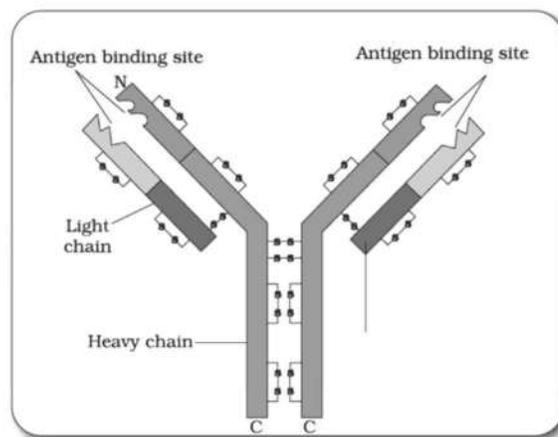
179. Answer (2)

Diphtheria is a bacterial disease caused by *Corynebacterium diphtheriae*.

180. Answer (3)

Thymus and bone marrow are examples of primary lymphoid organs.

181. Answer (3)



182. Answer (4)

The body is able to differentiate 'self' and 'non-self' cells and the cell-mediated immune response is mainly responsible for the graft rejection.

Humoral immune response is antibody mediated.

183. Answer (3)

Bone marrow and thymus are primary lymphoid organs where immature lymphocytes differentiate into antigen-sensitive lymphocytes. After maturation the lymphocytes migrate to secondary lymphoid organs such as spleen.

184. Answer (2)

Marijuana is obtained from hemp plant.

185. Answer (1)

A-Thymus

Spleen has the large reservoir of erythrocytes. It is also called graveyard of RBCs.

#### SECTION - B

186. Answer (2)

Both pneumonia and common cold are transmitted through droplets released by infected person. Pneumonia is a bacterial disease while common cold is a viral disease.

Houseflies act as mechanical carriers and serve to transmit the pathogen of amoebiasis from faeces of an infected person to food and food products, thereby contaminating them.

187. Answer (4)

Psoriasis is an auto-immune disorder.

Typhoid is a bacterial disease.

Hepatitis B is a viral disease.

188. Answer (3)

Rheumatoid arthritis is an example of auto-immune disorder. Asthma is an allergic disorder.

189. Answer (1)  
Macrophages are considered as HIV factory in humans.
190. Answer (1)  
There is no vaccine for AIDS.  
Vaccines are available for polio, pneumonia, diphtheria, tetanus, etc.
191. Answer (2)  
The use of vaccines and immunisation programmes have enabled us to completely eradicate a deadly disease like small pox. Hepatitis-B is not eradicated.
192. Answer (2)  
Interferons are glycoproteins which are secreted from virus infected cells.
193. Answer (4)  
In filariasis, the lymphatic vessels get blocked.
194. Answer (4)  
The side-effects of use of anabolic steroids in human males include increased aggressiveness, mood swings, depression, acne, reduction of size of testicles, decreased sperm count, enlargement of the prostate gland, etc.
195. Answer (3)  
Tobacco contains nicotine which causes the release of hormones from adrenal medulla. Adrenal medullary hormones raise blood pressure. Morphine is very useful in patients who have undergone surgery. Cocaine has a potent stimulating action on CNS, producing a sense of euphoria and increased energy.
196. Answer (2)  
Malarial parasite reproduce asexually in RBCs and liver of human host.
197. Answer (2)  
IgA is a dimeric antibody which is present abundantly in colostrum.
198. Answer (1)  
The gametocytes are the infective stage for female *Anopheles* mosquito.
199. Answer (2)  
Innate immunity has 4 types of barriers. Monocytes and PMNL are cellular barriers. Skin is physical barrier whereas interferons are cytokine barriers.
200. Answer (1)  
Yoga has been practiced since time immemorial to achieve physical and mental health.

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