Aakash

Medical | IIT-JEE | Foundations

(Divisions of Aakash Educational Services Limited)

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MM : 720

Test Series for NEET - 2019
Test – 8

Time : 3 Hrs.

Topics Covered :

Physics : Magnetism and matter, Electromagnetic Induction, Alternating current, Electromagnetic waves.

Chemistry : Haloalkanes and Haloarenes, Alcohols, Phenols and Ethers.

Botany : Strategies for Enhancement in Food Production, Microbes in Human Welfare, Organisms and Populations.

Zoology : Human Health and Disease.

Instructions :

 (i) Use Blue/Black ballpoint pen only to darken the appropriate circle.

 (ii) Mark should be dark and should completely fill the circle.

 (iii) Dark only one circle for each entry.

 (iv) Dark the circle in the space provided only.

 (v) Rough work must not be done on the Answer sheet and do not use **white-fluid** or any other **rubbing material** on Answer sheet.

 (vi) Each question carries 4 marks. For every wrong response 1 mark shall be deducted from total score.

PHYSICS

Choose the correct answer :

1. The Curie's law is given as (symbols have their usual meanings)

   (1) $\mu_r = 1 - \chi$

   (2) $H = \dfrac{cB_0}{T}$

   (3) $\chi = \dfrac{c\mu_0}{T}$

   (4) $\chi = \dfrac{c\mu_0}{T^2}$

2. A short bar magnet placed with its axis at 30° with a uniform external magnetic field of 0.25 T experiences a torque of magnitude equal to 0.05 Nm. The magnitude of the magnetic moment of the magnet is

   (1) 0.2 J T^{-1}

   (2) 0.4 J T^{-1}

   (3) 4.0 J T^{-1}

   (4) 0.64 J T^{-1}

3. Time period of a vibration magnetometer is T_0. Its magnet is replaced by another magnet whose moment of inertia is two times and magnetic moment is half of the initial magnet. The new time period of vibration magnetometer will be
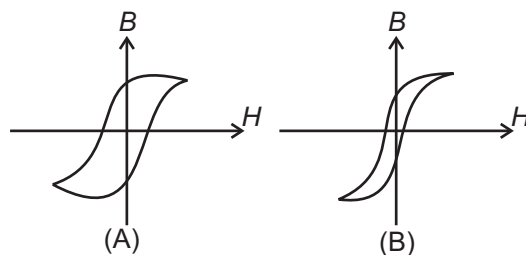
   (1) T_0

   (2) $\sqrt{2}\,T_0$

   (3) $\dfrac{3}{2}T_0$

   (4) $2T_0$

4. Meissner effect is related to

   (1) Paramagnetic substance

   (2) Superconductors

   (3) Antiferromagnetic substance

   (4) Ferromagnetic substance

5. Hysteresis loops for two magnetic materials (A) and (B) are shown in the figure. These materials are to be used to make cores for transformer and electromagnet, then it is prefer to use material


   (1) (A) for both transformer and electromagnet

   (2) (B) for both electromagnet and transformer

   (3) (A) for electromagnet and (B) for transformer

   (4) (A) for transformer and (B) for electromagnet

6. If δ_1 and δ_2 be the apparent angles of dip observed in two vertical planes at right angle to each other. If the true dip at the place is δ then choose the correct option.

   (1) $\tan^2\delta = \tan^2\delta_1 + \tan^2\delta_2$

   (2) $\cot^2\delta = \cot^2\delta_1 + \cot^2\delta_2$

   (3) $\cos^2\delta = \cos^2\delta_1 + \cos^2\delta_2$

   (4) $\cot^2\delta = \tan^2\delta_1 + \tan^2\delta_2$

7. Two identical short bar magnets of magnetic moment M are arranged at the opposite corners of a square of side d such that their centres coincide with corners and their magnetic moments are parallel to each other as shown in figure. The magnitude of magnetic field at the corner P of the square is
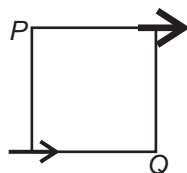
   (1) $\dfrac{\mu_0}{4\pi}\dfrac{2M}{d^3}$

   (2) $\dfrac{\mu_0}{4\pi}\dfrac{M}{2d^3}$

   (3) $\dfrac{\mu_0}{4\pi}\dfrac{M}{d^3}$

   (4) $\dfrac{\mu_0}{4\pi}\dfrac{M}{4d^3}$

8. A circular coil of radius 1 m carries a current 2.5 A. If it is placed in a magnetic field of 10 Wb/m². The work done to rotate it from position to stable equilibrium to unstable equilibrium is

   (1) 50π J

   (2) 2.5π J

   (3) 25 J

   (4) 2.5 J

9. All substances, to some extent, exhibit

   (1) Paramagnetism

   (2) Diamagnetism

   (3) Ferromagnetism

   (4) Both (1) and (3)

10. Ideal inductors of inductance 6.0 H each are connected as shown in the figure. The equivalent inductance of the circuit between A and B is
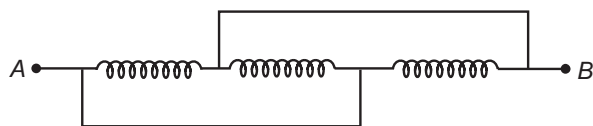
    (1) 1 H

    (2) 18 H

    (3) 0 H

    (4) 2 H

11. A current carrying circular coil of magnetic moment M is placed in region of uniform magnetic field B with its plane perpendicular to magnetic field, then net torque on the coil will be

    (1) MB

    (2) $\dfrac{MB}{2}$

    (3) Zero

    (4) $2MB$

12. A magnet oscillating in horizontal plane has a time period of 2 s at a place where angle of dip is 45° and 6 s at a place where angle of dip is 60°. The ratio of earth's magnetic field at two places is
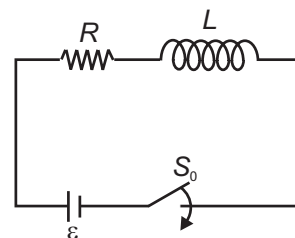
    (1) $9 : \sqrt{2}$

    (2) $9 : 1$

    (3) $\sqrt{3} : 1$

    (4) $6 : 5$

13. The impedance of a circuit containing a resistance of 30 Ω and an inductance of $\dfrac{0.4}{\pi}$ H in series, for A.C. source of 50 Hz frequency is

    (1) 100 Ω

    (2) 70 Ω

    (3) $50\sqrt{2}$ Ω

    (4) 50 Ω

14. The energy stored in the inductor long time after switch S is closed is (steady state)

    (1) $\dfrac{L\varepsilon^2}{R}$

    (2) Zero

    (3) $\dfrac{L\varepsilon^2}{2R^2}$

    (4) $\dfrac{L\varepsilon^2}{4R^2}$

15. An ideal choke coil draws a current 8 A when connected to an AC supply of 100 V, 50 Hz. A resistance of 10 Ω is connected in series to choke and then connected to the AC source of 120 V, 40 Hz. The current in the circuit will be

    (1) 10 A

    (2) 8 A

    (3) $6\sqrt{3}$ A

    (4) $6\sqrt{2}$ A

16. In the given branch PQ of a circuit, electric current $i = (5t + 2)$ A is flowing, where t is time in second. At $t = 1$, the potential difference between points P and Q is
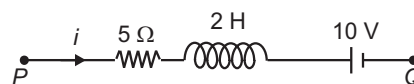

    (1) Zero

    (2) 20 V

    (3) 10 V

    (4) 55 V

17. A short-magnet is kept with its north pole pointing magnetic north pole of earth. A neutral point is formed at a distance of 15 cm from the magnet at its equatorial position.The magnetic moment of bar magnet is ($B_H = 0.4 \times 10^{-4}$ T)

    (1) 2.35 A-m^2 (2) 1.35 A-m^2

    (3) 1.75 A-m^2 (4) 4.35 A-m^2

18. Two concentric and coplanar circular coils having radius r_1 and r_2 are shown in figure. The resistance of inner coil is R. If the current in outer coil is increased from 0 to I, then the total charge that passes in the inner coil is ($r_2 \gg r_1$)
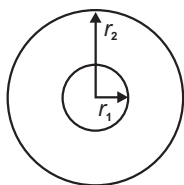
    (1) $\dfrac{\mu_0 \pi I r_1^2}{2Rr_2}$ (2) $\dfrac{\mu_0 \pi I\, r_2^2}{2Rr_1}$

    (3) $\dfrac{\mu_0 I r_2^2}{Rr_1}$ (4) $\dfrac{\mu_0 I r_1^2}{Rr_2}$

19. At resonance, the phase angle between voltage across inductor and current in a series LCR circuit connected to an A.C. source is

    (1) $\dfrac{\pi}{2}$ (2) $\dfrac{\pi}{4}$

    (3) Zero   (4) $\dfrac{\pi}{3}$

20. The variation of induced emf (ε) with time (t) in a coil, if a short bar magnet is moved along its axis with a constant velocity, as shown in the figure, is best represented by

21. The magnetic flux through a coil varies with time as $\phi(t) = 7t^2 + 6t + 9$. The ratio of emf at time $t = 3$ s to $t = 0$ s will be (where t is in second)

    (1) 1 : 6   (2) 8 : 1

    (3) 1 : 8   (4) 9 : 1

22. A solenoid (air core) having 400 turns is 10 cm long and has a cross-sectional area of 0.2 cm^2. The coefficient of self inductance is (approx.)

    (1) 0.4 mH   (2) 40 μH

    (3) 4.0 H   (4) 40 H

23. A rectangular coil of two turns having area A rotates in a uniform magnetic field B with angular speed ω about an axis perpendicular to the field and in plane of the coil. If initially the plane of the coil is perpendicular to the field, then the average induced emf when it has rotated through $\dfrac{\pi}{2}$ is
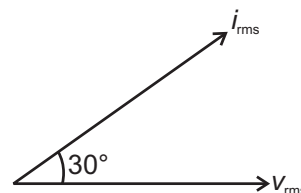
    (1) $\dfrac{4BA\omega}{\pi}$ (2) $2BA\omega$

    (3) $\dfrac{2BA\omega}{\pi}$ (4) $\dfrac{BA\omega}{2\pi}$

24. In the circuit shown in the figure, the reading of the a.c. voltmeter V_3 and a.c. ammeter A will be (Readings of a.c. voltmeters V_1 and V_2 are indicated in the figure)
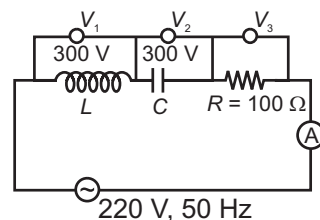
    (1) 820 V, 2 A   (2) 200 V, 2 A

    (3) 100 V, 2.2 A   (4) 220 V, 2.2 A

25. The phasor diagram of current and voltage for a series A.C. circuit is shown in the figure. The circuit may contain


    (1) Only a capacitor
    (2) Only an inductor and a capacitor
    (3) Only a resistor
   (4) An inductor, a capacitor and a resistor

26. Alternating current in an AC circuit varies with time as $i(t) = 100 \sin 50\pi t \cos 50\pi t$. The maximum current and frequency are respectively (i is in ampere and t is in second)
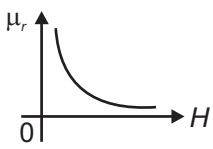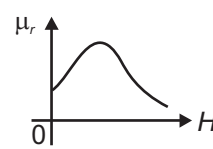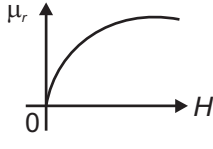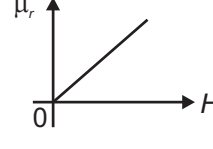
    (1) 100 A, 100 Hz   (2) $50\sqrt{2}$ A, 100 Hz

    (3) 50 A, 50 Hz   (4) 50 A, 100 Hz

27. A square loop of side L is being pulled with a constant speed v (parallel to one of its diagonals) inside the uniform magnetic field $\vec{B}$ as shown in figure. The magnitude of induced emf in the loop
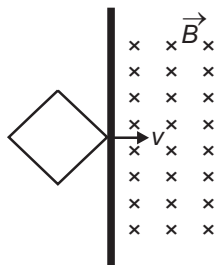

   (1) Has a maximum value of BLv

   (2) Has the maximum value of $\dfrac{BLv}{\sqrt{2}}$

   (3) First increases then decreases

   (4) First decreases then increases

28. An R-L circuit is initially connected across the emf E_0 for long time as shown in the figure. The key K_1 is closed and K_2 is opened at $t = 0$. Then average current in the period $t = 0$ to $t = \dfrac{L}{R}$ is
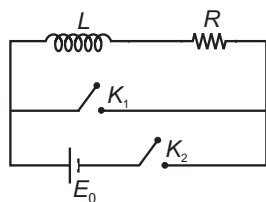

   (1) $\dfrac{2E_0}{Re}[e-1]$ (2) $\dfrac{E_0}{Re}[e-1]$

   (3) $\dfrac{2E_0}{Re}$ (4) $\dfrac{E_0}{Re}$

29. For ferromagnetic material, the relative permeability (μ_r) versus magnetic intensity (H) plot is described by

30. In an ideal step-down transformer, the turn ratio (between primary and secondary) is 25 : 1. If AC voltage across primary is 220 V, then AC voltage developed in the secondary would be

   (1) 8.8 V   (2) 110 V

   (3) 7.5 V   (4) Zero

31. In the given i-V graph of an a.c. circuit, the circuit may be
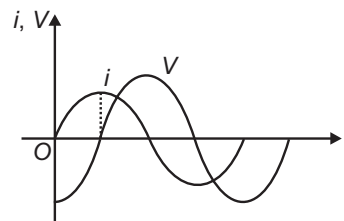
   (1) Purely inductive

   (2) Purely capacitive

   (3) Purely resistive

   (4) Combination of resistive and inductive

32. In an LCR series circuit, the alternating emf e and current i are given by the equations $e = (100\ \text{V}) \sin(100t)$ and $i = (5\text{A}) \sin\left(100t + \dfrac{\pi}{3}\right)$.

   (here t is in s). The average power dissipated in the circuit and impedance of circuit respectively are

   (1) 100 W, 500 Ω (2) 10 W, 20 Ω

   (3) 500 W, 20 Ω (4) 125 W, 20 Ω

33. The given I-t graph comprises of semi elliptical curves in every T time interval. The average value of current between 0 to $\dfrac{T}{2}$ is
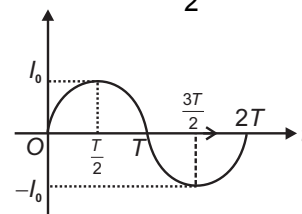

   (1) $\dfrac{\pi I_0}{4}$ (2) $\dfrac{I_0}{4}$

   (3) $\dfrac{\pi I_0}{2}$ (4) I_0

34. A square loop of edge length a is rotated, in a uniform and vertical magnetic field with a uniform angular speed ω about one of its diagonals which is kept in a horizontal position. The emf induced in the coil as a function of time is (initially plane of loop is perpendicular to the magnetic field)

   (1) $Ba^2\omega\cos 2\omega t$ (2) $\dfrac{Ba^2}{\omega}\sin\omega t$

   (3) $\dfrac{Ba^2}{\omega}\cos\omega t$ (4) $Ba^2\omega\sin\omega t$

35. Resonant frequency of series LCR circuit is 200 Hz. Quality factor of the circuit is 5, then band width is

   (1) 200 Hz   (2) 100 Hz

   (3) 40 Hz   (4) 50 Hz

36. Two conducting rods of length l and $4l$ undergo translatory motion in opposite direction with velocity $4v$ and v respectively on a conducting surface S as shown in the figure. There is a uniform magnetic field B into the plane of the paper. The potential difference between the highest points P and Q of the two rods is
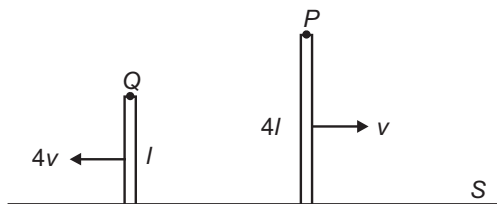
   (1) Zero
   (2) $8lvB$
   (3) $4lvB$
   (4) $10lvB$

37. The magnetic field component in plane electromagnetic wave, moving in vacuum along x axis, is given by $B_z = 2\times10^{-6} \sin\{2\times10^2 x - 6\times10^{10} t\}\hat{k}$. The electric field component is given by (all quantities are in SI units)

   (1) $600 \sin (2 \times 10^2 x - 6 \times 10^{10} t) (\hat{j})$
   (2) $600 \sin (2 \times 10^2 x - 6 \times 10^{10} t) (-\hat{j})$
   (3) $60 \sin (2 \times 10^2 x - 6 \times 10^{10} t) (-\hat{j})$
   (4) $600 \sin (2 \times 10^2 x + 6 \times 10^{10} t) (\hat{j})$

38. A uniform but time varying magnetic field $B(t)$ exists in a circular region of radius R and directed into the plane of paper. The magnitude of induced electric field at a point P at a distance r ($r > R$) from the centre of the circular region is proportional to

   (1) r^2
   (2) $\dfrac{1}{r}$
   (3) $\dfrac{1}{r^2}$
   (4) r

39. The inertia for electric circuit is (symbols have their usual meanings)

   (1) L
   (2) $\dfrac{1}{L}$
   (3) C
   (4) $\dfrac{1}{C}$

40. In the AC circuit as shown in the figure, the effective current is 6 A through the resistor R and 8 A through the capacitor C. The current drawn from the source is
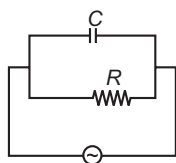
   (1) 5 A
   (2) 10 A
   (3) 14 A
   (4) 2 A

41. λ_V, λ_{UV} and λ_{IR} represents the wavelengths of visible light, ultravoilet rays and infrared rays respectively, in same medium then

   (1) $\lambda_V < \lambda_{UV} < \lambda_{IR}$
   (2) $\lambda_{IR} > \lambda_V > \lambda_{UV}$
   (3) $\lambda_{IR} < \lambda_V < \lambda_{UV}$
   (4) $\lambda_{UV} = \lambda_V = \lambda_{IR}$

42. A parallel plate capacitor with circular plates of radius a is being charged as shown in the figure. At the instant shown, the displacement current in the region between the plates enclosed between $\dfrac{a}{3}$ to a is given by
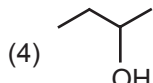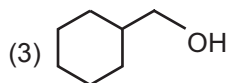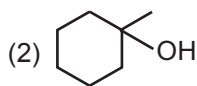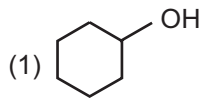

   (1) i
   (2) $\dfrac{i}{9}$
   (3) $\dfrac{8}{9}i$
   (4) $\dfrac{9}{8}i$

43. A plane electromagnetic wave is incident on a plane surface of area A normally. The surface is perfectly absorbing. If net energy E strikes the surface in time t then average pressure exerted on the surface is (c is speed of light)

   (1) $\dfrac{E}{Atc}$
   (2) $\dfrac{2E}{Atc}$
   (3) $\dfrac{E}{c}$
   (4) Zero

44. The Electric field components of an electromagnetic wave in a medium is given by

   $E_x = 0$;

   $E_y = \left(5\dfrac{N}{C}\right)\sin\left[\left\{2\pi\times10^6\left(\dfrac{rad}{s}\right)t\right\} - \left\{\pi\times10^{-2}\left(\dfrac{rad}{m}\right)x\right\}\right]$;

   $E_z = 0$;

   The wave is

   (1) Moving along positive x-direction with frequency 10^6 Hz and wavelength 100 m
   (2) Moving along positive x-direction with frequency 10^6 Hz and wavelength 200 m
   (3) Moving along negative x-direction with frequency 10^6 Hz and wavelength 200 m
   (4) Moving along negative x-direction with frequency 10^6 Hz and wavelength 100 m

45. For the medium with relative permittivity $\varepsilon_r = 4$ and relative permeability $\mu_r = 6.25$, the velocity of light is given as (c is velocity of light in vacuum).
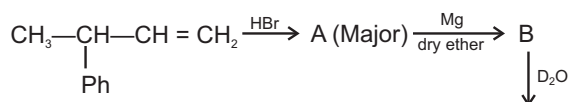
   (1) $\dfrac{c}{2}$
   (2) $\dfrac{c}{5}$
   (3) $\dfrac{c}{25}$
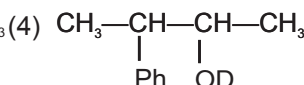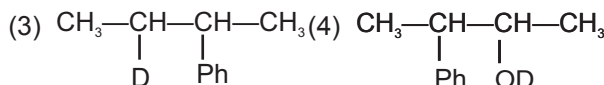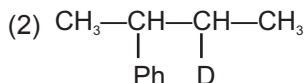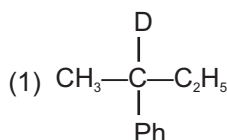   (4) $\dfrac{c}{4}$

CHEMISTRY

46. Which alcohol will react fastest with HCl and anhy. ZnCl$_2$?

(1) [cyclohexanol with OH]

(2) [1-methylcyclohexanol with CH$_3$ and OH]
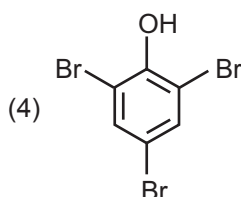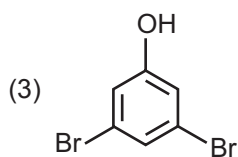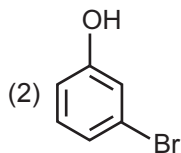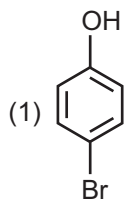
(3) [cyclohexylmethanol, CH$_2$OH]

(4) [2-propanol, CH$_3$-CH(OH)-CH$_2$-]

47. Consider the following reaction.

$$CH_3-CH(Ph)-CH=CH_2 \xrightarrow{HBr} A\ (Major) \xrightarrow[dry\ ether]{Mg} B$$

B $\xrightarrow{D_2O}$ C (Major)

Major product C is

(1) $CH_3-\underset{Ph}{\overset{D}{C}}-C_2H_5$

(2) $CH_3-\underset{Ph}{CH}-\underset{D}{CH}-CH_3$

(3) $CH_3-\underset{D}{CH}-\underset{Ph}{CH}-CH_3$

(4) $CH_3-\underset{Ph}{CH}-\underset{OD}{CH}-CH_3$
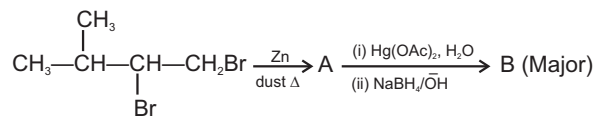
48. When phenol reacts with Br$_2$/water, the major product formed is

(1) [4-bromophenol: OH para to Br]

(2) [3-bromophenol: OH meta to Br]

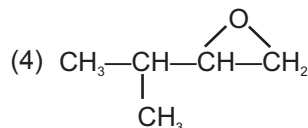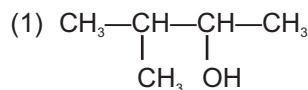(3) [3,5-dibromophenol: OH with two Br]

(4) [2,4,6-tribromophenol: OH with three Br]

49. The most acidic compound among the following is

(1) [phenol, OH]

(2) [4-nitrobenzyl alcohol, CH$_2$OH with NO$_2$]

(3) [4-nitrophenol, OH with NO$_2$]

(4) [benzyl alcohol, CH$_2$OH]

50. Consider the following reaction.

$$CH_3-\underset{CH_3}{CH}-\underset{Br}{CH}-CH_2Br \xrightarrow[dust\ \Delta]{Zn} A \xrightarrow[(ii)\ NaBH_4/\bar{O}H]{(i)\ Hg(OAc)_2,\ H_2O} B\ (Major)$$

Major product B is

(1) $CH_3-\underset{CH_3}{CH}-\underset{OH}{CH}-CH_3$

(2) $CH_3-\underset{CH_3}{\overset{OH}{C}}-CH_2-CH_3$

(3) $CH_3-\underset{CH_3}{CH}-CH_2-CH_2-OH$

(4) $CH_3-\underset{CH_3}{CH}-CH-CH_2$ [epoxide, O bridging]
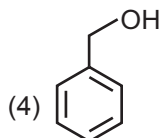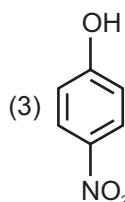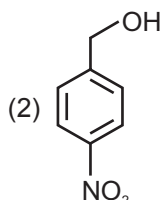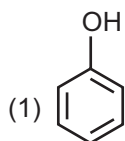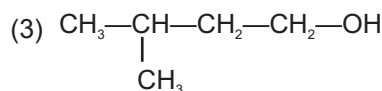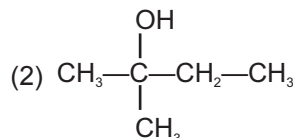
51. Total number of optically active compound(s) formed in the given reaction is

$$\underset{H}{\overset{CH_3}{}}C=C\underset{C_2H_5}{\overset{H}{}} \xrightarrow[CCl_4]{Br_2}$$
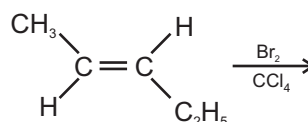
(1) 4　　　　　　　　　　(2) 3

(3) 2　　　　　　　　　　(4) Zero

52. The compound which will react fastest by S$_N$1 mechanism is

(1) (CH$_3$)$_2$CH – Br　　　(2) (CH$_3$)$_3$C – Br

(3) CH$_3$CH$_2$ – Br　　　(4) Ph – CH$_2$ – Br

53. Ethylidene chloride is a/an

(1) Allyl halide　　　　(2) Vinyl halide

(3) Vic-dihalide　　　　(4) Gem-dihalide

54. Which among the following will not form intramolecular hydrogen bonding?

(1) [salicylic acid: COOH and OH]

(2) [1,2-dimethoxybenzene: OCH$_3$ and OCH$_3$]

(3) [2-methoxyphenol: OH and OCH$_3$]

(4) [2-nitrophenol: OH and NO$_2$]
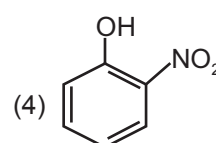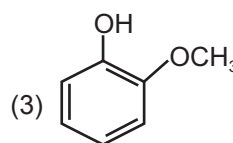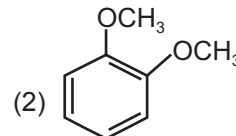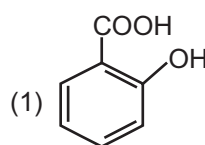
55. Alkyl fluorides are synthesised by heating an alkyl chloride/bromide with

    (1) AgF

    (2) CoF_2

    (3) Hg_2F_2

    (4) All of these

56. Consider the following reaction.

    $\xrightarrow{\text{HBr}}$ P (Major)
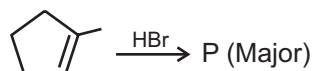
    Major product P is
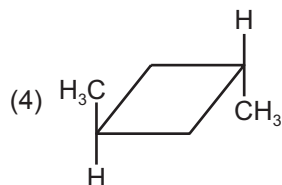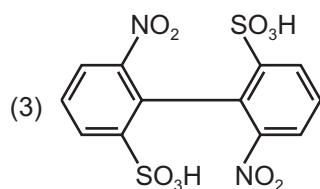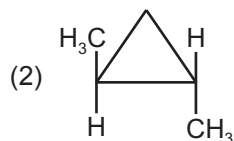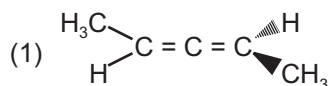
    (1)

    (2)

    (3)

    (4)

57. The decreasing order of rate of S_N2 reaction is

    (I) $CH_3 - Cl$

    (II)

    (III)

    (IV)

    (1) (IV) > (III) > (II) > (I) (2) (II) > (III) > (I) > (IV)

    (3) (II) > (I) > (IV) > (III) (4) (I) > (IV) > (II) > (III)

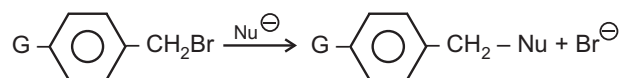58. Which among the following is an optically inactive molecule?

    (1)

    (2)

    (3)

    (4)

59. When phenyl magnesium bromide reacts with t-butanol, the product would be

    (1) Benzene

    (2) Phenol

    (3) t-butyl benzene

    (4) t-Butyl phenyl ether

60. Which of the following is a polar aprotic solvent?

    (1) H_2O

    (2) DMSO

    (3) C_2H_5OH

    (4) CS_2

61. Para substituted benzyl bromide undergoes S_N1 reaction with nucleophiles.

    Arrange the given compounds in decreasing order of reactivity for the above reaction.
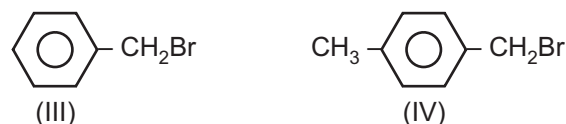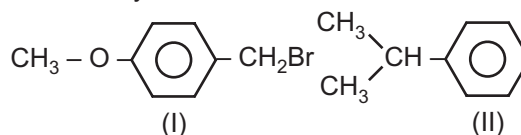
    (1) (I) > (IV) > (II) > (III)

    (2) (I) > (II) > (IV) > (III)

    (3) (III) > (II) > (IV) > (I)

    (4) (IV) > (I) > (III) > (II)

62. The compound which is least reactive towards nucleophilic substitution reaction is

    (1)

    (2)

    (3)

    (4)
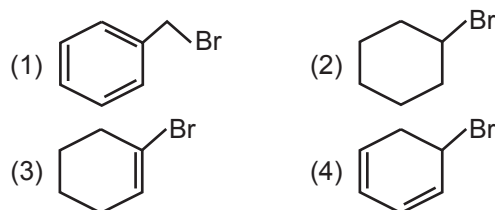
63. Which of the following is called westron?

    (1) CH_3Cl

    (2) $CHCl_3$

    (3) $CHCl_2.CHCl_2$

    (4) $CH_2 = CHCl$

64. Reaction of 2,3-dibromopropene with Zn dust in methanol gives

    (1) Propadiene

    (2) Propene

    (3) Allyl bromide

    (4) Propyne

65. Consider the following reaction.

    $\xrightarrow[\text{(ii) } H_3O^+]{\text{(i) PhMgBr}}$ P (Major)
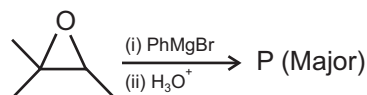
    Major product P is

    (1)

    (2)

    (3)

    (4)

66. In which reaction C–C bond formation does not take place?

    (1) Reimer Tiemann reaction

    (2) Swarts reaction

    (3) Fittig reaction

    (4) Wurtz reaction

67. Correct order of density of the given compounds is

    (1) $CHCl_3 > CH_2Cl_2 > CCl_4$

    (2) $CCl_4 > CH_2Cl_2 > CHCl_3$

    (3) $CCl_4 > CHCl_3 > CH_2Cl_2$

    (4) $CH_2Cl_2 > CHCl_3 > CCl_4$

68. Nucleophilic substitution reaction with OH^- will be fastest in

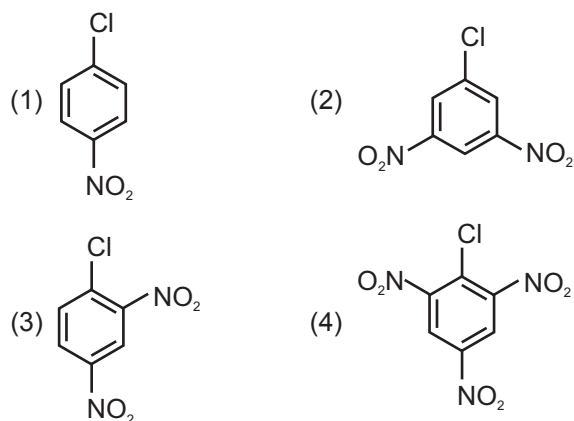69. The product formed when chloroform is heated with silver power is

    (1) $CH_2 = CH_2$

    (2) $CH \equiv CH$

    (3) $CH_2 = CH – CH = CH_2$

    (4) $CH_2 = C = CH_2$

70. In which of the following reactions secondary alcohol is obtained as major product?
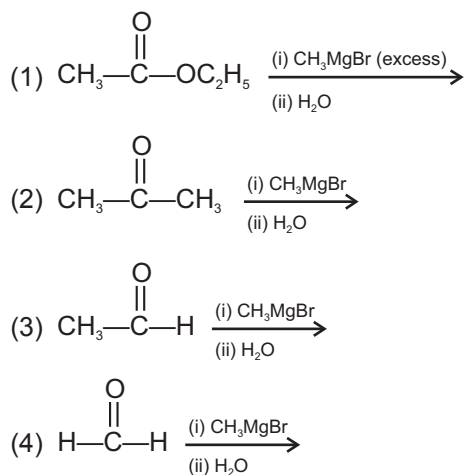
71. When anisole is heated with one equivalent HI then the major products obtained are

72.
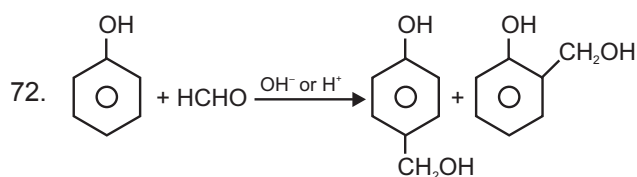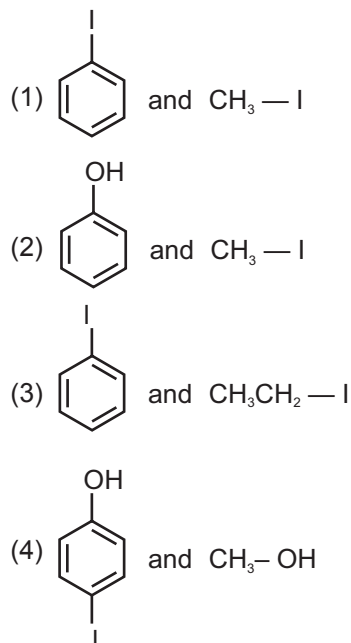
    This reaction is used in

    (1) Aspirin formation

    (2) Bakelite formation

    (3) TNT formation

    (4) RDX formation

73. Glycerol on heating with $KHSO_4$ gives
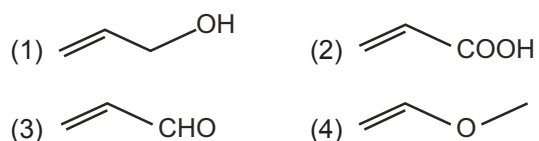
74. Oxidation of ethane-1,2-diol using periodic acid gives

    (1) Acetic acid

    (2) Formaldehyde

    (3) Oxalic acid

    (4) Glyoxal

75. Which among the following is an incorrect statement?
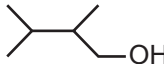
    (1) In S_N2 reaction, transition state is formed

    (2) In S_N1 reaction, carbonium ion is formed as intermediate

    (3) In S_N1 reaction, carbonium ion formation is the rate determining step

    (4) In S_N2 reaction, racemisation takes place

76. In the reaction of phenol with $CHCl_3$ and aqueous NaOH, the electrophile attacking on the benzene ring is

   (1) $CHCl_3$
   (2) $CHCl_2$
   (3) CCl_2
   (4) $COCl_2$

77. The compound which gives blue coloration in Victor Meyer's test is

   (1)
   (2)
   (3)
   (4)
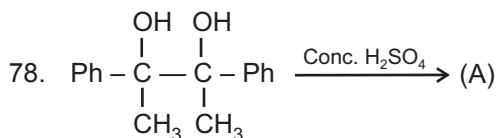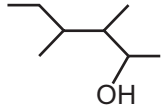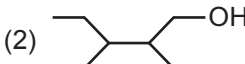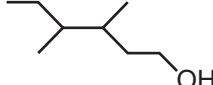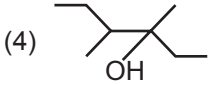
78. Ph $-$ C $-$ C $-$ Ph with OH OH groups and CH_3 CH_3 groups $\xrightarrow{\text{Conc. } H_2SO_4}$ (A)

   The product (A) is

   (1) $C_6H_5 - C = C - CH_3$ with CH_3 CH_3

   (2) Ph $-$ C $-$ C $-$ CH_3 with CH_3, O, Ph

   (3) Ph $-$ C $-$ C $-$ Ph with CH_3 CH_3 and O (epoxide)

   (4) Ph $-$ C $-$ C $-$ Ph with CH_3, O, CH_3

79. $\xrightarrow[\text{(ii) } H_2O_2, \bar{O}H]{\text{(i) } B_2H_6, \text{ THF}}$ P (Major)
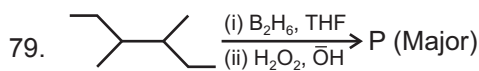
   Major product P is

   (1)
   (2)
   (3)
   (4)
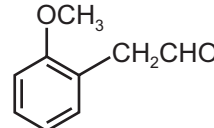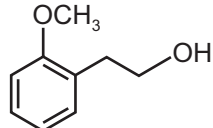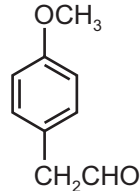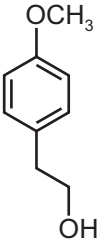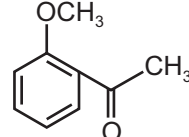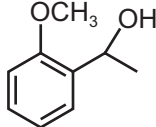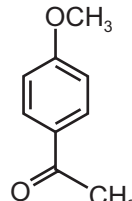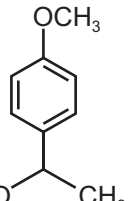
80. When sodium phenoxide is heated with CO_2 under pressure followed by acidification with HCl, the product obtained is

   (1) Salicylic acid
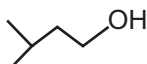   (2) Salicylaldehyde
   (3) Benzoic acid
   (4) Cinnamic acid

81. Consider the following reaction.

    $\xrightarrow[\text{anh. } AlCl_3]{CH_3COCl}$ A (Major) $\xrightarrow[CH_3OH]{NaBH_4}$ B
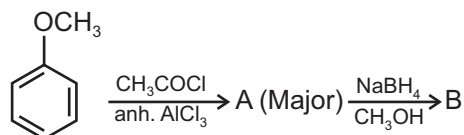
   Major products A and B respectively are
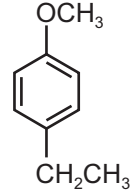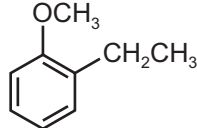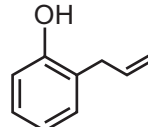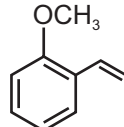
   (1) and
   (2) and
   (3) and
   (4) and

82. Phenol can be distinguished from aliphatic alcohol with

   (1) Tollen's reagent
   (2) Schiff's base
   (3) Neutral $FeCl_3$
   (4) HCl

83. Major product of the given reaction is

    $\xrightarrow{200°C}$ Major product
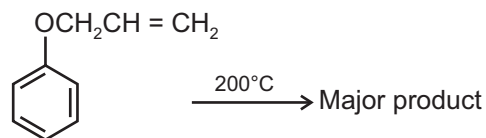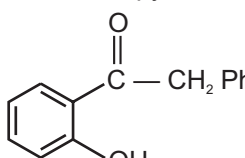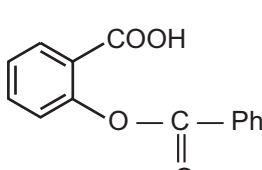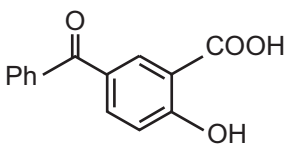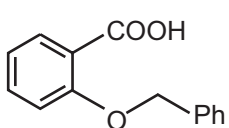
   (1)
   (2)
   (3)
   (4)
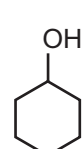
84. Which reaction with give the best yield of ether?

(1) $CH_3CH_2O^{\ominus}Na^{\oplus}$ + $CH_3 - Br \longrightarrow$

(2) $CH_3CH_2O^{\ominus}Na^{\oplus}$ + $CH_3 - CH - Br \longrightarrow$
     |
     CH_3

(3) $CH_3CH_2O^{\ominus}Na^{\oplus}$ +
[cyclohexyl bromide] $\longrightarrow$

(4) $CH_3CH_2O^{\ominus}Na^{\oplus}$ + $CH_3 - \overset{\overset{\displaystyle CH_3}{|}}{\underset{\underset{\displaystyle CH_3}{|}}{C}} - Br \longrightarrow$

85. When salicylic acid is treated with benzoyl chloride in presence of pyridine the product formed is

(1) [benzene ring with $\overset{O}{\overset{||}{C}} - CH_2 Ph$ and OH]

(2) [benzene ring with COOH and $O - \overset{\overset{\displaystyle O}{||}}{C} - Ph$... $O - C - Ph$ with O]

(3) $Ph - \overset{O}{\overset{||}{C}}$ [benzene ring with COOH and OH]

(4) [benzene ring with COOH and $O - CH_2 - Ph$]

86. Which alcohol on heating with Cu at 573 K gives alkene as major product?

(1) $CH_3CH_2CH_2OH$

(2) $CH_3CH_2 - \overset{\overset{\displaystyle C_2H_5}{|}}{\underset{\underset{\displaystyle C_2H_5}{|}}{C}} - OH$

(3) $CH_3 - CH - CH_3$
          |
          OH

(4) [cyclohexanol with OH]
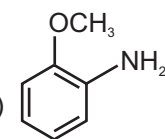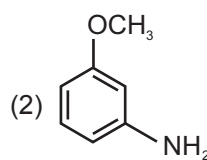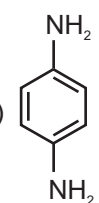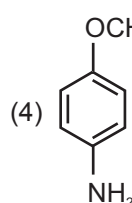
87. S_N1 reaction accelerates in which of the following solvents

(1) Acetone

(2) Water

(3) Ethanol

(4) Both (2) and (3)

88. Consider the following reactions.

[benzene ring with OCH_3 at top and Cl at bottom]
$\xrightarrow[\text{liq. } NH_3]{NaNH_2}$ P (major)

Major product P is

(1) [benzene ring with OCH_3 and NH_2 ortho]

(2) [benzene ring with OCH_3 and NH_2 meta]

(3) [benzene ring with NH_2 top and NH_2 bottom]

(4) [benzene ring with OCH_3 top and NH_2 bottom]
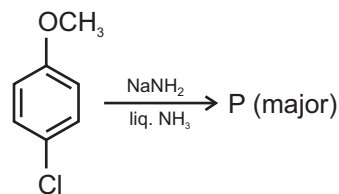
89. In the given reaction, product C is

[benzene] $\xrightarrow[\text{Anh. } AlCl_3]{CH_3CH_2CH_2- Cl}$ A (major) $\xrightarrow{O_2}$ B $\xrightarrow[H_2O]{H^{\oplus}}$ [phenol with OH] + C
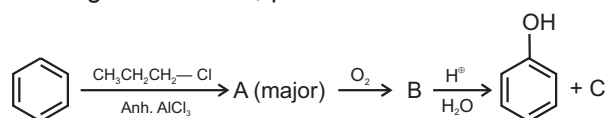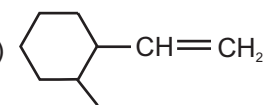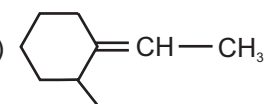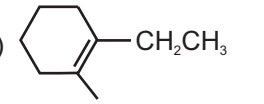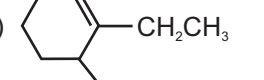
(1) CH_3CH_2OH

(2) CH_3CHO

(3) CH_3CH_2CHO

(4) $CH_3 - \overset{O}{\overset{||}{C}} - CH_3$

90. Consider the following reaction.

[cyclohexane ring with CH_3 substituent, and $CH - CH_3$ with $\overset{\oplus}{NMe_3}$]
$\xrightarrow[\Delta]{C_2H_5O^{\ominus}Na^{\oplus}}$ P (Major)

Major product P is

(1) [methylcyclohexane ring with $CH=CH_2$]

(2) [methylcyclohexane ring with $=CH - CH_3$]

(3) [methylcyclohexene ring with CH_2CH_3]

(4) [methylcyclohexene ring with CH_2CH_3]
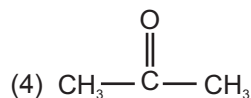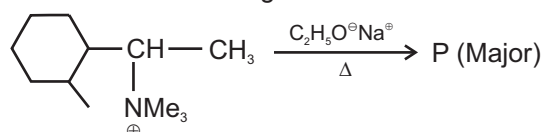
BOTANY

91. Tropical cane, *Saccharum officinarum* had all the following characteristics, **except**
    (1) Thicker stem
    (2) Higher sugar content
    (3) Higher yield
    (4) Ability to grow well in areas of North India

92. Lactic acid bacteria (LAB)
    (1) Convert curd into milk
    (2) Produce acids that coagulate and partially digest milk proteins
    (3) Deteriorates nutritional quality of milk
    (4) In stomach, promote the growth of disease causing microbes

93. A yeast, *Monascus purpureus* is used for commercial production of
    (1) A clot buster compound
    (2) An antibiotic
    (3) A blood-cholesterol lowering agent
    (4) Household products like dosa and cheese

94. Aeration tank of sewage treatment plant
    (1) Is used for removal of soil and small pebbles
    (2) Has activity of methanogens for production of biogas
    (3) Allows growth of useful aerobic bacteria associated with fungal filaments
    (4) Shows microbial activity that leads to rise in BOD of water

95. Which of the following is **not** used as facilitator for fusion of naked protoplasts?
    (1) Alternating electric field of high frequency with short current pulses
    (2) Sodium nitrate
    (3) Polyethylene glycol (PEG)
    (4) Cellulase enzyme

96. A biome which has the lowest mean annual temperature and also has low mean annual precipitation is
    (1) Tropical rainforest   (2) Coniferous forest
    (3) Grasslands   (4) Arctic and Alpine tundra

97. Organisms which can tolerate narrow range of salinities
    (1) Can survive well in inland waters
    (2) Are called euryhaline
    (3) Do not face any osmotic problem in sea water
    (4) Are abundant in hypersaline lagoons

98. In 1963, which of the following varieties were introduced in all wheat growing belts of India?
    (1) Sonara-64 and Lerma Rojo-64
    (2) IR-8 and TN-1
    (3) Sonalika and Kalyan Sona
    (4) Jaya and Ratna

99. A population interaction shown by *Ophrys* and a species of bee is
    (1) Parasitism   (2) Predation
    (3) Mutualism   (4) Commensalism

100. Which of the following is **not** the lysine rich variety of maize?
    (1) Protina   (2) Shakti
    (3) Rattan   (4) Atlas 66

101. Which of the following statements is **correct** regarding androgenic haploids?
    (1) They are produced through classical breeding programme
    (2) They are produced from unfertilized ovules
    (3) They are produced through anther culture
    (4) They are not useful in mutation breeding

102. Read the following statements.
    a. SCP is obtained from unicellular as well as multicellular organisms.
    b. IARI, New Delhi has developed vitamin A enriched bathua and Ca & Fe enriched pumpkin.
    (1) Only b is correct
    (2) Both a & b are correct
    (3) Both a & b are incorrect
    (4) Only a is correct

103. The zone of lake with perpetual darkness is
    (1) Profundal zone   (2) Euphotic zone
    (3) Benthic zone   (4) Disphotic zone

104. In order to obtain virus-free plants through tissue culture, the best method is
    (1) Protoplast culture
    (2) Anther culture
    (3) Embryo rescue
    (4) Meristem culture

105. Grit from sewage is removed by
    (1) Sedimentation
    (2) Sequential filtration
    (3) Tertiary treatment
    (4) Anaerobic sludge digester

106. The organic acid which is **not** obtained from a bacterial source is
    (1) Citric acid   (2) Butyric acid
    (3) Acetic acid   (4) Lactic acid

107. Mexican wheat was adopted in India on large scale after
    (1) Induction of gamma radiation
    (2) Cross hybridisation with Indian variety
    (3) Somatic hybridisation
    (4) Micropropagation

108. Match the Column I and Column II.

Column I	Column II
a. Lipases	(i) Clarifying bottle juices
b. Pectinases	(ii) Clot buster
c. Streptokinase	(iii) Detergent formulation
d. Cyclosporin-A	(iv) Immunosuppressive agent

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

109. Which of the following is the first step of the plant breeding experiment?
    (1) Evaluation and selection of parents
    (2) Selection and testing of superior recombinants
    (3) Collection of germplasm
    (4) Cross hybridisation among the selected parents

110. Which of the following is **not** a biofortified crop?
    (1) Iron rich rice
    (2) Tryptophan and lysine rich maize
    (3) Vitamin A rich spinach
    (4) Nectar-less cotton

111. Match the columns and select the **correct** option.

Column I (Plant varieties)	Column II (Resistant to pests/ diseases)
a. Pusa Gaurav	(i) Leaf curl
b. Pusa Komal	(ii) Bacterial blight
c. Pusa Sadabahar	(iii) Shoot and fruit borer
d. Pusa Sawani	(iv) Aphids

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

112. Improved mung bean and Parbhani Kranti varieties show similarity in
    (1) The method of breeding techniques
    (2) Being variety of same plant species
    (3) Showing resistance to yellow mosaic virus
    (4) Having higher levels of vitamins and mineral content

113. Read the following statements and select the **correct** option.

    Statement A: Methanogens are present in the rumen of cattles.

    Statement B: The technology of biogas production was developed in India mainly due to the efforts of Indian Agricultural Research Institute and Khadi and Village Industries Commission.

    (1) Only A is incorrect
    (2) Only B is incorrect
    (3) Both A and B are correct
    (4) Both A and B are incorrect

114. Biocontrol agent used in order to control butterfly caterpillars is
    (1) Dragonfly   (2) *Bacillus thuringiensis*
    (3) Lady bird   (4) *Trichoderma*

115. In mycorrhizal association which of the following advantage is **not** provided by fungal partner to the plant species?
    (1) Resistance to soil-borne pathogens
    (2) Help in absorption of minerals like phosphorus from soil
    (3) Tolerance to salinity and drought
    (4) Availability of food

116. Humus is
    (1) An amorphous substance
    (2) Slightly alkaline
    (3) Deficient in nutrients
    (4) Lighter in colour

117. Arrange the following biomes in decreasing order of mean annual precipitation.
    A. Desert
    B. Coniferous forest
    C. Grassland
    D. Tropical forest
    (1) D > B > C > A   (2) A > C > B > D
    (3) D > C > B > A   (4) A > B > C > D

118. Select the **correct** match.

Alcoholic beverages		Alcohol concentration(%)
(1) Rum	–	20
(2) Whisky	–	60-80
(3) Beer	–	3-6
(4) Wine	–	20-30

119. Most ecologically relavant environmental factor is

    (1) Light   (2) Temperature

    (3) Water   (4) Soil

120. **Statement A :** Autotrophic microbe which can fix atmospheric nitrogen.

    Statement B : Fungus that forms symbiotic association with roots of higher plants.

    Identify the organisms for which statement A and B are **correct**.

	A	B
(1)	*Glomus*	*Nostoc*
(2)	*Anabaena*	*Azotobacter*
(3)	*Nostoc*	*Glomus*
(4)	*Oscillatoria*	*Azotobacter*

121. The body of a tourist at Rohtang pass (Himalyan region) get acclimatised after short duration because of

    A. Increased red blood cell production.

    B. Increased binding affinity of haemoglobin to O_2.

    C. Decreased breathing rate.

    (1) A and C   (2) Only B

    (3) Only A   (4) Only C

122. Thick layer of fat below the skin, called blubber which helps in reduction in loss of body heat is a characteristic feature of

    (1) Kangaroo rat   (2) Antarctic fish

    (3) Seal   (4) Desert lizard

123. If in a pond, the number of lotus plants increases from 20 to 25 in one year then the birth rate is _____ offspring per lotus per year.

    (1) 0.2   (2) 0.25

    (3) 0.8   (4) 1.25

124. All of the following are characteristic features of tropical rainforest, **except**

    (1) Rich in biodiversity

    (2) Presence of woody climbers and epiphytes

    (3) Plants with long needle like leaves

    (4) Occurrence of 4 - 5 strata

125. Find the **correct** option w.r.t. biological control of insect/pest.

    (1) The method is more harmful as compared with the use of chemical pesticides

    (2) It kills both useful and harmful organisms indiscriminately

    (3) Baculovirus can have negative impact on plants mammals and birds

    (4) Organic farmers work to create a system where pests are not eradicated but kept at manageable levels

126. Ecological niche of an organism includes all, **except**

    (1) Range of conditions it can tolerate

    (2) Resources it utilises

    (3) Body organisation which it has

    (4) Function it performes in an ecological system

127. Identify the **correct** combination.

	Species A	Species B	Interaction
(1)	Clown fish	Sea anemone	Protocooperation
(2)	Sea anemone	Hermit crab	Competition
(3)	*Balanus*	*Chathamalus*	Predation
(4)	Black walnut	Alfalfa	Amensalism

128. Identify the **correct** match w.r.t. A, B and C in the graph, representing response to abiotic factors of different organism.
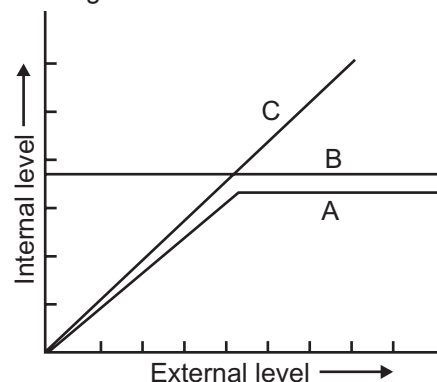
    (1) A – Regulators, include majority of animals

    (2) C – Conformers, include nearly all plants

    (3) B – Partial regulators, include all birds and mammals

    (4) A – Conformers, include small animals like shrew and humming bird

129. In some bacteria, fungi and algae, thick walled spores are formed to overcome unfavourable conditions. Such response to abiotic factors is categorised into

    (1) Regulation

    (2) Suspension

    (3) Conformation

    (4) Migration

130. Select the **odd** one w.r.t adaptations of xerophytic plants.

    (1) Presence of sunken stomata

    (2) Presence of thick cuticle on leaf and stem epidermis

    (3) Modification of stem into leaf like structure

    (4) Presence of large air spaces and aerenchyma

131. Graphical representation of a young and growing population

    (1) Is a bell shaped age pyramid

    (2) Shows zero growth rate

    (3) Shows fewer number of individuals in pre-reproductive group

    (4) Is a triangular shaped age pyramid

132. Select the **incorrectly** matched pair :

    (1) Fig and fig wasp – Mutualism

    (2) Goats and abingdon tortoise on Galapagos islands – Commensalism

    (3) Cuckoo and crow – Brood parasitism

    (4) *Cuscuta* and hedge plants – Parasitism

133. Select the **odd** feature about an r- selected species.

    (1) Requirement of extensive parental care

    (2) High fecundity

    (3) Small body size

    (4) Short generation time

134. In a newly colonised habitat, which factor contributes more significantly for population growth?

    (1) Natality

    (2) Mortality

    (3) Immigration

    (4) Emigration

135. J-shaped population growth curve

    (1) Represents logistic growth

    (2) Represents growth under limited nutrients

    (3) Shows asymptote when population density reaches carrying capacity

    (4) Is shown by species which can reach enormous population density in a short time under unlimited resources

ZOOLOGY

136. DNA fragments can be separated by

    (1) Hybridisation　　　　(2) Western blotting

    (3) Gel electrophoresis　(4) Autoradiography

137. Select the **correct** statement w.r.t. polio.

   (1) Its a bacterial disease caused by *Haemophilus influenzae*

    (2) Pathogen infects alveoli of the lungs

    (3) Infection is acquired through oral-faecal route

    (4) In severe cases, lips and fingers turns bluish in colour

138. Malignant malaria which is the most serious and even fatal form is caused by

    (1) *P. falciparum*　　　(2) *P. vivax*

    (3) *P. ovale*　　　　　(4) *P. malaria*

139. Post fertilization events such as sporogony of *Plasmodium* takes place in

    (1) Mosquito's salivary glands

    (2) Mosquito's gut wall

    (3) RBCs of human blood

    (4) Hepatocytes of infected human

140. Select the **correct** match.

    (1) Amoebiasis　　:　Helminth disease

    (2) Ascariasis　　　:　Air borne disease

    (3) Common cold　:　Bacterial disease

    (4) Dengue　　　　:　Viral disease

141. Infective stage of plasmodium to human is

    (1) Sporozoite　　　(2) Merozoite

    (3) Gametocyte　　(4) Cryptozoite

142. Symptoms of Ascariasis includes all **except**

    (1) Internal bleeding

    (2) Muscular pain

    (3) Intestinal perforation

    (4) Anaemia

143. Antigen binding site in an antibody is formed by

    (1) Variable region of heavy chains only

    (2) Variable region of light chain and heavy chain

    (3) Constant region of light chains and four heavy chain

    (4) Constant region of light chains only

144. Select the **odd one** w.r.t allergy

    (1) Rheumatoid arthritis

    (2) Asthma

    (3) Anaphylactic shock

    (4) Hay fever

145. Virus infected cells secrete biological response modifiers called interferons which protect neighbouring cells by

    (1) Lysis of virus

    (2) Synthesis of translation inhibition proteins in neighbouring cells

    (3) Lysis of neighbouring cell

    (4) Phagocytosis

146. Select the safest technique used for the detection of cancer.
    (1) CT scan   (2) MRI
    (3) Biopsy   (4) X-rays

147. One of the most common infectious disease in human is
    (1) Cancer   (2) Goitre
    (3) Common cold   (4) Emphysema

148. T-lymphocytes having cell surface marker CD-4
    (1) Are cells which mature in thyroid gland
    (2) Originate in secondary lymphoid organs
    (3) Solely responsible for graft rejection
    (4) Can respond to antigen with the help of antigen presenting cells

149. Identify the chemical structure given below and choose the **correct** option.
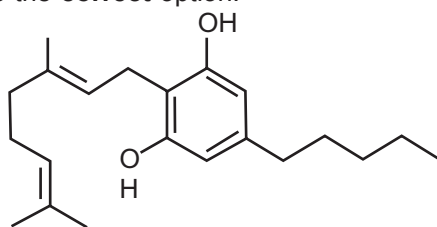
    (1) Barbiturates   (2) Benzodiazepines
    (3) Morphine   (4) Cannabinoids

150. The part of antibodies which combines with epitope is
    (1) Paratope   (2) Known as hinge region
    (3) Fc fragment   (4) Agretope

151. Select the **incorrect** option in context with IgA
    (1) Dimeric antibody
    (2) It has four paratopes
    (3) Found in colostrum
    (4) Smallest antibody in size

152. ___A___, a helminth disease characterised by swollen limbs, is caused by *Wuchereria* and ___B___ acts as the vector for the disease. Select the option filling the blanks **correctly**.
    (1) A – Elephantiasis, B – Male *Anopheles*
    (2) A – Filariasis, B – Female *Culex*
    (3) A – Elephantiasis, B – Female *Anopheles*
    (4) A –, Ascariasis, B – Female *Culex*

153. HIV reduces immunity of body by destroying
    (1) Helper T-cells   (2) Cytotoxic T-cells
    (3) Plasma cells   (4) B-cells

154. Cellular barriers of innate immunity **exclude**
    (1) NK cells
    (2) Monocytes
    (3) Thrombocytes
    (4) PMNLs

155. Retroviruses are unique due to presence of enzyme
    (1) RNA polymerase
    (2) DNA ligase
    (3) DNA polymerase
    (4) Reverse transcriptase

156. Tobacco contains alkaloids that stimulate the release of hormones into blood circulation which
    (1) Raises blood pressure and increases heart rate
    (2) Reduces heart rate and blood pressure
    (3) Increases duration of cardiac cycle
    (4) Reduces time of each cardiac cycle and blood pressure

157. Anabolic steroids mimic
    (1) Glucagon   (2) Progesterone
    (3) Androgens   (4) Cortisol

158. Select the **incorrect** statement regarding cancer
    (1) It may be caused by enveloped retrovirus.
    (2) It is not spread by mere touch or physical contact.
    (3) It's a curable disease if detected early in life time.
    (4) Decrease in telomerase activity is observed

159. Cancerous cells
    (1) Exhibit contact inhibition
    (2) Show regulated cell growth
    (3) Exhibit metastasis
    (4) Do not divide rapidly

160. Select the **correct** option from following given sentences.
    (1) AIDS is a congenital disease
    (2) Lymph nodes are graveyard of RBCs
    (3) Spleen is not included in secondary lymphoid organs
    (4) Allergy is an exaggerated immune response to certain antigens.

161. Choose the **incorrect** match.
    (1) Colostrum   : Natural passive immunity
    (2) Antivenom   : Artificial passive immunity
    (3) ATS   : Natural active immunity
    (4) T-lymphocytes : Cell mediated immunity

162. Passive immunity does **not** involve
    (1) Injection of antivenom after snake bite to the patients
    (2) Immediate development of immune response
    (3) Immunological memory
    (4) Use of antibodies taken from another organism

163. Immunosuppressant that inhibits T-cell mediated response is
    (1) Aspirin   (2) Amphetamine
    (3) Cyclosporin   (4) Ampicillin

164. Which of the following is transmitted through droplets and aerosol?
    (1) Genital warts and flu
    (2) Whooping cough and Pneumonia
    (3) Leprosy and Gonorrhea
    (4) Anthrax and Dengue

165. HCl produced by gastric mucosa belongs to the same barrier of immunity as
    (1) Mucous membranes and skin
    (2) Lysozyme in saliva and tears
    (3) NK cells and PMNL
    (4) Cytokines and interferons

166. Find odd one w.r.t source of the drug.
    (1) Cocaine
    (2) Marijuana
    (3) Charas
    (4) Ganja

167. The infective stage of *Plasmodium* for female *Anopheles* is
    (1) Trophozoite   (2) Ookinete
    (3) Gametocyte   (4) Sporozoite

168. Use of α-interferons to treat cancer is a part of
    (1) Immunotherapy
    (2) Radiotherapy
    (3) Chemotherapy
    (4) Surgery

169. Typhoid is detected by .
    (1) Widal test
    (2) VDRL
    (3) Mantoux test
    (4) Wayson stain test

170. Humoral immunity is primarily mediated by
    (1) B-cells   (2) Neutrophil
    (3) T-cells   (4) Complement system

171. **False** statement w.r.t. secondary immune response is
    (1) Mediated through IgG
    (2) Slow and short lived response
    (3) Immune response triggered by memory cells
    (4) Also termed as anamnestic response

172. A condition of body wherein there is abnormal response against self antigens
    (1) Apoptosis   (2) Autoimmunity
    (3) Graft rejection   (4) Immunodeficiency

173. Both ionic and non-ionic radiations may cause carcinoma by
    (1) Inhibiting telomerase activity
    (2) Causing early cell differentiation
    (3) Inactivating tumor suppressor genes
    (4) Inhibiting oncogenic transformation

174. Which one is an **incorrect** match?
    (1) Morphine   :   Analgesic
    (2) Marijuana   :   Hallucinogen
    (3) Amphetamines :   Stimulant
    (4) Nicotine   :   Hallucinogen

175. Which of the following is **correct** example of autoimmune disorder?
    (1) Gouty arthritis   (2) Rheumatoid arthritis
    (3) Osteomalacia   (4) Osteoporosis

176. BCG is administered to counter which disease?
    (1) Diphtheria
    (2) Plague
    (3) Tuberculosis
    (4) Amoebiasis

177. The symptoms of allergy can be reduced by use of following drugs, **except**
    (1) Anti-histamine   (2) Adrenaline
    (3) Diuretics   (4) Corticosteroid

178. Select the antibody causing maximum opsonisation
    (1) IgD   (2) IgE
    (3) IgG   (4) IgA

179. Histopathological examinations is also known as
    (1) Chemotherapy   (2) MRI
    (3) X-rays   (4) Biopsy

180. Select the **incorrect** statement.
    (1) Chronic use of alcohol cause liver cirrhosis
    (2) Macrophages act like a HIV factory
    (3) Injecting tetanus toxoid is example of natural passive immunity
    (4) Cannabinoids effect cardiovascular system of the body.

❑ ❑ ❑