on the Answer sheet.

PHYSICS

Choose the correct answer :

CC-723 CC-723

SECTION - A

1. The SI unit of power factor is

   (1) watt (2) J s

   (3) ampere (4) No unit

2. For an electromagnetic wave, the direction of propagation of wave is in the direction of

   (1) $\vec{E}$

   (2) $\vec{B}$

   (3) $\vec{B} \times \vec{E}$

   (4) $\vec{E} \times \vec{B}$

CC-723 CC-723

3. A D.C. ammeter shows 1 A reading for a circuit containing coil connected to 100 V D.C. source. The same coil carries 0.5 A current when connected to a 100 V, 50 Hz A.C. supply. The inductance of coil is nearly

   (1) $\frac{\sqrt{3}}{\pi}$ H

   (2) $\sqrt{5}\pi$ mH

   (3) $\frac{\sqrt{3}}{\pi}$ mH

   (4) $\frac{3}{\pi}$ mH

4. In a series LCR circuit, the capacitance is changed from C to $\frac{C}{4}$. For the resonating frequency to remain unchanged, the inductance should becomes

(1) 4 times (2) $\frac{1}{4}$ times

(3) 2 times (4) $\frac{1}{2}$ times

5. Which of the following statement is correct for a transformer?

(1) A step up transformer increases the power

(2) A step down transformer decreases the current

(3) Using laminated core in transformer reduces energy loss

(4) If transformation ratio, $K = 4$ then output power is four times the input power

6. Electric field between the plates of a capacitor varies as $E = 4t^2$. The displacement current between the plates is proportional to

(1) t^2 (2) t

(3) t^3 (4) $\frac{1}{t^2}$

7. A plane electromagnetic wave propagates in vacuum where amplitude of electric field is 30 V/m. The amplitude of magnetic field will be

(1) 10^{-7} T

(2) $\sqrt{2}\times10^{-7}$ T

(3) 10^{-8} T

(4) $\sqrt{2}\times10^{-8}$ T

8. The electromagnetic rays which is widely used to disinfect water is

(1) UV Rays (2) IR Rays

(3) X-Rays (4) γ-Rays

9. Light travelling in air strikes an air-glass refracting interface at angle 'θ'. If the refractive index of glass is 1.5 then it will

(1) Undergo total internal reflection for $\theta = 30°$

(2) Undergo total internal reflection for $\theta = 45°$

(3) Undergo total internal reflection for $\theta = 60°$

(4) Not undergo total internal reflection for any value of 'θ'

10. A giant refracting telescope at an observatory has an objective lens of focal length 15 m. If an eye-piece of focal length 1.0 cm is used, then the angular magnification of the telescope at normal adjustment will be

(1) 1500

(2) 150

(3) 15

(4) 1.5

11. A small bulb is placed at the bottom of tank containing water to a depth of 100 cm. The area of the surface of water through which light from the bulb can emerge out is approximately

[Refractive index of water is 1.33 (Consider the bulb to be a point source)]

(1) 12 m^2

(2) 8 m^2

(3) 6.5 m^2

(4) 4 m^2

12. The critical angle for light going from medium x into medium y is θ. The speed of light in medium x is v. The speed of light in medium y is

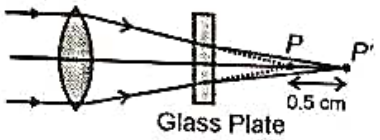
(1) $v(1 - \cos\theta)$

(2) $\frac{v}{\sin\theta}$

(3) $\frac{v}{\cos\theta}$

(4) $v\cos\theta$

13. Rays from a lens are converging towards a point P, as shown in figure. The thickness of glass plate of refractive index 2 kept between the lens and point P, so that image will be formed at P', will be



(1) 1 cm (2) 3.2 cm

(3) 5 cm (4) 2.4 cm

14. If a transparent parallel plate of uniform thickness t having refractive index μ is interposed perpendicularly in the path of a light beam, the optical path is

(1) Increased by $(\mu - 1)t$

(2) Decreased by μ

(3) Decreased by $(\mu - 1)t$

(4) Increased by μ

15. **Assertion (A):** For best contrast between maxima and minima in the interference pattern in YDSE, the intensity of light waves emerging out of the two slits should be equal.

Reason (R): The intensity of interference pattern is proportional to square of amplitude of resultant wave.

(1) Both Assertion & Reason are true and the reason is the correct explanation of the assertion

(2) Both Assertion & Reason are true and the reason is not the correct explanation of the assertion

(3) Assertion is true but Reason is false

(4) Both Assertion and Reason are false

16. A ray of unpolarised light is incident on a glass plate at polarising angle 57°. Then choose the correct statement.

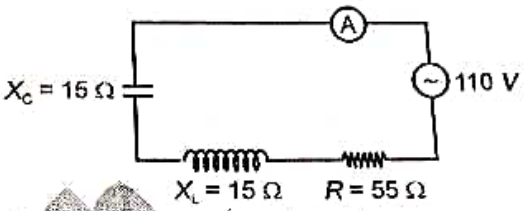
(1) The reflected ray and the transmitted ray both will be completely polarised

(2) The reflected ray will be completely polarised and the transmitted ray will be partially polarised

(3) The reflected ray will be partially polarised and the transmitted ray will be completely polarised

(4) The reflected and transmitted both rays will be partially polarised

17. The reading of ammeter in the circuit shown will be



(1) 2 A (2) 4 A

(3) 3 A (4) 5 A

18. What will be the angular width of central maxima in Fraunhofer diffraction when the light of wavelength 5000 Å is used and slit width is 10×10^{-5} cm?

(1) 2 rad (2) 3 rad

(3) 1 rad (4) 4 rad

19. In an LCR series circuit, $R = 10\ \Omega$, $X_L = 20\ \Omega$ and $X_C = 10\ \Omega$. The average value of current for a complete cycle, for source voltage $V = 20\sin(30t)$ is

(1) 2 A (2) 0.5 A

(3) 3 A (4) Zero

20. Out of the following, choose the ray which does not travel with the speed of light in vacuum

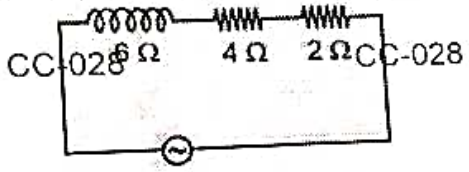
(1) X-rays (2) Microwaves

(3) γ-rays (4) β-rays

21. Which among the following has the largest wavelength?
(1) Radio wave (2) X-ray
(3) Ultraviolet ray (4) Infra-red ray

22. An electromagnetic wave of intensity 30 W/m² is incident on a surface of area 2 m². If the surface is perfectly absorbing, then the amount of momentum transferred to the surface in 10 s will be
(1) 2×10^{-6} kg m/s (2) 2×10^{6} kg m/s
(3) 4×10^{-9} kg m/s (4) 10^{-8} kg m/s

23. The net impedance of the following circuit is



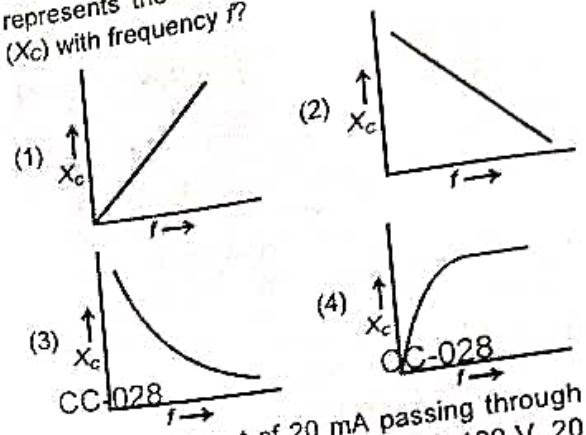
(1) $6\sqrt{2}$ Ω (2) 2 Ω
(3) 4 Ω (4) 6 Ω

24. The r.m.s. value of current from $t = 0$ to $t = 3$ s for the current $i = (3t)$ A is
(1) 2 A (2) 1.45 A
(3) 4 A (4) 5.19 A

25. Consider the following two statements regarding transformers and choose the correct one.
Statement-A : For step up transformer, $V_s > V_p$ so $N_s > N_p$ and $I_s < I_p$
Statement-B : For step down transformer, $V_s < V_p$ so $N_s < N_p$ and $I_s > I_p$
(Here symbols have their usual meaning)
(1) Only statement A is correct
(2) Only statement B is correct
(3) Both statements are correct
(4) Neither statement A nor statement B is correct

26. An ideal transformer converts a 20 V input voltage in primary coil to 100 V output in secondary coil. The current in secondary coil if the current in primary coil is 20 A is
(1) 4 A (2) 20 A
(3) 0.3 A (4) 40 A

27. Which of the following curves correctly represents the variation of capacitive reactance (X_C) with frequency f?



28. There is a current of 20 mA passing through an ideal inductor when connected to a 100 V, 20 Hz supply. The power consumed is
(1) 1 W (2) 25 W
(3) 39 W (4) Zero

29. A small insect is at 60 cm from a concave mirror of focal length 20 cm. What is the image distance from the mirror?
(1) 30 cm (2) 20 cm
(3) 15 cm (4) 18 cm

30. The minimum distance between the real object and its real image for concave mirror is
(1) f (2) $2f$
(3) $4f$ (4) Zero

31. A compound microscope has two lenses. The magnifying power of one is 8 and the combined magnifying power is 96. The magnifying power of the other lens is
(1) 8 (2) 12
(3) 14 (4) 6

32. What is angular width between central maxima and first ordered maxima of diffraction pattern due to single slit of width 0.25 mm, when light of wavelength 600 nm is incident normally?
(1) 3.6×10^{-3} rad (2) 4.2×10^{-3} rad
(3) 1.2×10^{-3} rad (4) 2.4×10^{-3} rad

Space for Rough Work

33. Choose the correct statement among the following
(1) Polarization of light supports wave nature while diffraction of light supports particle nature
(2) Polarization of light supports particle nature of light while diffraction of light supports wave nature
(3) Both polarization of light and diffraction supports wave nature of light
(4) Both polarization of light and diffraction support particle nature of light

34. Two polarising sheets are placed with their plane parallel so that intensity of transmitted light is maximum. The angle through which either sheet must be turned so that light intensity drops to half of maximum value is
(1) 30°
(2) 45°
(3) 135°
(4) Both (2) and (3) are correct

35. In single slit diffraction experiment, first minima of red light $\lambda_1 = 660$ nm coincides with first maxima of another wavelength λ_2. The value of λ_2 is
(1) 440 nm (2) 470 nm
(3) 550 nm (4) 690 nm

SECTION-B

36. A prism is made of glass of refractive index $\sqrt{3}$. The refracting angle of prism is A. If angle of minimum deviation is equal to A, then the value of A is
(1) 30° (2) 45°
(3) 60° (4) 90°

37. Dispersion of light in a medium implies that
(1) Light of different wavelengths travel with equal speed in medium
(2) Light of different frequencies travel with equal speed in medium
(3) Refractive index of medium is different for different wavelengths
(4) All of above are correct

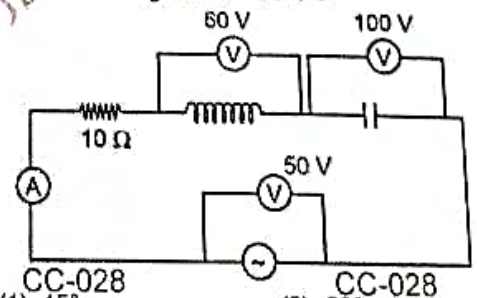
38. When a ray of light enters a glass slab from air
(1) Its speed increases
(2) Its frequency decreases
(3) Its wavelength decreases
(4) Neither wavelength nor frequency change

39. Two coherent monochromatic light waves of amplitude $3A$ and $2A$ interfere at a point on screen having a phase difference of $\frac{\pi}{3}$ rad. The resultant intensity at that point will be proportional to
(1) $5A^2$ (2) $13A^2$
(3) $19A^2$ (4) $6A^2$

40. The velocity of light in air is 3×10^8 m s^{-1} and in water 2.25×10^8 m/s. The polarising angle for air water interface will be
(1) 15° (2) 30°
(3) 53° (4) 37°

41. The deviation δ of a ray produced by a thin prism of small angle A is
(1) $\frac{\mu - 1}{A}$ (2) $\frac{A}{(\mu - 1)}$
(3) $(\mu - 1)A$ (4) $(\mu^2 - 1)A$

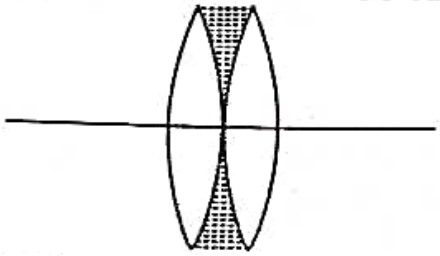
42. In the circuit shown below the phase difference between voltage and current is



(1) 45° (2) 53°
(3) 37° (4) 30°

43. Consider the following two statements.
Statement-A : A hot wire ammeter reads the RMS value of current.
Statement-B : A hot wire ammeter can read AC but cannot read DC.
The correct statement(s) is/are
(1) Only A (2) Only B
(3) Both A and B (4) Neither A nor B

44. Two identical thin equiconvex lenses made of glass (μ = 1.5) are placed in contact. Their combine power is *P*. If the space between them is filled with water μ = 1.33 as shown then power of the combination



(1) Will be greater than *P*
(2) Will be less than *P*
(3) May be less than or greater than *P*
(4) Will becomes zero

45. An equiconvex lens has focal length $\frac{80}{3}$ cm and radius of curvature 40 cm. If one face of the lens is silvered then the effective focal length of the mirror so formed will be
(1) $-\frac{80}{3}$ cm (2) -8 cm
(3) -40 cm (4) $-\frac{40}{3}$ cm

46. An electromagnetic wave of intensity 100 W/m^2 falls on a perfectly reflecting surface. The force exerted by it on a 6 cm^2 portion of surface will be

(1) 4×10^{-10} N (2) 10^{-12} N
(3) 4×10^{-6} N (4) 0.66×10^{-8} N

47. A series LCR circuit has a inductive reactance of 100 Ω, a capacitive reactance of 200 Ω and a resistor of 100 Ω. It is connected to an A.C. source of $150\sqrt{2}$ V, $\frac{500}{\pi}$ Hz. The power dissipated in the resistor will be
(1) 450 W (2) 225 W
(3) 311.5 W (4) 100 W

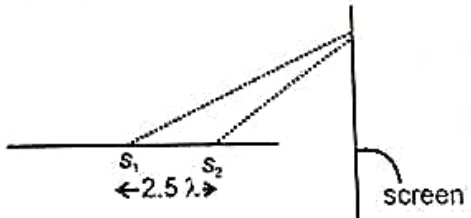
48. Column-I contains quantities while column-II contains their corresponding SI units. Match the columns and choose the correct option.

Column-I		Column-II	
A.	Impedance	(P)	Ampere
B.	Wattless current	(Q)	Ohm
C.	Quality factor	(R)	Volt
D.	RMS voltage	(S)	Unitless

(1) A → Q; B → P; C → S; D → R
(2) A → P; B → Q; C → R; D → S
(3) A → Q; B → R; C → P; D → S
(4) A → S; B → Q; C → R; D → P

49. Monochromatic light of wavelength 8000 Å is used in YDSE, if fifth bright fringe is observed at 2 cm from centre then third dark fringe will be
(1) 1 cm (2) 2 cm
(3) 4 cm (4) 0.5 m

50. In the following modified set-up of YDSE, the number of minima formed on screen is



(1) 5 (2) 7
(3) 3 (4) 4

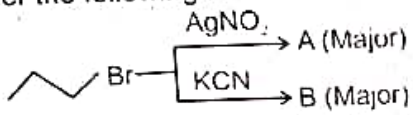
Space for Rough Work

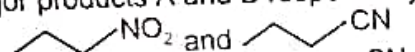
CHEMISTRY

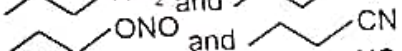
SECTION - A

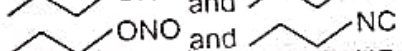
51. Which among the following is an incorrect statement?
(1) S_N1 reaction is accelerated in polar protic solvent.
(2) In S_N2 reaction, transition state is formed.
(3) Complete retention in configuration takes place in S_N1 reaction.
(4) Inversion in configuration takes place in S_N2 reaction.

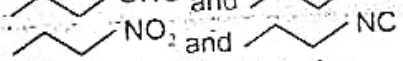
52. Consider the following reactions.



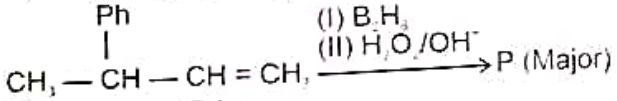
Major products A and B respectively are
(1) 

(2) 

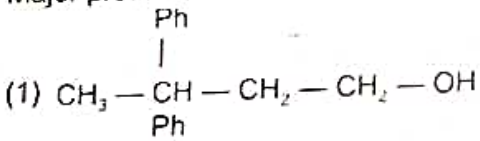
(3) 

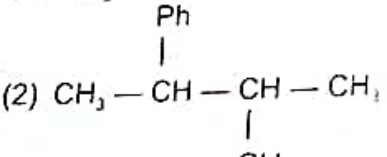
(4) 

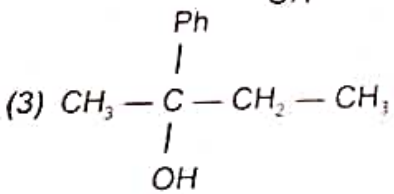
53. Consider the following reaction

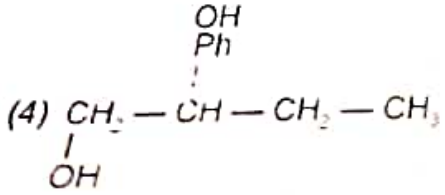


Major product P is

(1) 

(2) 

(3) 

(4) 

54. Given below are two Statements: One is labelled as **Assertion (A)** and the other is labelled as **Reason (R).**

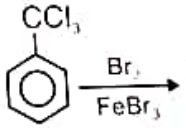
Assertion (A): Benzyl halide is an aryl halide.

Reason (R): In benzyl halide, halogen atom is bonded to an sp^3-hybridised carbon atom attached to an aromatic ring.

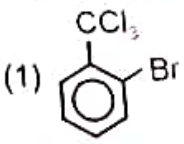
In the light of above statements, choose the most appropriate answer from the options given below.
(1) Both (A) and (R) are correct and (R) is the correct explanation of (A)
(2) (A) is correct but (R) is incorrect
(3) (A) is incorrect but (R) is correct
(4) Both (A) and (R) are correct and (R) is not the correct explanation of (A)

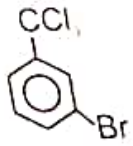
55. Total number of isomeric products (including stereoisomers) obtained when 2-chlorobutane is heated with alcoholic KOH is
(1) One (2) Two
(3) Three (4) Four

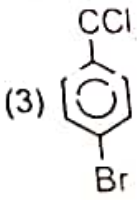
56. The increasing order of nucleophilicity in polar aprotic medium would be
(1) $F^- > Cl^- > Br^- > I^-$ (2) $I^- > Br^- > Cl^- > F^-$
(3) $Br^- > Cl^- > I^- > F^-$ (4) $I^- > F^- > Cl^- > Br^-$

57. 

P (Major), Major product P is

(1) 

(2) 

(3) 

(4) 

58. Given below are two statements

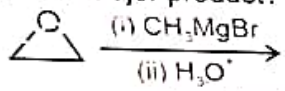
Statement-I: The acidic strength of alcohols decreases in the order: Primary > Secondary > Tertiary.

Statement-II: Phenols do not react with aqueous NaOH.

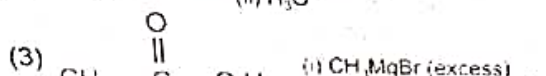
In the light of the above statements, choose the **correct** answer from the options given below.

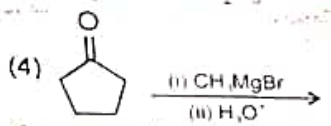
(1) Statement-I is true but statement-II is false
(2) Statement-I is false but statement-II is true
(3) Both statement-I and statement-II are false
(4) Both statement-I and statement-II are true

59. Which of the following reactions will give primary alcohol as major product?

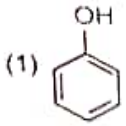
(1) 

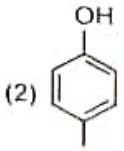
(2) $CH_3CHO \xrightarrow[(ii)\ H_3O^+]{(i)\ CH_3CH_2MgBr}$

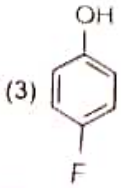
(3) 

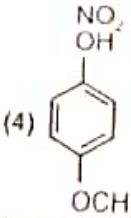
(4) 

60. Compound having lowest pK_a value among the following is

(1) 

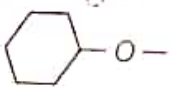
(2) 

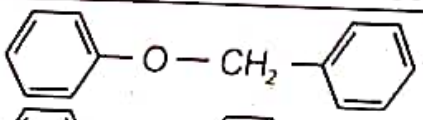
(3) 

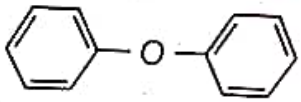
(4) 

61. The ether which is most difficult to be cleaved by heating with HI among the following is

(1) 

(2) 

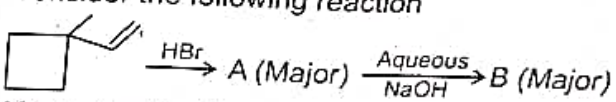
(3) 

(4) 

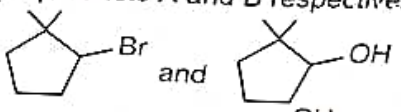
62. Williamson synthesis mostly involves

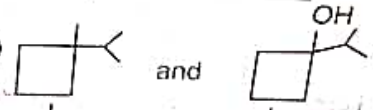
(1) S_N1 attack of an alkoxide ion on 3°-alkyl h
(2) S_N1 attack of an alkoxide ion on 2°-alkyl ha
(3) S_N2 attack of an alkoxide ion on 1°-alkyl hal
(4) S_N2 attack of an alkoxide ion on 3°-alkyl hali

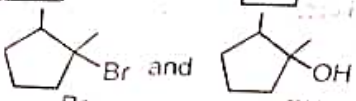
63. Consider the following reaction

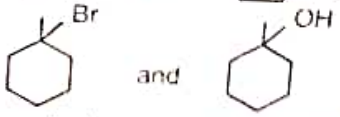


Major products A and B respectively are

(1) 

(2) 

(3) 

(4) 

64. Given below are two Statements: One is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A): Addition of HCN to CH_3CHO gives an optically active compound.

Reason (R): Nucleophilic addition of HCN in aldehyde with two or more carbon gives a chiral product.

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

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

65. $C_2H_5-C\equiv CH \xrightarrow[(ii)\ CH_3Br]{(i)\ CH_3MgBr}$ Product

The product is

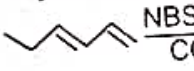
(1) $CH_3-(CH_2)_3-CH_3$

(2) $C_2H_5-C(CH_3)=CH(Br)$

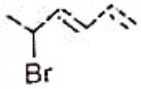
(3) $C_2H_5CH=CH-CH_3$

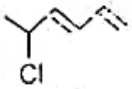
(4) $C_2H_5-C\equiv C-CH_3$

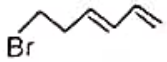
66. Major product of the given reaction is

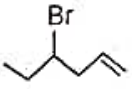


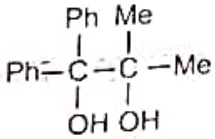
Product

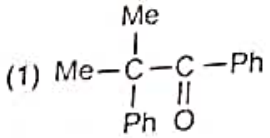
(1) 

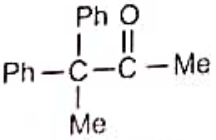
(2) 

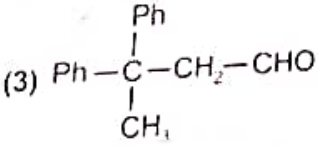
(3) 

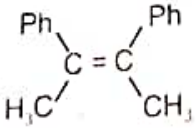
(4) 

67.  $\xrightarrow{H_2SO_4}$ P(Major), P is

(1) 

(2) 

(3) 

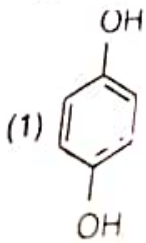
(4) 

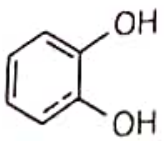
68. Which of the following is a polar aprotic solvent?

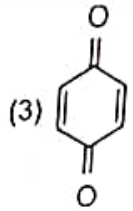
(1) H_2O (2) DMSO

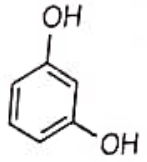
(3) C_2H_5OH (4) CS_2

69. When phenol is treated with chromic acid then the product formed is

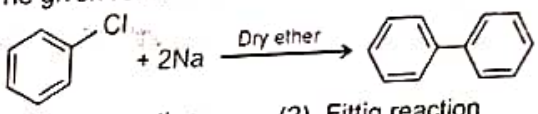
(1) 

(2) 

(3) 

(4) 

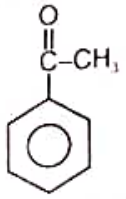
70. The given reaction is called

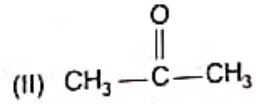


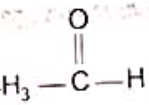
(1) Wurtz reaction (2) Fittig reaction

(3) Wurtz-Fittig reaction (4) Swarts reaction

71. The reactivity order towards the nucleophilic addition reaction among the following compounds is

(I) 

(II) 

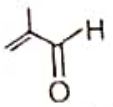
(III) 

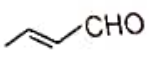
(1) I > II > III (2) II > III > I

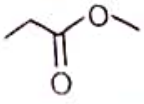
(3) III > II > I (4) I > III > II

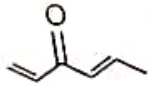
72. In the following reaction, the product [A] is

$CH_3CHO \xrightarrow[\Delta]{dil.\ NaOH}$ [A]

(1) 

(2) 

(3) 

(4) 

73. In which of the following reaction hydrocarbon produced?

(1) $CH_3COCH_2COOH \xrightarrow{\Delta}$

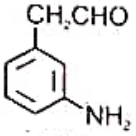
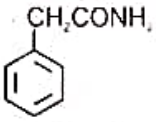
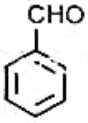
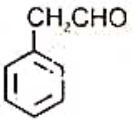
(2) $CH_3COONa + H_2O \xrightarrow{\text{Electrolysis}}$

(3) $CH_3COOC_2H_5 + NaOH \xrightarrow{\Delta}$

(4) $C_2H_5COOH + NaHCO_3 \xrightarrow{\Delta}$

Rough Work

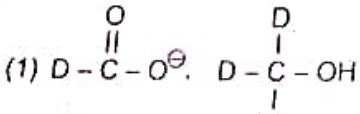
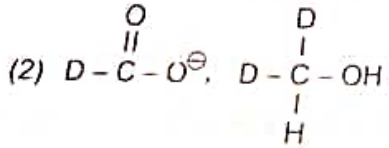
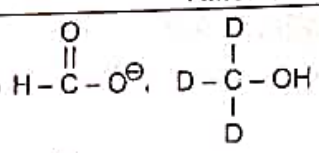
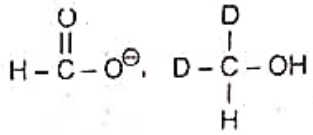
74. Compound 'A' undergoes formation of cyanohydrin which on hydrolysis gives lactic acid [$CH_3CH(OH)COOH$] therefore, compound 'A' is
(1) Formaldehyde (2) Acetaldehyde
(3) Acetone (4) Benzophenone

75. The compound which will not form oxime with NH_2OH is
(1) 
(2) 
(3) 
(4) 

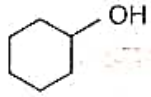
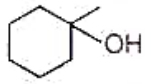
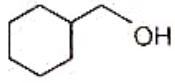
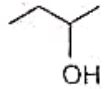
76. The major product (A) in the following reaction is
$R-Mg-X+CO_2 \xrightarrow{\text{Dry ether}} \xrightarrow{H_3O^+} A$
(1) An aldehyde (2) A ketone
(3) An ether (4) A carboxylic acid

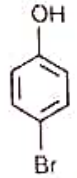
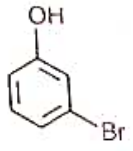
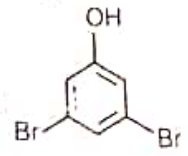
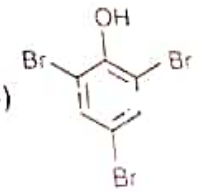
77 F_3CCOOH $HCOOH$ C_6H_5COOH
(a) (b) (c)
The order of pK_a of given acids is
(1) a > c > b (2) c > b > a
(3) b > c > a (4) a > b > c

78. Least reactive acid derivative towards hydrolysis is
(1) Ester (2) Acid amide
(3) Acid halide (4) Acid anhydride

79. $2D-\overset{D}{\underset{|}{C}}=O + OH^- \longrightarrow X + Y$
X and Y will be
(1) 
(2) 
(3) 
(4) 

80. $C_2H_5COOH \xrightarrow[(ii)\,H_2O]{(i)\,\text{Red } P/X_2}$ Product, the **incorrect** statement for the reaction is
(1) The product formed is a chiral compound
(2) This is Hell-Volhard-Zelinsky reaction
(3) α - halo acid is formed as major product
(4) Acyl halide is formed as major product

81. Which alcohol will react slowest with concentrated HCl and $ZnCl_2$?
(1) 
(2) 
(3) 
(4) 

82. When phenol reacts with Br_2/water, the major product formed is
(1) 
(2) 
(3) 
(4) 

83. Given below are two statements

Statement-I: $(CH_3)_3CCl$ gives faster S_N1 reaction than $C_6H_5CH_2Cl$.

Statement-II: $C_6H_5\overset{\oplus}{C}H_2$ is less stable than $(CH_3)_3\overset{\oplus}{C}$.

In the light of the above statements, choose the **correct** answer from the options given below.

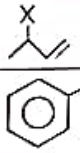
(1) Both statement-I and statement-II are true

(2) Both statement-I and statement-II are false

(3) Statement-I is true but statement-II is false

(4) Statement-I is false but statement-II is true

84. Match the column 'A' with column 'B'.

	Column A		Column B
(i)		a.	Aryl halide
(ii)		b.	Vinyl halide
(iii)		c.	Allyl halide
(iv)		d.	Alkyl halide

Choose the **correct** option.

(1) (i)→a, (ii)→c, (iii)→b, (iv)→d

(2) (i)→d, (ii)→b, (iii)→c, (iv)→a

(3) (i)→d, (ii)→c, (iii)→b, (iv)→a

(4) (i)→d, (ii)→b, (iii)→a, (iv)→c

85. The decreasing order of rate of S_N2 reaction for the given compounds is

(I) $CH_3 - Cl$

(II) 

(III) 

(1) (III) > (II) > (I)

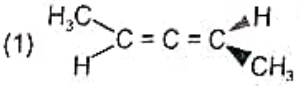
(2) (II) > (III) > (I)

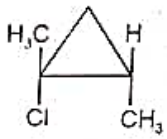
(3) (II) > (I) > (III)

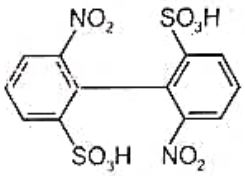
(4) (I) > (II) > (III)

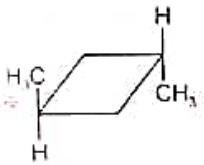
SECTION-B

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

(1) 

(2) 

(3) 

(4) 

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

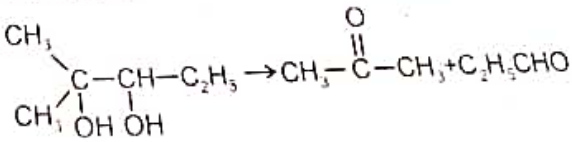
(1) Benzene

(2) Phenol

(3) t-butyl benzene

(4) t-Butyl phenyl ether

88. The given conversion can be achieved by



(1) Baeyer's reagent

(2) Dil. H_2SO_4

(3) HIO_4

(4) Acidified $K_2Cr_2O_7$

89. Given below are two statements

Statement-I: 1-Chloropropane has higher boiling point than 2-Chloropropane.

Statement-II: For isomeric alkyl halides order of boiling point is 3° > 2° > 1°.

In the light of above statements choose the **correct** answer from options given below.

(1) Statement I is true and statement II is false

(2) Statement I is false and statement II is true

(3) Both statement I and statement II are false

(4) Both statement I and statement II are true

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

(1) Reimer-Tiemann reaction

(2) Swarts reaction

(3) Fittig reaction

(4) Wurtz reaction

91. Given below are two statements

Statement-I: Reaction of methanal with CH_3MgBr gives secondary alcohol as major product.

Statement-II: Reaction of Grignard reagent with carbonyl compound gives alcohol.

In the light of above statements choose the **correct** answer from options given below.

(1) Both statement I and statement II are true

(2) Both statement I and statement II are false

(3) Statement I is true and statement II is false

(4) Statement I is false and statement II is true

92. Given below are two statements: One is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A): Ethanal and ethanol can be distinguished by iodoform reaction.

Reason (R): Aldehydes and ketones having '$CH_3-\overset{\overset{O}{\|}}{C}-$' group give yellow precipitate in iodoform reaction.

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

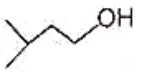
(1) Both (A) and (R) are correct and (R) is the correct explanation of (A)

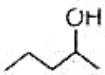
(2) (A) is correct but (R) is not correct

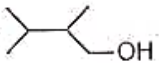
(3) (A) is not correct but (R) is correct

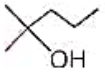
(4) Both (A) and (R) are correct but (R) is not the correct explanation of (A)

93. The compound which gives blue colouration in Victor Meyer's test is

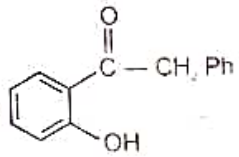
(1) 

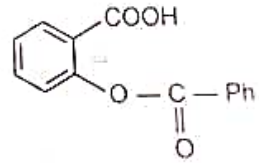
(2) 

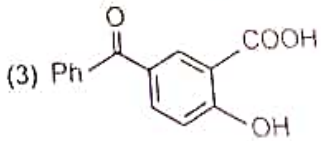
(3) 

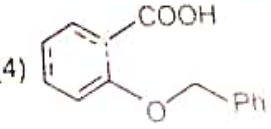
(4) 

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

(1) 

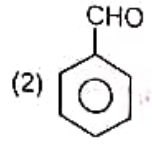
(2) 

(3) 

(4) 

95. An organic compound X on treatment with acidified $K_2Cr_2O_7$ gives compound Y which reacts with I_2 and sodium hydroxide to form tri-iodomethane. The compound X can be

(1) CH_3OH

(2) 

(3) CH_3CHO

(4) $CH_3CH(OH)CH_3$

96. Given below are two Statements: One is labelled as Assertion (A) and the other is labelled as Reason (R):

Assertion (A): Most of the carboxylic acids exist as dimer in vapour phase.

Reason (R): Carboxylic acids form intermolecular hydrogen bonds.

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

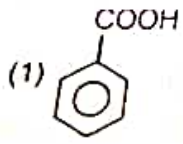
(1) Both (A) and (R) are correct and (R) is the correct explanation of (A)

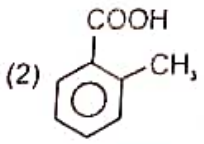
(2) (A) is correct but (R) is not correct

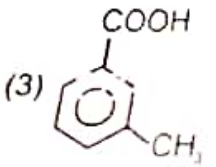
(3) (A) is not correct but (R) is correct

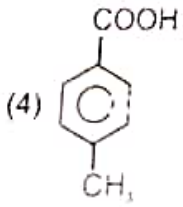
(4) Both (A) and (R) are correct but (R) is not the correct explanation of (A)

97. Which of the following is most acidic?

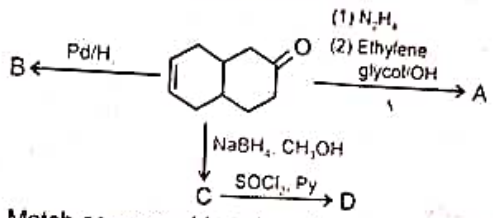
(1) 

(2) 

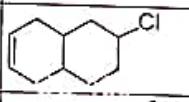
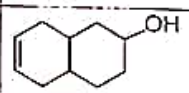
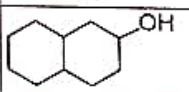
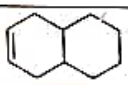
(3) 

(4) 

98. On the basis of following reactions



Match compound in column 'I' with their structure in column 'II' and choose the correct answer.

	Column I		Column II
(a)	A	(i)	
(b)	B	(ii)	
(c)	C	(iii)	
(d)	D	(iv)	

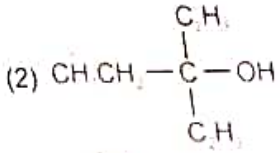
(1) (a)-(iii), (b)-(iv), (c)-(ii), (d)-(i)
(2) (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)
(3) (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)
(4) (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)

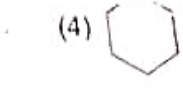
99. Phenol can be distinguished from aliphatic alcohol with

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

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

(1) $CH_3CH_2CH_2OH$

(2) 

(3) 

(4) 

147. Graphical representation of proportion of various age groups of a population is

(1) Sex ratio (2) Percent cover

(3) Age pyramid (4) Biotic community

148. In which of the following population interactions, both interacting species are negatively affected?

(1) Commensalism (2) Competition

(3) Mutualism (4) Protocooperation

149. Exponential growth

(1) Occurs when resources are limiting in environment

(2) Is the realistic growth model found in nature

(3) Is not influenced by environmental factors

(4) Results in J-shaped curve

150. Read the following statements.

Assertion (A): In the polar sea, the aquatic mammals like seal have thick layer of fat which helps in reducing loss of body heat.

Reason (R) : Mammals from the colder climates generally have shorter ears and limbs to minimise heat loss.

In the light of above statements, choose the **correct** option.

(1) Both (A) and (R) are true and (R) is the correct explanation of (A)

(2) Both (A) and (R) are true but (R) is not the correct explanation of (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

ZOOLOGY

SECTION - A

151. Select the **incorrect** statement w.r.t. AIDS.

(1) It was first reported in the year 1981.

(2) It is caused by Human Immuno-deficiency Virus.

(3) Transmission of HIV infection occurs only by sexual contact with an infected person.

(4) HIV does not spread by mere touch or physical contact.

152. Which of the following techniques/methods is not used in detection of cancers of the internal organs?

(1) Radiography

(2) Computed tomography

(3) Magnetic resonance imaging

(4) Radiotherapy

153. Complete the analogy by selecting the **correct** option.

_____ : *Wuchereria* : : *Aedes* : Dengue virus

(1) *Anopheles* (2) *Aedes*

(3) *Culex* (4) *Plasmodium*

154. Heat and moisture help *Microsporum* to grow in the groin or between toes of an individual and causes a disease that is generally acquired from/by

(1) Soil

(2) Towel of healthy person

(3) Mosquito bite

(4) Viral spreading

155. The most serious form of malaria i.e., malignant malaria which can be even fatal is caused by

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

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

156. One of the most infectious human ailment – the common cold generally occurs through
(1) Ingestion of contaminated food
(2) Bite of an infected mosquito
(3) Droplet inhalation from cough and sneezes
(4) Hyperactivity of immune system

157. Who among the following disproved the 'good humor' hypothesis of health?
(1) Hippocrates (2) William Harvey
(3) M.S. Swaminathan (4) Herbert Boyer

158. All of the following are important to maintain good health, **except**
(1) Balanced diet (2) Personal hygiene
(3) Sedentary habits (4) Yoga

159. Which vector is responsible for reported cases of chikungunya in many parts of India?
(1) *Gambusia*
(2) *Periplaneta americana*
(3) *Aedes* mosquito
(4) Tse-tse fly

160. The fertilisation of gametes of *Plasmodium* takes place in
(1) Mosquito's gut
(2) Human liver
(3) Human RBCs
(4) Mosquito's salivary gland

161. How many of the structures given in the box below are secondary lymphoid organs?

Spleen, Lymph nodes, Bone marrow, Thymus, Tonsils, Peyer's patches, Appendix

Choose the **correct** option.
(1) Three (2) Four
(3) Five (4) Six

162. Consider the following statements and choos the most appropriate option.
Statement (A): All organisms belonging t protozoa and helminth can cause diseases i man and are called pathogens.
Statement (B): Most parasites are pathogens as they cause harm to the host by living in/on them.
(1) Only statement (A) is true
(2) Both statements (A) and (B) are true
(3) Both statements (A) and (B) are false
(4) Only statement (A) is false

163. Observe the diseases listed below.
(a) AIDS (b) Cancer
(c) Pneumonia (d) Common cold
How many of the above listed diseases is/are transmitted from one person to another?
(1) Four (2) Three
(3) One (4) Two

164. Read the following statements carefully.
(A) *Salmonella typhi* is a pathogenic bacterium that causes typhoid fever in human beings.
(B) The pathogens of typhoid generally enter the colon of small intestine through contaminated food and water.
(C) Typhoid fever can be confirmed by Widal test.
Select the most appropriate option.
(1) Statement (A) is true while statements (B and (C) are false.
(2) Statements (A) and (B) are true wh statement (C) is false.
(3) Statements (A) and (C) are true statement (B) is false.
(4) All statements (A), (B) and (C) are true.

165. An immunoglobulin molecule consists all of the following components, **except**
(1) Light chains (2) Heavy chains
(3) Disulphide bonds (4) Antibody binding site

166. Which type of antibodies primarily increase in response to allergens like dust, animal dander, *etc*?
(1) IgA (2) IgE
(3) IgM (4) IgG

167. Select an opiate drug which suppresses brain function, relieves intense pain and thus is used as an analgesic, post surgery.
(1) Cocaine (2) Marijuana
(3) Morphine (4) Hashish

168. Mucosa Associated Lymphoid Tissue (MALT) constitutes about X per cent of the lymphoid tissue in human body. Here 'X' is
(1) 50 (2) 60
(3) 70 (4) 80

169. **Assertion (A):** During malarial infection, the chill and high fever is usually observed at regular intervals.
Reason (R): A toxic substance, haemozoin is released by the rupture of RBCs in each cycle.
In the light of above statements, choose the **correct** option.
(1) Both (A) and (R) are true and (R) is the correct explanation of (A)
(2) Both (A) and (R) are true but (R) is not the correct explanation of (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

170. *Read the statements (P) and (Q) given below and select the* **correct** *option.*
Statement (P) : *Haemophilus influenzae* and *Trichophyton* cause common cold in human beings.
Statement (Q) : *Common cold is characterised by nasal congestion and discharge, sore throat, cough, headache, etc.*
(1) Both statements (P) and (Q) are true
(2) Both statements (P) and (Q) are false
(3) Statement (P) is true but statement (Q) is false
(4) Only statement (Q) is true

171. A large bean-shaped organ which has a large reservoir of erythrocytes is
(1) Liver (2) Spleen
(3) Pancreas (4) Thymus

172. The chronic use of drugs and alcohol damages liver and cause
(1) Bronchitis (2) Cirrhosis
(3) Emphysema (4) AIDS

173. In a monomeric antibody molecule, the total number of intra-chain disulphide bonds is equal to
(1) Six (2) Eight
(3) Twelve (4) Four

174. Observe the figure given below.

Identify the above given figure and select the **correct** option w.r.t. it.
(1) Extracts of this plant are generally taken by oral ingestion
(2) Extracts of this plant belong to cannabinoids
(3) This plant is native to South America
(4) Morphine is extracted from the latex of this plant

175. Observe the facts/features listed below

(a) White and odourless

(b) Bitter and crystalline

(c) Slows down body function

(d) Taken by snorting and injection

Above mentioned facts/features are associated with the chemical whose receptors are present in

(1) Heart only

(2) Brain only

(3) Gastrointestinal tract only

(4) Both CNS and GIT

176. Which of the following substances is given to cancer patients that activates their immune system and helps in destroying the tumor?

(1) Smack (2) α-interferons

(3) IgE (4) Histamine

177. All of the following are symptoms associated with pneumonia, **except**

(1) Gray to bluish discoloration of lips

(2) Cough and headache

(3) Diarrhoea

(4) Fever

178. The period between _____ years of age is termed as adolescence period.

Choose the option which fills the blank **correctly**.

(1) 10 – 12 (2) 8 – 12

(3) 12 – 18 (4) 22 – 30

179. Vaccine produced using genetic engineering or recombinant DNA technique is/has

(1) Eradicated polio

(2) Lower availability for immunisation

(3) Hepatitis B vaccine

(4) Used for passive immunisation

180. Choose the **incorrect** statement.

(1) Tobacco contains a large number of harmful chemical substances including nicotine, an alkaloid.

(2) Nicotine stimulates adrenal gland to release adrenaline and noradrenaline.

(3) Smoking decreases carbon monoxide (CO) content in blood and increases concentration of haem-bound oxygen.

(4) Smoking is associated with the increased incidences of emphysema and gastric ulcer.

181. The *Plasmodium* enters the mosquito's body as

(1) Sporozoites (2) Gametocytes

(3) Zygotes (4) Gametes

182. Which of the following structures of our immune system serve to trap the blood-borne micro-organisms and also act as graveyard of RBCs?

(1) Thymus (2) Bone-marrow

(3) Appendix (4) Spleen

183. Mucus coating of the epithelium lining the urogenital tract is included under the category of

(1) Physiological barriers of innate immunity

(2) Physical barriers of innate immunity

(3) Cellular barriers of innate immunity

(4) Passive acquired immunity

184. Which of the following is **not** true w.r.t. acquired immunity?

(1) It is pathogen specific and is characterised by memory

(2) When our body encounters a pathogen for the first time, it produces anamnestic response.

(3) Primary immune response is of low intensity.

(4) Subsequent encounter with the same pathogen elicits a highly intensified secondary response.

185. Match Column I with Column II and choose the **correct** option.

Column I		Column II
a. Antibodies	(i)	Cell-mediated immunity
b. T-lymphocytes	(ii)	Humoral immunity
c. Monocytes	(iii)	Phagocytosis

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

SECTION - B

186. All of the following are few common causes, which motivate youngsters towards drug and alcohol use, **except**
(1) Need for adventure and excitement
(2) Experimentation
(3) Education and counselling
(4) Curiosity

187. Choose the **incorrect** option w.r.t. filariasis in humans.
(1) It is caused by a helminth, *W. malayi*.
(2) The lymphatic vessels of the lower limbs are usually affected.
(3) Characterised as a rapid developing chronic inflammation of the organs in which the pathogens do not survive more than a week.
(4) The genital organs also get affected

188. Internal bleeding, muscular pain, anemia and blockage of intestinal passage are symptoms of a helminthic disease caused by
(1) *Epidermophyton* (2) *Ascaris*
(3) *Wuchereria* (4) *Plasmodium*

189. Read the following carefully
(a) Drop in academic performance
(b) Change in sleeping and eating habits
(c) Increased interest in personal hygiene
(d) Better relations with family and friends
How many of the above is/are **not** true w.r.t. the common warning signs of drug abuse among youth?
(1) Three (2) Four
(3) Two (4) Zero

190. Lysozyme present in saliva destroys certain types of
(1) Bacteria (2) Fungi
(3) Viruses (4) Nematodes

191. **Assertion (A):** Virus infected cells secrete a polysaccharide that is a cytokine barrier of innate immunity.
Reason (R): Interferons keep a check on the spreading of virus to non-infected cells.
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) (A) is true but (R) is false
(4) (A) is false but (R) is true

192. Consider the symptoms listed below
(a) Constipation
(b) Abdominal pain and cramps
(c) Stools with excess mucous and blood
Identify the disease and select the **correct** option w.r.t. it.
(1) This disease is caused by a bacterium, *E. histolytica*.
(2) Housefly acts as mechanical carrier to transmit parasite of this disease.
(3) The pathogen of this disease is a parasite in the small intestine of human.
(4) It is usually transmitted via nasal droplets.

193. All of the following are correct w.r.t. cannabinoids, **except**
(1) Obtained from the inflorescences of the plant *Cannabis sativa*
(2) Generally taken by inhalation and oral ingestion
(3) Known for their inhibitory effects on transport of dopamine
(4) Cannabinoid receptors are present principally in the brain.

194. Mary Mallon, who was a cook by profession was known to be a carrier of a disease named
(1) Amoebiasis (2) Typhoid
(3) Filariasis (4) Ascariasis

195. Select the **incorrect** match among the following.

(1)	Colostrum	–	Passive immunity
(2)	α-interferon	–	Biological response modifier
(3)	Mast cells	–	Histamine, serotonin, adrenaline
(4)	CT scan	–	Uses X-rays

196. Which of the following is the part of innate immunity?
(1) RBCs (2) B-lymphocytes
(3) NK cells (4) Platelets

197. Barbiturates are normally used as medicine to help patients cope with
(1) AIDS (2) Malaria
(3) Insomnia (4) Ascariasis

198. The immune response that is mainly responsible for the rejection of kidney graft is
(1) Humoral immune response
(2) Cell mediated immune response
(3) Auto-immune response
(4) Innate immune response

199. Choose the **correct** statement w.r.t. addiction and dependence.
(1) Addiction is a physical attachment to certain effects associated with drugs and alcohol.
(2) With the repeated use of drugs, the tolerance level of the receptors present in our body decreases.
(3) Withdrawal syndrome is characterised by anxiety, shakiness, nausea and sweating.
(4) Dependence leads the patient to obey all social norms in order to get sufficient funds to satiate his/her needs.

200. The side-effects of the use of anabolic steroids in human females do not include
(1) Masculinisation
(2) Enlargement of clitoris
(3) Breast enlargement
(4) Depression

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