AJMAL SUPER 40

ADMISSION CUM SCHOLARSHIP TEST : 2025

Challenger Batch (Complete Syllabus of Class XII**)**

Conducted by : **AJMAL FOUNDATION, Hojai**

TEST BOOKLET SERIES D

INSTRUCTIONS TO CANDIDATES

1. Candidates are to use the OMR Answer Sheet provided.
2. It is the candidate's responsibility to write and fill in the **Application Number** (from Admit Card) and **Test Booklet Series** (from Question Paper) carefully and without any omission or discrepancy at the appropriate place in the **OMR Answer Sheet.**
3. Candidates are required to mark the correct answer choice by **shading** the circle completely with **blue** or **black** ball point pen. (Pen of any other colour or pencil is not allowed). For example, if the correct answer to question no. 1 is 'B' then the marking should be:

4. Write your details on the OMR Answer Sheet which are asked for.
5. Only one circle, i.e. the correct one should be shaded. Shading more than one circle will render the answer invalid.
6. A candidate having completed his/her **OMR ANSWER SHEET** must hand it over, even if blank, to the invigilator.
7. An examinee must not bring any loose paper, book, etc. to the Examination Hall. Any examinee found in possession of even loose papers will be EXPELLED.
8. An examinee must not talk to, disturb or seek help from a fellow examinee during the examination.
9. Any mechanical or digital calculating device (Smart Watch, Mobile,calculator etc.) shall not be used by the examinee during the examination.
10. No candidate will be allowed to leave the Examination Hall before completion of 3 hours.
11. For each correct answer 1 mark will be awarded and for each incorrect answer 0 mark will be deducted.
12. Duration of the exam is **03 hours from 11:00 AM to 02:00 PM.**

For Medical			For Engineering		
Subject	Questions	Marks	Subject	Questions	Marks
Physics	1 to 40	40	Physics	1 to 40	40
Chemistry	41 to 80	40	Chemistry	41 to 80	40
Biology	81 to 150	70	Mathematics	81 to 130	50
Total	**150**	**150**	**Total**	**130**	**130**

13. Contravention of any of the instruction mentioned above shall render a candidate liable for disciplinary action as per rule.
14. **Date of Result Declaration : 14 - 01- 2025 (After 6.00 PM on www.ajmalsuper40.in)**

SPACE FOR ROUGH WORK

ADMISSION CUM SCHOLARSHIP TEST – 2025

CHALLENGER BATCH (Complete Syllabus of Class XII**)**

PHYSICS

1. The RMS current in an ac circuit is 2 A. If the wattless current be $\sqrt{3}$ A, what is the power factor?

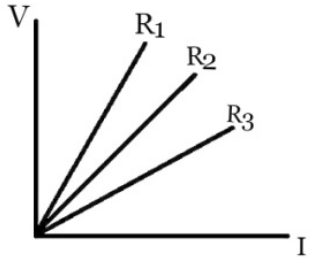
   (1) $\frac{1}{\sqrt{3}}$ (2) $\frac{1}{\sqrt{2}}$ (3) $\frac{1}{2}$ (4) $\frac{1}{3}$

2. If m, m_n and m_p are the masses of ${}_ZX^A$ nucleus, neutron and proton respectively then

   (1) $m < (A-Z)m_n + Zm_p$ (2) $m = (A-Z)m_n + Zm_p$

   (3) $m < (A-Z)m_p + Zm_n$ (4) $m > (A-Z)m_n + Zm_p$

3. Three resistances R_1, R_2 & R_3 are in series with a battery of potential difference 50 V. Graph between current and potential difference across each resistor is as shown in figure. Which resistance developed maximum heat energy?



   (1) R_1 (2) R_2 (3) R_3 (4) Same in all

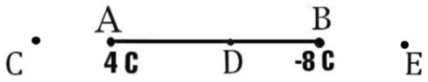
4. When the current in a certain inductor coil is 5.0 A and is increasing at the rate of 10.0 A/s, the potential difference across the coil is 140 V. When the current is 5.0 A and decreasing at the rate of 10.0 A/s, the potential difference is 60 V. The self inductance of the coil is

   (1) 2 H (2) 4 H (3) 8 H (4) 12 H

5. An electron moves with a speed of 2×10^5 m/s along the +x-direction in a magnetic field B = (i – 4j – 3k) T. The magnitude of the force (in newton) experienced by the electron is (the charge on electron is 1.6×10^{-19} C)

   (1) 1.18×10^{-13} (2) 1.28×10^{-13} (3) 1.6×10^{-13} (4) 1.72×10^{-13}

6. Two charges are placed at position A and B respectively as shown in figure. Position of third charge q_0 such that q_0 is in equilibrium will be

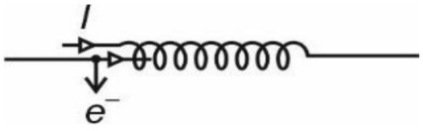


   (1) D (2) C (3) E (4) A

7. A parallel plate capacitor of capacitance 5 μF is connected with a battery of potential difference 100V. If terminals of battery are interchanged across capacitor, the heat energy developed in the circuit is

   (1) 0.1 J (2) 2.5×10^{-2} J (3) 2.5×10^{-4} J (4) –0.1 J

8. An electron is projected along the axis of solenoid which carries constant current I, the trajectory of electron shall be :



   (1) Circular path (2) Uniform motion along the axis

   (3) Uniform accelerated motion in straight line (4) Parabolic path

9. Proton and alpha-particles have the same de-Broglie wavelength. Ratio of their kinetic energy is

   (1) 1:2 (2) 1:1 (3) 2:1 (4) 4:1

10. A positively charged (+q) particle of mass *m* having kinetic energy *K* enters vertically downward in a horizontal field of magnetic induction $\vec{B}$. The acceleration of the particle is

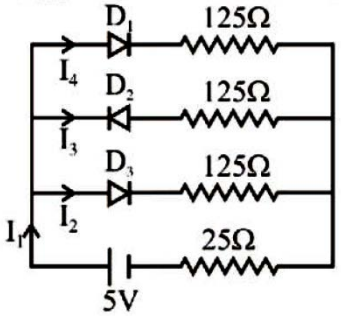
    (1) $qB\sqrt{\frac{2K}{m}}$ (2) $\frac{qB\sqrt{2K}}{(m)^{3/2}}$ (3) $\frac{2qB}{(m)^{3/2}}\sqrt{2K}$ (4) $2qB\frac{\sqrt{2K}}{m}$

11. If the magnetic dipole moment of an atom of diamagnetic material, paramagnetic material and ferromagnetic material are denoted by μ_d, μ_p and μ_f respectively, then

    (1) $\mu_p = 0$ and $\mu_f = 0$ (2) $\mu_p = 0$ and $\mu_d = 0$

    (3) $\mu_d \neq 0$ and $\mu_p = 0$ (4) $\mu_d = 0$ and $\mu_p \neq 0$

12. If each diode has a forward bias resistance of $25\,\Omega$ in the below circuit,



which of the following options is correct?

(1) $\frac{I_3}{I_4}=1$ (2) $\frac{I_2}{I_3}=1$ (3) $\frac{I_1}{I_3}=1$ (4) $\frac{I_1}{I_2}=2$

13. If the focal length of objective lens is increased, then magnifying power of telescope

(1) decreases (2)increases

(3) same (4)cannot be predicted

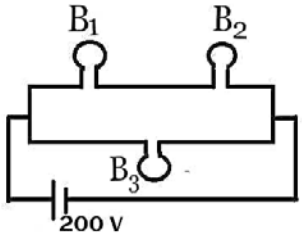
14. An equiconvex lens has a focal length 2/3 times the radius of curvature of either surface. Refractive index of the material is

(1) $\mu=1.5$ (2) $\mu=1.3$ (3) $\mu=1.6$ (4) $\mu=1.75$

15. The ratio of the speed of the electron in the 3^{rd} orbit of He^{+} to the speed of the electron in the 3^{rd} orbit of hydrogen atom will be

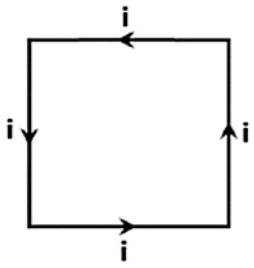
(1) 1 : 1 (2)1 : 2 (3) 4 : 1 (4) 2 : 1

16. A 40 W bulb B_1 and two bulb B_2 and B_3 each of 10 W are connected as shown in figure .Which bulb glows dimmer? (Rated voltage are same in all bulbs)



(1) B_1 (2) B_2 (3) B_3 (4) None of these

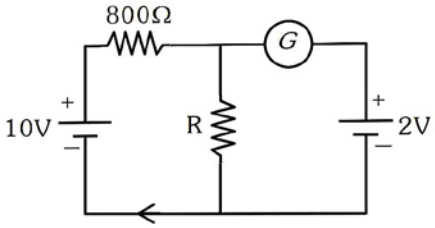
17. A current carrying loop of wire in the shape of a square of side 'a' lies in the x-y plane. A uniform magnetic field B acts parallel to the plane. Then



(1) The force on the loop is 4iaB (2) The torque on the loop is ia^2B

(3) The force on the loop is $\sqrt{2}iaB$ (4) The torque on the loop is $\sqrt{2}ia^2B$

18. If the galvanometer G does not show any deflection in the circuit shown, the value of R is given by:

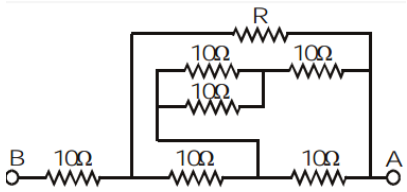


(1) 100 Ω (2) 200 Ω (3) 50 Ω (4)250 Ω

19. A pure semiconductor has equal electron and hole concentration of $10^{16}m^{-3}$. Doping by indium increases hole concentration n_h to $4\times10^{22}m^{-3}$. Then, the value of electron concentration n_e in the doped semiconductor is

(1) $2\times10^{9}/m^3$ (2) $2.5\times10^{9}/m^3$ (3) $2\times10^{6}/m^3$ (4) $2\times10^{19}/m^3$

20. For the network of resistances shown in the figure the equivalent resistance of the network between the points A and B is 18 Ω. The value of unknown resistance R is



(1) 8 Ω (2) 10 Ω (3) 16 Ω (4) 24 Ω

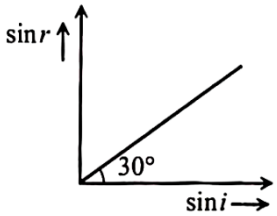
21. A nucleus A has mass number 220 and its binding energy per nucleon is 5.0 MeV. It splits into two fragments B and C of mass number 100 and 120. Binding energy per nucleon of B and C is 7.0 Mev and 6.0 MeV respectively then energy librated per nucleon is

(1) 21/ 11 MeV (2) 18/11 MeV (3) 16/11 MeV (4) 19/11 MeV

22. Turn ratio in a step-up transformer is 1 : 2. If a cell of 1.5 V is connected across the input, what is the voltage across the output?

(1) 1.5 V (2) 0 V (3) 3 V (4) 0.75 V

23. A ray enters from air to medium whose relation between *i* and *r* is as shown. If speed of light in the medium is *(nc)* then value of *n* is



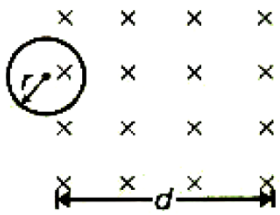
(1) 1.5 (2) 2 (3) 2^{-1} (4) $3^{-1/2}$

24. Match the dimensions in column (2) with their physical quantities in column (1)

	Column-(1)		Column-(2)
A	Electric Potential	p	$M^1L^2T^{-3}A^{-1}$
B	Charge	q	$M^0L^1A^1T^1$
C	Electric field	r	$M^0L^0A^1T^1$
D	Dipole moment	s	$M^1L^1T^{-3}A^{-1}$

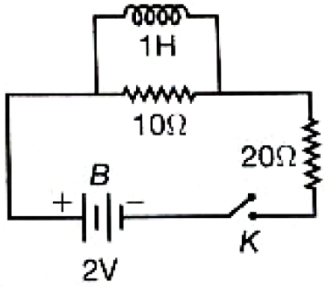
(1) A → r; B → p; C → q; D → s (2) A → p; B → r; C → s; D → q
(3) A → s; B → q; C → r; D → p (4) A → q; B → r; C → s; D → p

25. A conducting loop is pulled with a constant velocity towards a region of uniform magnetic field of induction *B* as shown in the figure. Then, the current induced in the loop is *(d>r)*



(1) clockwise while entering (2) Anti clockwise while entering
(3) Zero when partially outside (4) Anti clockwise while leaving

26. In the adjoining figure what is the final value of current in the 10 ohm resistor when the plug of key *K* is inserted?

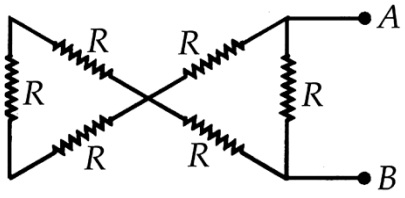


(1) (3/10) A (2) (3/20) A (3) (3/11) A (4) Zero

27. A moving coil galvanometer has resistance 50 Ω and full deflection current is 5 mA. The resistance needed to convert this galvanometer into voltmeter of range 100 volt is

(1) 19950 Ω (2) 18500 Ω
(3) 19850 Ω (4) 18760 Ω

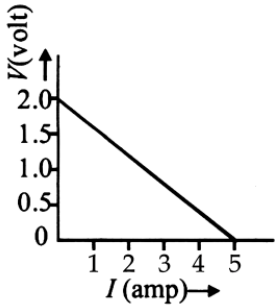
28. The equivalent resistance between A and B in the figure is



(1) R (2) (2/3)R (3) $\left(\frac{2}{5}\right)R$ (4) $\left(\frac{5}{2}\right)R$

29. Stopping potential is 8 V if wavelength of incident light is λ and it is 2 V for 3λ. Find threshold wavelength.
(1) 2λ (2) 9λ (3) 3λ (4) 8λ

30. For a cell, the graph between the potential difference (V) across terminals of the cell and the current I drawn from the cell is shown in the figure.



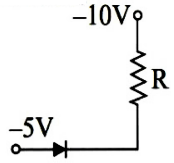
Then
(a) Emf of the cell is 2.5 V (b) Emf of the cell is 2 V
(c) The internal resistance of cell is 0.5 Ω (d) The internal resistance of the cell is 0.4 Ω
Choose the correct statements
(1) *a, c* (2) *a, d* (3) *b, c* (4) *b, d*

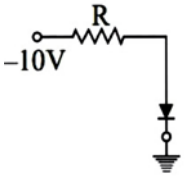
31. Match the following statements about fundamental forces.

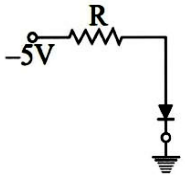
	List - I		List – II
A	Gravitational force	I	Has infinite range and can be both attractive and repulsive
B	Strong nuclear force	II	Weakest force but has infinite range
C	Weak nuclear force	III	Strongest among the forces
D	Electromagnetic force	IV	Responsible for radioactive decay

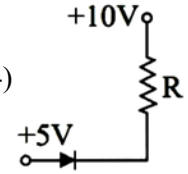
(1) A-iv, B-iii, C-ii, D-i (2) A-ii, B-i, C-iv, D-iii
(3) A-iii, B-ii, C-i, D-iv (4) A-ii, B-iii, C-iv, D-i

32. Which of the junction diodes shown below are forward biased

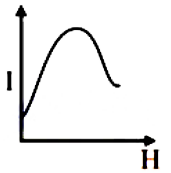
(1) 

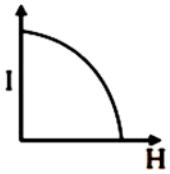
(2) 

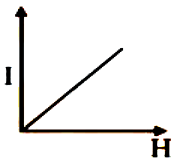
(3) 

(4) 

33. The correct I-H curve for paramagnetic materials is- (where I is the intensity of Magnetisation)

(1) 

(2) 

(3) 

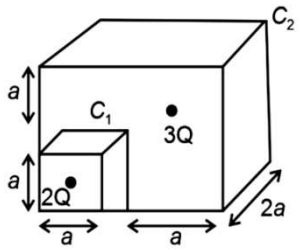
(4) 

34. An infinite non-conducting sheet of charge has a surface charge density of $10^{-7}\,C\,m^{-2}$. The separation between two equipotential surfaces near the sheet whose potential differ by 5 V is
(1) 0.88 cm (2) 0.88 mm
(3) 0.88 m (4) 5×10^{-7} m

35. In YDSE using monochromatic light of wavelength λ, the intensity of light at a point on the screen where path difference is λ, is K units. The intensity of light at a point where path difference is $\frac{\lambda}{4}$ is

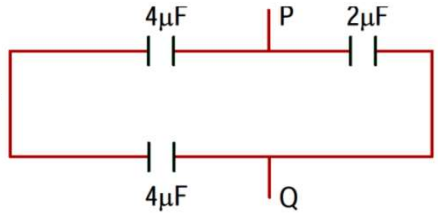
(1) $\frac{K}{4}$ (2) $\frac{K}{2}$ (3) K (4) 0

36. There are two cubical Gaussian surface carrying charges as shown. Find ratio of flux through surface C_1 to flux through surface C_2.



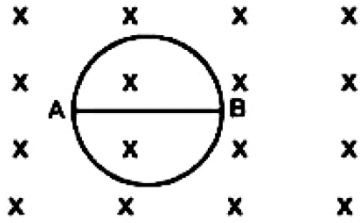
(1) 1 : 1 (2) 2 : 5 (3) 5 : 2 (4) 2 : 3

37. The resultant capacity between the points P and Q of the given figure is



(1) $4\mu F$ (2) $\frac{16}{3}\mu F$ (3) $1.6\mu F$ (4) $1\mu F$

38. The radius of the circular conducting loop shown in figure is R. Magnetic field is decreasing at a constant rate α. Resistance per unit length of the loop is ρ. Then current in wire AB is (AB is one of the diameters)



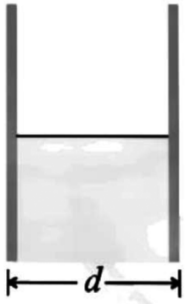
(1) $\frac{R\alpha}{2\rho}$ from A to B (2) $\frac{R\alpha}{2\rho}$ from B to A

(3) $\frac{2R\alpha}{\rho}$ from A to B (4) Zero

39. For measuring resistivity, the relation $R = \rho\frac{l}{A} = \frac{\rho l}{\pi r^2}$ is used. Percentage error in resistance (R), in length (l) and in radius (r) are given x, y and z respectively. Find percentage error in resistivity ρ.

(1) $x+y+2z$ (2) $x+2y+z$ (3) $\frac{x}{2}+y+z$ (4) $x+2z-y$

40. A parallel plate air capacitor has a capacitance C. When it is half filled with a dielectric of dielectric constant 5, the percentage increase in the capacitance will be



(1) 400% (2) 66.6% (3) 33.3% (4) 200%

CHEMISTRY

41. How many terms will have negative value for a solution showing negative deviation?
ΔG_{mix}, ΔS_{mix}, ΔH_{mix}, ΔV_{mix}

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

42. The highest electrical conductivity among the following aqueous solution (0.1M) is of

(1) HCl (2) LiCl (3) NaCl (4) KCl

43. Find molar conductance of NH_4OH at infinite dilution.

Given: $\wedge^{\infty}_{Ba(OH)_2} = 523\ S\,m^2\,mol^{-1}$

$\wedge^{\infty}_{BaCl_2} = 280\ S\,m^2\,mol^{-1}$

$\wedge^{\infty}_{NH_4Cl} = 130\ S\,m^2\,mol^{-1}$

(1) $251.5\ S\ m^2\ mol^{-1}$ (2) $350\ S\ m^2\ mol^{-1}$ (3) $280\ S\ m^2\ mol^{-1}$ (4) $650\ S\ m^2\ mol^{-1}$

44. A cell is formed by combination of cu and Zn.

Given $E^{\circ}_{cu^{2+}/cu} = +0.34V, E^{\circ}_{Zn^{2+}/Zn} = -0.76V$

Find out the incorrect statement

(1) When $CuSO_4$ is added to Cu^{2+} compartment emf of the cell increases

(2) When Zn^{2+} is added to Zn^{2+} compartment emf of the cell decreases

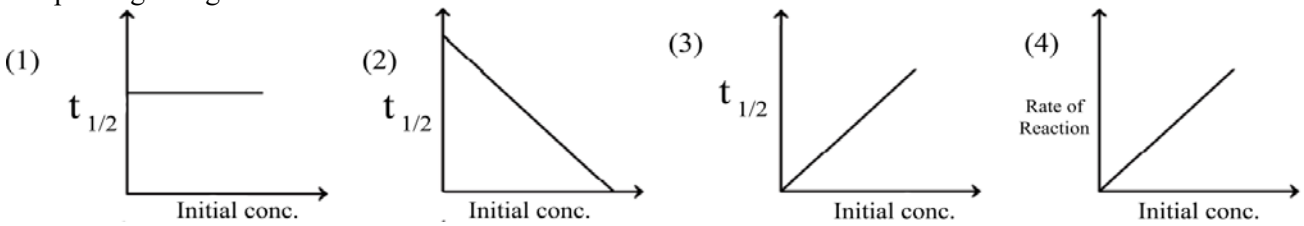
(3) When NH_3 is added to Cu^{2+} compartment emf of the cell increases

(4) If Zn^{2+} compartment is diluted emf of the cell increases

45. For a first order reaction, the ratio of times to complete 99.9% and half of the reaction is approximately

(1) 5 (2) 10 (3) 2 (4) 8

46. Correct plot regarding zero reaction is –



47. The colour of $KMnO_4$ is purple due to –

(1) d-d electronic transition (2) ligand to metal charge transfer spectra

(3) Metal to ligand charge transfer spectra (4) Transition of 4s electron in Mn

48. The most common oxidation state of lanthanide is –

(1) + 2 (2) + 3 (3) + 4 (4) + 1

49. Aqueous solution of Mohr's salt gives test of

(1) $Fe^{2+}ion$ (2) $NH_4^+\ ion$ (3) $SO_4^{2-}\ ion$ (4) All of these

50. The hybridisation of Ni in $\left[Ni(CN)_4\right]^{2-}\ ion$ is –

(1) sp^3 (2) sp^2d (3) dsp^2 (4) sp^3d^2

51. $\left[Co(NH_3)_4\ Br_2\right]Cl$ can show –

(1) Geometrical isomerism only (2) Both geometrical and optical isomerism

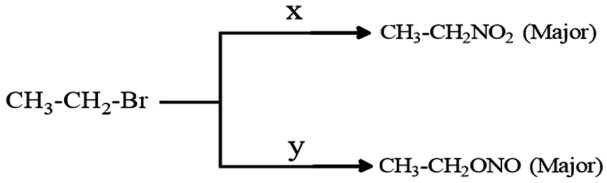
(3) Both geometrical and isonisation isomerism (4) Both optical and ionization isomerism

52. $CH_3-\underset{\displaystyle F}{\underset{|}{CH}}-CH_2-CH_3 \xrightarrow[\Delta]{EtONa} P$ major product P in the above reaction will be –

(1) $CH_2=CH-CH_2-CH_3$ (2) $CH_3-CH=CH-CH_3$

$CH_3-\underset{\displaystyle OH}{\underset{|}{CH}}-CH_2-CH_3$ $CH_3-\underset{\displaystyle OEt}{\underset{|}{CH}}-CH_2-CH_3$

(3) (4)

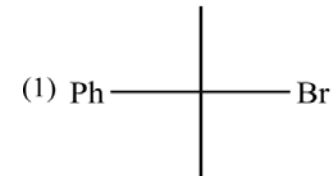
53. 

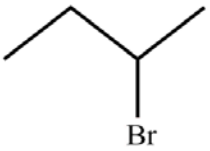
The reagent X and Y used for the above conversion respectively are-

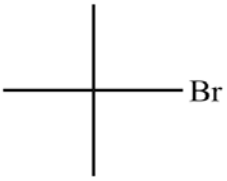
(1) $K\ NO_2$ and $AgNO_2$ (2) $AgNO_2$ in both

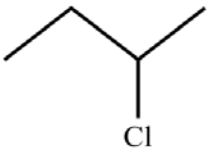
(3) KNO_2 in both (4) $AgNO_2$ and KNO_2

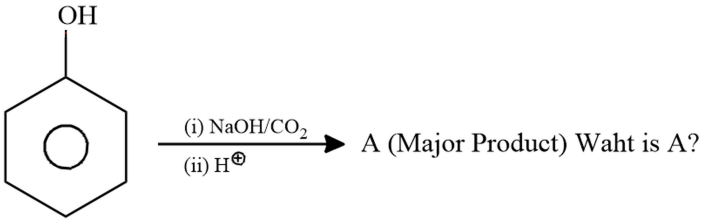
54. Which of the following compound will be more reactive in SN^1 reaction?

(1) 

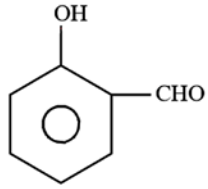
(2) 

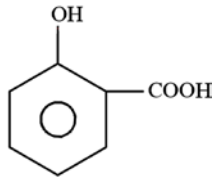
(3) 

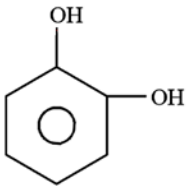
(4) 

55. 

A (Major Product) Waht is A?

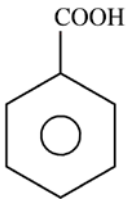
(1) 

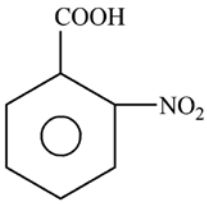
(2) 

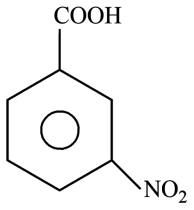
(3) 

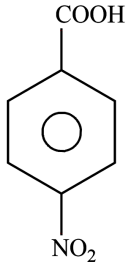
(4) None of these

56. The correct acid strength order of the following is-

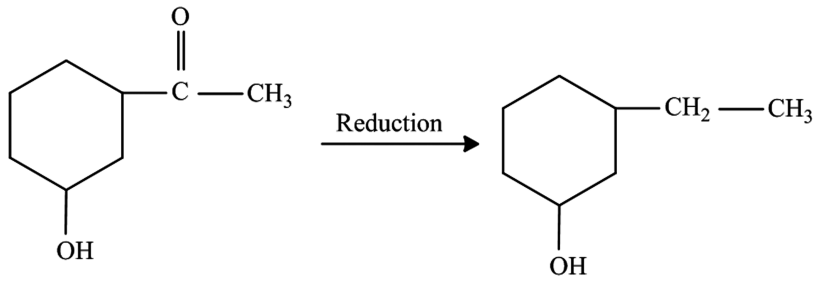
(i) 

(ii) 

(iii) 

(iv) 

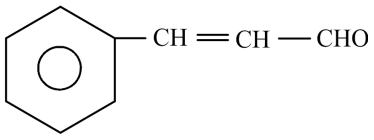
(1) $iv > ii > iii > i$ (2) $ii > iii > iv > i$ (3) $ii > iv > iii > i$ (4) $i > ii > iii > iv$

57. 

Suitable reagent among the following for above product will be –

(1) $Zn - Hg$ / conc. HCl (2) $NH_2 - NH_2 / OH^{\ominus}$ (3) Both 1 & 2 (4) HI / Red P, Δ

58. Which of the following compounds will give aldol condensation?

(1) $CH_3 - CH = CH - CHO$ (2) 

(3) $Ph - \overset{\overset{O}{\|}}{C} - ph$ (4) $CH_3 - CH_2 - CHO$

59. $CH_3 - CH_2 - COOH \xrightarrow{Br_2 / \text{Red } P} X \xrightarrow[\Delta]{alcoholic\ KOH} Y$

The product Y is –

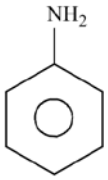
(1) $CH_2 = CH - COOK$ (2) $CH_3 - \underset{\underset{OH}{|}}{CH} - COOK$

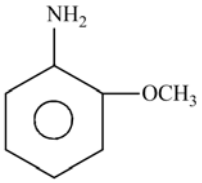
(3) $CH_2 = CH - COBr$ (4) $CH_3 - CH_2 - CH_2OH$

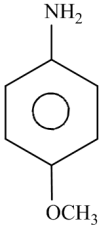
60. Which one of the following salts will have the same value of van't Hoff factor (i) as that of $K_4\left[Fe(CN)_6\right]$

(1) $Al_2(SO_4)_3$ (2) $NaCl$ (3) $Al(NO_3)_3$ (4) Na_2SO_4

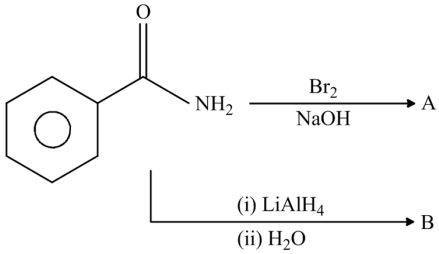
61. Which of the following compounds is the most basic?

(1) 

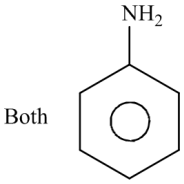
(2) 

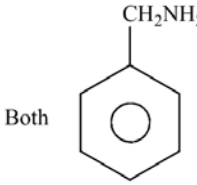
(3) 

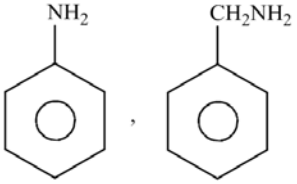
(4) 

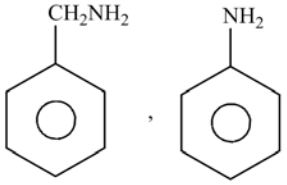
62. 

Organic products A and B respectively are –

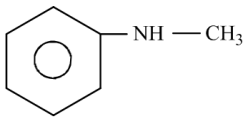
(1) 

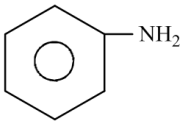
(2) 

(3) 

(4) 

63. Compounds A gives carbylamines on reaction with $CHCl_3$ and KOH compound may be –

(1) $(CH_3)_2 NH$ (2) 

(3) 

(4) $CH_3 - N - C_2H_5$ with CH_3 below

64. Hinsberg's test is associated with

(1) Test of different alcohols (2) test of different amines $(1^\circ, 2^\circ \& 3^\circ)$

(3) test of urea (4) Test of protein

65. The type of linkage in cellulose is-

(1) $\alpha - D$ glycosidic (2) $\beta - D$ glycosidic

(3) $\alpha - L$ glycosidic (4) No glycosidic linkage in cellulose

66. Blood cells retain their normal shape in solution which are

(1) hypotonic to blood (2) isotonic to blood (3) hypertonic to blood

(4) equinormal to blood

67. If α is the degree of dissociation of Na_2SO_4, the van't Hoff's factor (i) used for calculating the molecular mass is

(1) $1+\alpha$ (2) $1-\alpha$ (3) $1+2\alpha$ (4) $1-2\alpha$

68. The addition of a catalyst during a chemical reaction alters which of the following quantity?

(1) Entropy (2) Internal energy (3) Enthalpy (4) Activation energy

69. Match Column-I with Column-II.

Column-I		Column-II	
A	$\wedge_m$	p	intensive property
B	E^0_{cell}	q	Depends on number of ions/ volume
C	κ	r	Extensive property
D	$\Delta_r G_{cell}$	s	Increases with dilution

(1) A-(P), B-(s), C-(q), D-(r) (2) A-(s), B-(P), C-(q), D-(r)

(3) A-(s), B-(q), C-(P), D-(r) (4) A-(s), B-(P), C-(r), D-(q)

70. Name the gas that can readily decolourise acidified $KMnO_4$ solution:

(1) SO_2 (2) NO_2 (3) P_2O_5 (4) CO_2

71. Mechanism of a hypothetical reaction $X_2 + Y_2 \rightarrow 2XY$ is given below

(i) $X_2 \rightarrow X + X\,(fast)$ (ii) $X + Y_2 \rightleftharpoons XY + Y\,(slow)$ (iii) $X + Y^2 \rightarrow XY\,(fast)$

The overall order of the reaction will be:

(1) 2 (2) 0 (3) 1.5 (4) 1

72. Given below are two statements:

Statements I: The boiling points of the following hydrides of group 16 elements increases in the order- $H_2O < H_2S < H_2Se < H_2Te$

Statements II: The boiling points of these hydrides increase with increase in molar mass.

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

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

73. Which is the correct thermal stability order for $H_2E\,(E = O, S, Se, Te \text{ and } Po)$?

(1) $H_2S < H_2O < H_2Se < H_2Te < H_2Po$ (2) $H_2O < H_2S < H_2Se < H_2Te < H_2Po$

(3) $H_2Po < H_2Te < H_2Se < H_2S < H_2O$ (4) $H_2Se < H_2Te < H_2Po < H_2O < H_2S$

74. $KMnO_4$ acts as an oxidising agent in acidic medium. The number of moles of $KMnO_4$ that will be needed to react with one mole of sulphite ions in acidic solution is

(1) $\frac{2}{5}$ (2) $\frac{3}{5}$ (3) $\frac{4}{5}$ (4) $\frac{1}{5}$

75. Which of the following oxides are amphoteric?

$Mn_2O_7, CrO_3, Cr_2O_3, CrO, V_2O_5, V_2O_4$

(1) V_2O_5, Cr_2O_3 (2) Mn_2O_7, CrO_3

(3) CrO, V_2O_5 (4) V_2O_5, V_2O_4

76. Match the metal ions given in Column I with the spin magnetic moments of the ions given in Column II and assign the correct code:

Column I		Column II	
A	Co^{3+}	i	$\sqrt{8}\ BM$
B	Cr^{3+}	ii	$\sqrt{35}\ BM$
C	Fe^{3+}	iii	$\sqrt{3}\ BM$
D	Ni^{2+}	iv	$\sqrt{24}\ BM$
		v	$\sqrt{15}\ BM$

	A	B	C	D
(1)	(iv)	(v)	(ii)	(i)
(2)	(i)	(ii)	(iii)	(iv)
(3)	(iii)	(v)	(i)	(ii)
(4)	(iv)	(i)	(ii)	(iii)

77. What kind of isomerism exists between $\left[Cr\left(H_2O\right)_6\right]Cl_3$ (violet) and $\left[Cr\left(H_2O\right)_5 Cl\right]Cl_2.H_2O$ (greyish-green)?

(1) Linkage isomerism (2) Solvate isomerism
(3) Ionisation isomerism (4) Coordination isomerism

78. IUPAC name of $\left[Pt\left(NH_3\right)_2 Cl\left(NO_2\right)\right]$ is

(1) Platinum diamminechloronitrite (2) Chloronitrito-N-ammineplatinum (II)
(3) Diamminechloridonitrito-N-platinum (II) (4) Diamminechloronitrito-O-plantinate (II)

79. The order of energy absorbed which is responsible for the colour of complexes

(A) $\left[Ni\left(H_2O\right)_2\left(en\right)_2\right]^{2+}$ (B) $\left[Ni\left(H_2O\right)_4\left(en\right)\right]^{2+}$ and (C) $\left[Ni\left(en\right)_3\right]^{2+}$

(1) $(C) > (B) > (A)$ (2) $(C) > (A) > (B)$ (3) $(B) > (A) > (C)$ (4) $(A) > (B) > (C)$

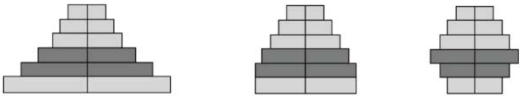
80. What is the correct order of reactivity of alcohols in the following reaction?

$R - OH + HCl \xrightarrow{ZnCl_2} R - Cl + H_2O$

(1) $1^\circ > 2^\circ > 3^\circ$ (2) $2^\circ > 3^\circ > 1^\circ$ (3) $3^\circ > 2^\circ > 1^\circ$ (4) $3^\circ > 1^\circ > 2^\circ$

BIOLOGY

81. Select the correct statement for the given diagram



(1) Representation of age pyramids for human population
(2) Representation of adaptation for human population
(3) Representation of energy pyramid
(4) Representation of pyramid of number

82. Which one of the following is the correct match
(1) Down syndrome – Palm crease
(2) Klinefelters syndrome – Sterile male individual
(3) Turner's syndrome – Rudimentary ovaries
(4) All of these

83. In which of the following interactions both partners are adversely affected:
(1) Parasitism (2) Mutualism (3) Competition (4) Predation

84. Greater number of Amphibian species are present in
(1) Eastern ghats (2) Western ghats (3) Deserts (4) Himalayan region

85. In dihybrid experiment on garden peas worked by mendel, what is the % of seed with rrYy genotype
(1) 12.5% (2) 25% (3) 6.25% (4) 37.5%

86. What is the correct sequence of sperm formation?
(1) Spermatid, Spermatocyte, Spermatogonia, Spermatozoa
(2) Spermatogonia, Spermatocyte, Spermatozoa, Spermatid
(3) Spermatogonia, Spermatozoa, Spermatocyte, Spermatid
(4) Spermatogonia, Spermatocyte, Spermatid, Spermatozoa

87. Rapid secretion of LH in ovulatory phase causes
(1) rupturing of Graafian follicle (2) release of ova
(3) ovulation (4) All of the above

88. During fertilisation, a sperm comes in contact with the zona pellucida layer of the ovum and induces changes in the membrane that block the ___A __ . The secretions of the ___B___ help the sperm enter into the cytoplasm of the ovum

	A	B
(1)	eggs	zona pellucida
(2)	eggs	acrosome
(3)	additional sperms	acrosome
(4)	additional sperms	zona pellucida

89. Trophoblast of blastocyst attaches to the
(1) endometrium (2) myometrium (3) mesoderm (4) perimetrium

90. Hormones secreted by the placenta to maintain pregnancy are
(1) hCG, hPL, progestogens, estrogens
(2) hCG, hPL, estrogens, relaxin, oxytocin
(3) hCG, hPL, progestogens, prolactin
(4) hCG, progestogens, estrogens, glucocorticoids

91. Which one of the following is the correct match:
(1) Autosomal dominant – Myotonic dystrophy (2) Sex - linked recessive – Myotonic dystrophy
(3) Autosomal dominant – Thalassemia (4) Sex - linked dominant – Cystic fibrosis

92. Which one of the following is the correct statement
(1) Brood parasitism occurs in birds
(2) *Cuscuta* has large green leaves
(3) The blood sucking female mosquito is considered a type of parasite
(4) Tick on dogs is the example of endoparasite

93. Examples of ectoparasite is/are
(1) Copepods (2) *Cuscuta* (3) Lice (4) All of these

94. Two strands of DNA in double helix model are held together by
(1) Ionic bond (2) Coordinate bond (3) Hydrogen bond (4) Covalent bond

95. Which one of the following is the incorrect match:
(1) Incomplete dominance – Snapdragon (2) Codominance – AB blood group
(3) Linkage – Drosophila (4) Polygenic inheritance – O blood group

96. Amniocentesis is the detection of
(1) chromosomal pattern by taking amniotic fluid (2) chorionic fluid from developing embryo
(3) chromosomal pattern after childbirth (4) chromosomal pattern before fertilization

97. Example of the non-medicated IUD is
(1) Cu-T (2) Cu-7 (3) Multiload-375 (4) Lippes loop

98. Pills have to be taken daily for period of ___*A*___ days starting preferably within first five days of menstrual cycle. After a gap of ___ *B*__ days, it has to be repeated in the same pattern
(1) A-27, B-1 (2) A-21, B-7 (3) A-22, B-5 (4) A-24, B-4

99. **Assertion** (A) In zygote intra Fallopian transfer, the zygote is transferred into the Fallopian tube of the female
Reason (R) ZIFT is an *in vivo* fertilisation method
(1) If both A and Rare true and R is correct explanation of A
(2) If both A and R are true, but R is not the correct explanation of A
(3) If A is true, but R is false
(4) If A is false, but R is true

100. According to one of the most widely accepted theories, earth's atmosphere before origin of life consisted of a mixture of
(1) O_3, CH_4, O_2 and H_2O (2) O_2, NH_3, CH_4 and H_2O
(3) NH_3 and CH_4 only (4) CH_4, NH_3, H_2 and H_2O vapours

101. In some plants thalamus contributes to fruit formation. Such are termed as
(1) false fruit (2) aggregate fruit
(3) true fruit (4) parthenocarpic fruit

102. In ecosystem energy are transferred from producer to consumer : A and B are transferred energy. What is A and B

(1) A – 10% , B – 5% (2) A – 50% , B – 50%
(3) A – 10% , B – 10% (4) A – 90% , B – 90%

103. In Rivet Popper hypothesis proposed by Paul Enrlich:
(1) Airplane is like a species (2) Rivets are like small ecosystem
(3) Rivets are like link species (4) Rivets on wings are like keystone species

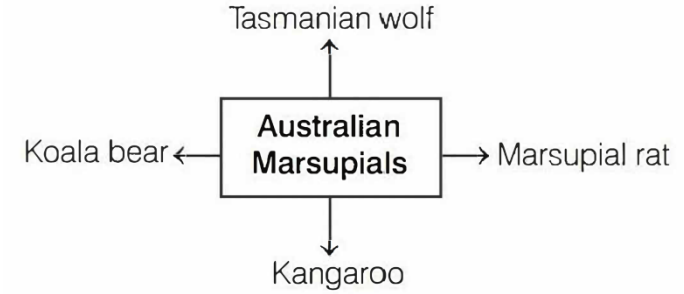
104. In bacteria, plasmid is :
(1) Extra chromosomal material (2) Main DNA
(3) None functional DNA (4) Repetitive gene

105. Non essential floral organs in a flower are
(1) sepals and Petals (2) anther and ovary
(3) stigma and filament (4) petals only.

106. Among the following sets of examples for divergent evolution select the incorrect option
(1) Brain of bat, man and cheetah (2) Heart of bat, man and cheetah
(3) Forelimbs of man, bat and cheetah (4) Eye of Octopus, bat and man

107. The peppered moth *(Biston betularia*), the black-coloured form becomes dominant over the light-coloured form of moth in England during industrial revolution. This is an example of
(1) appearance of the darker-coloured individuals due to very poor sunlight
(2) protective mimicry
(3) inheritance of darker colour character acquired due to the darker environment
(4) natural selection whereby the darker forms were selected.

108. Identify what the given diagram indicates?



(1) Convergent evolution (2) Divergent evolution (3) Recapitulation (4) Parallel evolution

109. A gene locus has two alleles A, a. If the frequency of dominant allele A is 0.4, then what will be the frequency of homozygous dominant , heterozygous and homozygous recessive individuals in the population?
(1) 0.16 (AA); 0.24 (Aa); 0.36 (aa) (2) 0.16 (AA); 0.48 (Aa); 0.36 (aa)
(3) 0.16 (AA); 0.36 (Aa); 0.48 (aa) (4) 0.36 (AA); 0.48 (Aa); 0.16 (aa)

110. 'PP' is a type of selection that favours both small sized and large-sized individuals. 'PP' eliminates most of the members with mean expression, so as to produce two peaks in the distribution of the tract that many leads to the development of two different populations. Identify 'PP'.
(1) Disruptive selection (2) Stabilising selection (3) Directional selection (4) None of these

111. How many pollen mother cells should undergo meiotic division to produce 64 pollen grains?
(1) 64 (2) 32 (3) 16 (4) 8

112. The female gametophyte of a typical dicot at the time of fertilization is
(1) 8-celled (2) 7-celled (3) 6-celled (4) 5-celled

113. Part of the gynoecium which receives the pollen is called
(1) style (2) stigma (3) ovule (4) ovary

114. A recessive allele is expressed in
(1) heterozygous condition only (2) homozygous condition only
(3) F_3 generation (4) both homozygous and heterozygous conditions

115. What is the probability of production of dwarf offsprings in a cross between two heterozygous tall pea plants?
(1) Zero (2) 50% (3) 25 % (4) 100%

116. The correct order of evolutionary scale is
(1) Palaeozoic → Cenozoic → Mesozoic (2) Mesozoic → Palaeozoic → Cenozoic
(3) Palaeozoic → Mesozoic → Cenozoic (4) Mesozoic → Cenozoic → Paleozoic

117. The chronological order of human evolution from early to the recent stages is
(1) *Ramapithecus* → *Australopithecus* → *Homo habilis* →*Homo erectus*
(2) *Australopithecus* → *Ramapithecus* → *Homo habilis* →*Homo erectus*
(3) *Neanderthal man* → *Homo habilis* → *Homo erectus*
(4) *Australopithecus* → *Ramapithecus* → *Neanderthal man* → *Homo erectus*

118. Common symptoms of typhoid are
(1) Sustained fever of 39° C to 40°C and weakness
(2) Stomach pain and constipation
(3) Headache and loss of appetite
(4) All of the above

119. Which one of the following diseases is spread by housefly?
(1) Dengue fever (2) Elephantiasis (3) Filariasis (4) Amoebiasis

120. **Assertion** (A) Interferons help to eliminate the viral infections.
Reason (R) Interferons released by infected cells, reach the nearby uninfected cells and make them resistant to viral infection.
(1) Both A and R are true and R is 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) A is false, but R is true

121. Mendel formulated the law of purity of gametes on the basis of
(1) monohybrid cross (2) dihybrid cross (3) test cross (4) back cross

122. What can be the blood group of offspring when both parents have AB blood group?
(1) AB only (2) A,B and AB (3) A, B AB and O (4) A and B Only

123. A pleiotropic gene
(1) Controls a trait only in combination with another gene
(2) controls multiple traits in an individual
(3) is expressed only in primitive plants
(4) is a gene evolved during Pliocene

124. When a single gene influences more than one trait it is called
(1) pseudodominance (2) pleiotropy
(3) epistasis (4) none of these

125. DNA as an acidic substance present in nucleus was first identified by _____ in 1869;he named it as___.
(1) Meischer, nuclein (2) Watson and crick, DNA
(3) Chargaff, nuclein (4) Wilkins and Franklin, double helix

126. If a double stranded DNA has 20% of cytosine, what will be the percentage of adenine in it?
(1) 20% (2) 40% (3) 30 % (4) 60%

127. **Assertion** (A) AIDS is a disease caused by HIV.
Reason (R) HIV is a virus that damages immune system of its host.
(1) Both A and R are true and R is 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) A is false, but R is true

128. Match the causative organisms with their diseases.

	Column-I		Column-II
(A)	*Haemophilus influenzae*	1	Malignant malaria
(B)	*Entamoeba histolytica*	2	Elephantiasis
(C)	*Plasmodium falciparum*	3	Pneumonia
(D)	*Wuchereria bancrofti*	4	Typhoid
(E)	*Salmonella*	5	Amoebiasis

	A	B	C	D	E
(1)	1	5	3	2	4
(2)	3	5	1	2	4
(3)	5	1	3	4	2
(4)	1	3	2	5	4

129. Which is the particular type of drug that is obtained from the plant whose one flowering branch is shown Below?

(1) Hallucinogen (2) Depressant (3) Stimulant (4) Pain killer

130. Which of the following is correct regarding AIDS causative agent HIV?
(1) HIV is enveloped virus containing DNA genome
(2) HIV is enveloped virus that contains RNA genome
(3) HIV is unenveloped retrovirus
(4) HIV is unenveloped DNA virus

131. Which of the following statements given below is/are correct?
I. Secondary lymphoid organs includes lymph nodes, spleen and small masses of lymph tissue such as Peyer's patches, appendix and tonsils.
II. The secondary lymphoid organs provide the site for interaction of lymphocyte with the antigens.
(1) Only I (2) Only II (3) I and II (4) None of these

132. Which of the following phenomena was experimentally proved by Meselson and Stahl?
(1) Transformation (2) Transduction
(3) Semi-conservative DNA replication (4) Central dogma

133. DNA replication takes place at ____phase of the cell cycle
(1) G_1 (2) S (3) G_2 (4) M

134. A nucleoside differs from a nucleotide. It lacks the
(1) base (2) sugar
(3) phosphate group (4) hydroxyl group

135. The process of removal of anther from the flower bud before it dehisces is called as
(1) emasculation (2) bagging (3) embryo rescue (4) budding

136. The key tools required for the recombinant DNA technology are
I. restriction enzymes II. polymerase enzymes III. ligases IV. Vector
V. host organism
Select the correct option
(1) I, II and III (2) I, III, IV and V (3) I, II, III and V (4) I, II, III, IV and V

137. What is the criterion for DNA fragments movements on agarose gel during gel electrophoresis ?
(1) The larger the fragment size, the farther it moves
(2) The smaller the fragments size, the farther it moves
(3) Positively charged fragments move to farther end
(4) Negatively charged fragments do not move

138. The two antibiotic resistance genes on vector pBR322 are for
(1) ampicillin and tetracycline (2) ampicillin and chloramphenicol
(3) chloramphenicol and tetracycline (4) tetracycline and kanamycin

139. **Assertion** (A) Use of chitinase enzyme is necessary for isolation of DNA from fungal cells.
Reason (R) Fungal cell wall is made up of chitin and chitinase is able to digest it.
(1) Both A and R are true and R is 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) A is false, but R is true

140. Plants, bacteria, fungi and animals whose genes have been altered by manipulation are called
(1) genetically modified organisms (2) hybrid organisms
(3) pest resistant organisms (4) insect resistant organisms

141. Chromosomal theory of inheritance was proposed by
(1) Sutton and Boveri (2) Bateson and Punnett
(3) TH Morgan (4) Watson and Crick

142. In a DNA strand the nucleotides are linked together by:
(1) glycosidic bonds (2) phosphodiester bonds
(3) peptide bonds (4) hydrogen bonds

143. Removal of large pieces of floating debris, oily substances, etc, during sewage treatment called
(1) Primary treatment (2) Secondary treatment (3) Final treatment (4) Amplification

144. The ecosystem consists of
(1) Producers (2) Consumers (3) Decomposers (4) All of these

145. Energy enters into the ecosystem through
(1) Herbivores (2) Carnivores (3) Producers (4) Decomposers

146. Consumption of which one of the following foods can prevent the kind of blindness associated with vitamin-A deficiency?
(1) *Flavr Savr* tomato (2) *Bt* rice (3) Golden rice (4) *Bt* brinjal

147. Bt toxin kills insects by
(1) inhibiting protein synthesis
(2) generating excessive heat
(3) creating pores in the midgut epithelial cells, leading to cell swelling and lysis
(4) obstructing a biosynthetic pathway

148. *cry* IIAb and *cry* IAc produce toxins that control
(1) cotton bollworms and corn borer, respectively (2) nematodes and tobacco budworms, respectively
(3) corn borer only (4) cotton bollworms only

149. A patient has a defective gene for the enzyme Adenosine Deaminase (ADA). He/She lacks functional cells and therefore, fails to fight the infecting pathogens. The cells are
(1) B-lymphocytes (2) Phagocytes (3) T-lymphocytes (4) Both (1) and (3)

150. Match the following columns

	Column-I		Column-II
A	Lepidopterans	1	Tobacco budworm and armyworm
B	Coleopterans	2	Beetles
C	Dipterans	3	Flies and mosquitoes

(1) A – 1, B – 2, C – 3 (2) A – 2, B – 3, C – 1
(3) A – 3, B – 2, C – 1 (4) A – 1, B – 3, C – 2

MATHEMATICS

81. Which of the following is an odd number for all $n \in I$?
(1) 3n + 2 (2) 5n + 1 (3) 7n – 3 (4) 8n –1

82. If a line has direction ratios 2, –1, –2, Determine its direction cosines.
(1) $\frac{2}{3},\frac{1}{3},\frac{-2}{3}$ (2) $\frac{2}{3},\frac{-1}{3},\frac{2}{3}$ (3) $\frac{-2}{3},\frac{-1}{3},\frac{-2}{3}$ (4) $\frac{2}{3},\frac{-1}{3},\frac{-2}{3}$

83. Angle between the tangents to the curve $y = x^2 - 5x + 6$ at points (2, 0) and (3, 0) is
(1) $\frac{\pi}{2}$ (2) $\frac{\pi}{6}$ (3) $\frac{\pi}{4}$ (4) $\frac{\pi}{3}$

84. A spherical balloon is expanding. If the radius is increasing at the rate of 2 inches per minute, the rate at which the volume increases (in cubic inches per minute) when the radius is 5 inches is
(1) 10π (2) 100π (3) 200π (4) 50π

85. If $f(x) = 4x^3 + 3x^2 + 2x + 1$ then area bounded by x = 0, y = 0 and x = 2 is
(1) 30 (2) 20 (3) 25 (4) 34

86. Which of the following is true?

(1) $N \not\subset Q$ (2) $W \not\subset R$ (3) $Q^C \not\subset R$ (4) $I \not\subset Q^C$

87. Equation of circle passing through origin and making intercept of 3 and 4 on positive x and y axes respectively, is

(1) $x^2+y^2-3x-4y=0$ (2) $x^2+y^2+3x+4y=0$

(3) $x^2+y^2-3x+4y=0$ (4) $x^2+y^2+3x-4y=0$

88. If $z=\sqrt{3}-2+i$, then principal value of argument z is (where i = $\sqrt{-1}$)

(1) $-\frac{5\pi}{12}$ (2) $\frac{\pi}{12}$ (3) $\frac{7\pi}{12}$ (4) $\frac{5\pi}{12}$

89. Let $f(x)=\begin{cases}\sin 2x, 0<x\le\pi/6\\ ax+b, \frac{\pi}{6}<x<1\end{cases}$ is continuous and derivable then

(1) $a=1, b=\frac{1}{\sqrt{2}}+\frac{\pi}{6}$ (2) $a=b=\frac{1}{\sqrt{2}}$ (3) $a=1, b=\frac{\sqrt{3}}{2}-\frac{\pi}{6}$ (4) $a=1, b\in R$

90. Let f(x) be a twice-differentiable function and $f''(0)=2$, then $\lim_{x\to 0}\frac{2f(x)-3f(2x)+f(4x)}{x^2}$ is

(1) 6 (2) 3 (3) 12 (4) 4

91. The value of the integral $\int_3^6 \frac{\sqrt{x}}{\sqrt{9-x}+\sqrt{x}}dx$ is

(1) 3/2 (2) 2 (3) 1 (4) ½

92. The set of non co-prime numbers is

(1) {4, 17} (2) {5, 21} (3) {15, 81} (4) {17, 80}

93. If P(x), Q (x) are polynomials of degree 8 and 5 respectively and r(x) is remainder when P(x) is divided by Q(x) then degree of r(x) can not be :

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

94. The solution of the equation $y^2x\,dx+ydx+xdy=0$ is

(1) $x^2+\frac{x}{y}+c=0$ (2) $\frac{x^2}{2}-\frac{x}{y}+c=0$ (3) $\frac{1}{xy}=\ln x+c$ (4) $\frac{x^2}{2}-xy+c=0$

95. The function f: [2, 5] → Y defined by f(x) = x^2 - 4x + 5 is both one-one and onto if:

(1) Y = R (2) Y = [1, 10] (3) Y = [4, 5] (4) [5, ∞)

96. The period of the function f (x) = $\cos\left(\frac{8x+5}{4\pi}\right)$ is

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

97. $\lim_{x\to 0}\frac{2x\cos\left(x^4\right)}{x\cos x+\sin x}$ equal to

(1) 1/2 (2) 0 (3) 1 (4) 3

98. $\int\frac{x^2+2}{x^4+4}$ dx is equal to

(1) $\frac{1}{2}\tan^{-1}\left(\frac{x^2+2}{2x}\right)+c$ (2) $\frac{1}{2}\tan^{-1}\left(\frac{x^2-2}{2x}\right)+c$

(3) $\frac{1}{2}\tan^{-1}\left(\frac{2x}{x^2-2}\right)+c$ (4) $\frac{1}{2}\tan^{-1}x^2+2+c$

99. Value of $\sin^{-1}\left(\frac{\sqrt{3}}{2}\right)+\sin^{-1}\left(\frac{1}{\sqrt{2}}\right)$ is equal to

(1) 75° (2) 105° (3) 150° (4) 15°

100. If $\left(\tan^{-1}x\right)^2+\left(\cot^{-1}x\right)^2=\frac{5\pi^2}{8}$, then x =

(1) –1 (2) 0 (3) 1 (4) 2

101. If $x \in [2,9)$ and $x \in (3,8)$ then possible value of integral values of x is

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

102. If $A = \begin{bmatrix} 1 & -1 & 1 \\ 0 & 2 & -3 \\ 2 & 1 & 0 \end{bmatrix}$, B = (adj A) and C = 5A, then $\frac{|adjB|}{|C|} =$

(1) 5 (2) 25 (3) -1 (4) 1

103. If A, B are square matrices of order 3 and $|A| = 3$, $|B| = -1$. The value of $|3A^{-1}B^2|$ is

(1) 27 (2) 9 (3) -27 (4) -9

104. If $y = \frac{x}{(x+5)}$ then $\frac{dx}{dy}$ equals

(1) $\frac{5}{(1-y)^2}$ (2) $\frac{5}{(1+y)^2}$ (3) $\frac{1}{(1-y)^2}$ (4) none of these

105. If $\vec{a} = \hat{i} + \hat{j} + k$, $\vec{b} = 4\hat{i} + 3\hat{j} + 4\hat{k}$ and $\vec{c} = \hat{i} + \alpha\hat{j} + \beta\hat{k}$ are linearly dependent vectors and $|\vec{c}| = \sqrt{3}$ then

(1) $\alpha = 1, \beta = -1$ (2) $\alpha = 1, \beta = 0$ (3) $\alpha = -1, \beta = -1$ (4) $\alpha = \pm 1, \beta = 1$

106. If $x^2 + (y-2)^2 = 0$ then

(1) x + y = 2 (2) x + y = 3 (3) x = y = 0 (4) x + y = 1

107. If $\vec{a}, \vec{b}$ and $\vec{c}$ are coplanar, which of following is FALSE

(1) $[\vec{a}\ \vec{b}\ \vec{c}] = 0$ (2) $\vec{a}\times\vec{b}, \vec{b}\times\vec{c}, \vec{c}\times\vec{a}$ are coplanar

(3) $[\vec{a}\times\vec{b}\quad \vec{b}\times\vec{c}\ \ \vec{c}\times\vec{a}] \neq 0$ (4) $[\vec{a}+\vec{b}\ \vec{b}+\vec{c}\ \ \vec{c}+\vec{a}] = 0$

108. If minimum and maximum value of f(x) = 3cos x + 4 sin x + 8 is a and b respectively then

(1) a + b = 16 (2) b – 3a = 4 (3) a + 2b = 29 (4) all of these

109. If (3, – 4) and (–6, 5) are the extremities of the diagonal of a parallelogram and (–2, 1) is its third vertex, then its fourth vertex is

(1) (–1, 0) (2) (–1, 1) (3) (0, –1) (4) None of these

110. In ΔABC, if a = 16, b = 24 and c = 20, then $\cos\frac{B}{2} =$

(1) 3/4 (2) 1/4 (3) 1/2 (4) 1/3

111. Two finite sets m and n are elements, the total number of subsets of the first set is 56 more than the total number of subsets of second. The value of m and n

(1) 7, 6 (2) 6, 3 (3) 5, 1 (4) 8, 7

112. If sum of first n terms of a progression is $3n^2$ + 5n then which of its term is 164?

(1) 26 (2) 27 (3) 28 (4) 29

113. If α, β are roots of equation $x^2 - 4x - 3 = 0$ and $s_n = \alpha^n + \beta^n, n \in N$ then the value of $\frac{s_7 - 4s_6}{s_5}$ is

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

114. Le t A and B be two independent events such that their probabilities of happening are $\frac{3}{10}$ and $\frac{2}{5}$ respectively, then probability of exactly one of the events happening is

(1) $\frac{23}{50}$ (2) $\frac{1}{2}$ (3) $\frac{31}{50}$ (4) $\frac{37}{50}$

115. The number of arrangements which can be made using all the letters of the word LAUGH if the vowels are adjacent is

(1) 10 (2) 24 (3) 120 (4) 48

116. $x^2 + (x-2)^2 = 0, x \in R$ then

(1) No value of x exists (2) One value of x exists
(3) Two value of x exists (4) Three value of x exists

117. The equation of the parabola whose vertex and focus are (0, 6) and (0, 3) respectively, will be

(1) $x^2 + 12y = 72$ (2) $x^2 - 12y = 72$ (3) $y^2 + 12y = 72$ (4) $y^2 - 12x = 72$

118. The function f(x) $=\frac{x}{2}+\frac{2}{x}$ has a local minima at

(1) x = – 2 (2) x = –1 (3) x = 1 (4) x = 2

119. If α, β satisfy equation $4\{x\} = x + [x]$, then $[\alpha + \beta]$ is equal to (where [.] denotes greatest integer function and {.} denotes fractional part function)

(1) 2 (2) 1 (3) 0 (4) -1

120. $\int_{-\pi/2}^{\pi/2} \sin^{10} x\left(6x^9 - 25x^7 + 4x^3 - 2x\right) dx$ equals

(1) π (2) 0 (3) 25 (4) 2

121. Let $\int e^{x^2+x}\left(4x^3 + 4x^2 + 5x + 1\right)dx = e^{x^2+x} f\left(x\right) + c$, then $f^{/}\left(/\right)$ is

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

122. Given $f\left(x\right) = \sum_{n=1}^{\infty} \sin\frac{2x}{3^n}.\sin\frac{x}{3^n}$ (independent of *n*) Then the sum of all possible values of *x* in (0, 628) such that *f* (x) = 0.

(1) 5050π (2) 10100π (3) 9900π (4) 99000π

123. If $\vec{a}$ and $\vec{b}$ are any two unit vectors, then the minimum value of $\frac{1}{\left|\vec{a}+\vec{b}\right|^2} + \frac{1}{\left|\vec{a}-\vec{b}\right|^2}$ is -

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

124. The number of solution of the equation $\cos^{-1} x + \cos^{-1}\left(\sqrt{1-x^2}\right) = \pi$ is -

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

125. The value of the integral $\int_0^{\infty} \frac{\tan^{-1} x}{x^2+1+2x} dx$ is

(1) $\frac{\pi}{2}$ (2) $\frac{\pi}{8}$ (3) $\frac{\pi}{4}$ (4) $\frac{3\pi}{4}$

126. The lines $\vec{\mu} = \left(\hat{i} - \hat{j}\right) + l\left(2\hat{i} + \hat{k}\right)$ and $\vec{\mu} = \left(2\hat{i} - \hat{j}\right) + m\left(\hat{i} + \hat{j} - \hat{k}\right)$

(1) Do not intersect for any values of *l* and *m* (2) Intersect for all values of *l* and *m*

(3) Intersect when *l* = 2 and *m* = $\frac{1}{2}$ (4) Intersect when *l* = 1 and *m* = 2

127. If the matrices A= $\begin{bmatrix} 1 & 1 & 2 \\ 1 & 3 & 4 \\ 1 & -1 & 3 \end{bmatrix}$, B = adj A and C = 3A, then $\frac{|\text{adj B}|}{|C|}$ is equal to -

(1) 16 (2) 2 (3) 8 (4) 72

128. Let $f^2\left(x\right) = \int_0^x \frac{t\ f\left(t\right)}{1+t^2} dt\ \forall x \in R$ where *f* is a continuous function on R, not identically zero and satisfying *f* (0) = 0, then the value of $f\left(\sqrt{e^4 - 1}\right)$ is

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

129. If the least area bounded by the curves $y = x^2 - 4$ and $y = \lambda x + 12$ is equal to $\frac{\alpha}{\beta}$, then $\alpha + 3\beta$ represents a three digit integer whose digit at ten's place is?

(1) 4 (2) 5 (3) 6 (4) 2

130. The function $f\left(x\right) = \left(e^x - 1\right)\sin\frac{\pi x}{2}\left|x\left(x-1\right)\left(x-2\right)\left(x-3\right)\right|$ is not differentiable at *x*.

(1) $\{0,1,2,3\}$ (2) $\{1,2,3\}$ (3) $\{0,2,3\}$ (4) $\{1,3\}$

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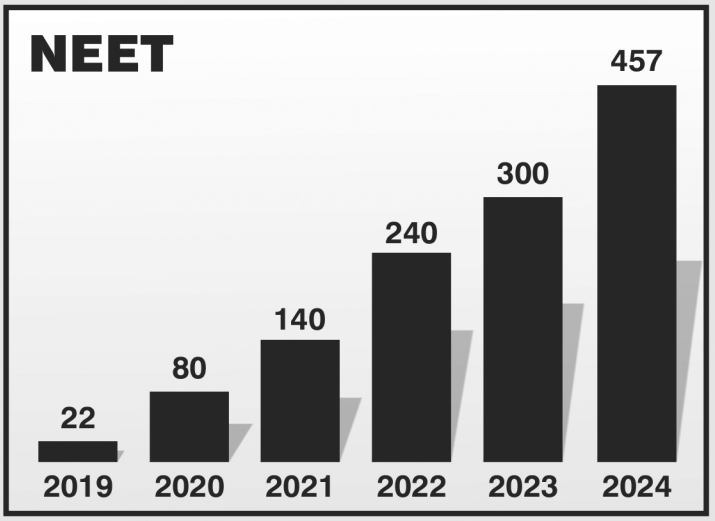

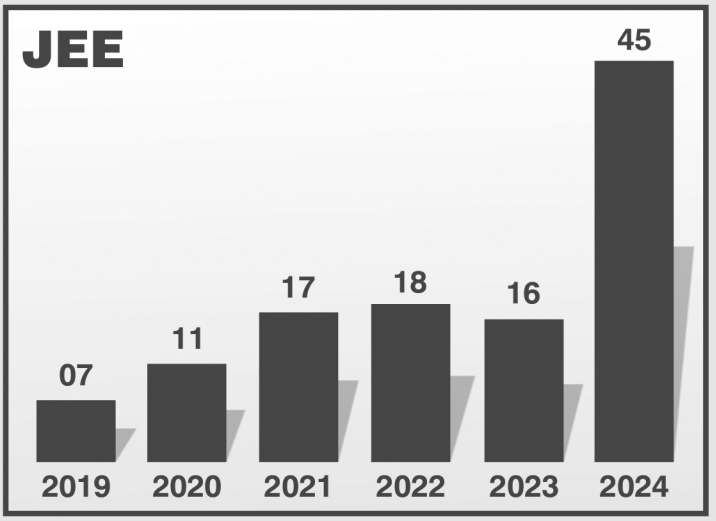

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