बिहार विद्यालय परीक्षा समिति (उच्च माध्यमिक), पटना द्वारा आयोजित
SCIENCE-XII की परीक्षा के लिए

TARGET

Senior Secondary (+2)

Question Bank

WITH ANSWER

SCIENCE

ENGLISH MEDIUM

CLASS - XII

2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016(A), 2017(A), 2018 (A), 2019 (A), 2020 (A), 2021 (A), 2022 (A) एवं 2023 (A) की परीक्षा में पूछे गये प्रश्न एवं उनके मानक उत्तर

2024

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CONTENTS

PHYSICS – XII, 2024 (A)

Time : 3 Hour 15 Minutes] [Full Marks : 70
Instructions to the candidates : See Previous Paper

SECTION – A (OBJECTIVE TYPE QUESTIONS)

■ **Questions Nos. 1 to 70 have four options, out of which only one is correct. You have to mark your selected option, on the OMR-Sheet. Answer any 35 questions. (35 × 1 = 35)**

1. In *AC* circuit, power is lost in only :
(A) resistance (B) inductance
(C) capacitance (D) all of these

2. An alternating electric current is represented by equation I = 0.6 is 100 πt. The frequency of alternating current is :
(A) 50 π (B) 50 (C) 100 π (D) 100

3. Current used in electroplating is :
(A) *DC* (B) *AC*
(C) both *DC* and *AC* (D) None of these

4. A large virtual image of object is formed by :
(A) concave mirror (B) convex mirror
(C) plane mirror (D) concave lens

5. Power of two lenses kept in contact, are P_1 and P_2. The power of equivalent lens will be :
(A) $\frac{P_1}{P_2}$ (B) $\frac{P_2}{P_1}$ (C) $P_1 \times P_2$ (D) $P_1 + P_2$

6. The wavelength of which colour is minimum ?
(A) Violet (B) Yellow (C) Blue (D) Red

7. Which causes the formation of rainbow ?
(A) Diffraction (B) Scattering
(C) Refraction (D) Dispersion

8. Unit of linear charge density is :
(A) Coulomb/metre (B) coulomb × metre
(C) metre/coulomb (D) none of these

9. The dimensional formula of intensity of electric field is :
(A) $[MLT^2A^{-1}]$ (B) $[MLT^{-3}A^{-1}]$
(C) $[MLT^{-3}A]$ (D) $[ML^2T^{-3}A{-}1]$

10. Number of electrons present in 8 coulomb negative charge is :
(A) 5×10^{19} (B) 2.5×10^{19}
(C) 12.8×10^{19} (D) 1.6×10^{19}

11. Two equal and opposite charge of 5 coulomb are kept mutually at a distance of 5.0 cm. The electric dipole moment of the system is :
(A) 5×10^{-2} coulomb-metre (B) 25×10^{-2} coulomb-metre
(C) 1 coulomb-metre (D) zero

12. On moving from the surface of a charged metallic sphereto the centre of the sphere, the electric field.
(A) decreases (B) increases
(C) remains same as at the surface
(D) zero at all places

13. *n* electric dipoles are situated in a closed surface. Total electric flux coming out from closed will be :
(A) q/ϵ_0 (B) $2q/\epsilon_0$ (C) nq/ϵ_0 (D) Zero

14. In broad-side on position, the electric potential due to electric dipole is :
(A) $\frac{1}{4\pi\epsilon_0}\frac{p}{r}$ (B) $\frac{1}{4\pi\epsilon_0}\frac{p}{r^2}$
(C) zero (D) infinite

15. If in a logic gate output (*Y*) is obtained by the product of its both inputs (*A.B*), then the gate is :
(A) AND (B) OR (C) NOR (D) NOT

16. The width of forbidden energy gap in the semiconductor is approximately :
(A) 1 eV (B) 10 eV (C) 100 eV (D) 0.01 eV

17. The equivalent number of decimal number 27 into binary number system will be :
(A) $(10011)_2$ (B) $(10111)_2$ (C) $(11001)_2$ (D) $(11011)_2$

18. In full wave rectifier, if input frequency is 50 Hz, then output frequency will be :
(A) 25 Hz (B) 50 Hz (C) 100 Hz (D) 200 Hz

19. The device which works of both modulation and demodulation is called :
(A) Laser (B) Radar (C) Modem (D) Fax

20. Distance of communication satellite from the surface of the earth is :
(A) 36000 km (B) 36000 mile
(C) 3600 km (D) 36000 metre

21. Attenuation is measured in :
(A) ohm (B) decibel (C) mho (D) siemen

22. What is produced by induction coil ?
(A) High current (B) High voltage
(C) Low current (D) Low voltage

23. The energy density of magnetic field $\vec{B}$ is :
(A) $\frac{B^2}{2\mu_0}$ (B) $\frac{B^2}{\mu_0}$ (C) $\frac{B^2}{4\mu_0}$ (D) $\frac{B^2}{3\mu_0}$

24. What value of alternating current is measured by hot wire ammetre ?
(A) High value
(B) Average value
(C) Root mean square value
(D) None of these

25. If magnetic field $\vec{B}$ is perpendicular to surface area vector $\vec{ds}$ then the magnetic flux on ds area will be :
(A) $B\,ds\cos\theta$ (B) $B\,ds\sin\theta$ (C) $B\,ds\tan\theta$ (D) zero

26. Unit of reactance is :
(A) ohm (B) tesla (C) henry (D) farad

27. Mean value of alternating current in a full cycle is :
(A) I (B) $\frac{I}{2}$ (C) $2I$ (D) zero

28. If the phase difference between alternating current and *e.m.f.* is ϕ then the value of power factor is :
(A) $\cos\phi$ (B) $\cos^2\phi$ (C) sin F (D) $\tan\phi$

29. An electron is accelerated to 5 volt potential difference. The energy gained by the electron will be :
(A) 5 joule (B) 5 eV (C) 5 erg (D) 5 watt

30. The relation between electric field (E) and electric potential (V) is :
(A) $E = -\left(\frac{dV}{dr}\right)$ (B) $E = -\left(\frac{dr}{dV}\right)$
(C) $E = \left(\frac{dV}{dr}\right)$ (D) $E = \left(\frac{dr}{dV}\right)$

31. The electrostatics energy of the system made by two electric dipoles kept at a distance 'r' is proportional to :
(A) r^2 (B) r^{-3}
(C) r^4 (D) none of these

32. Picofarad is the unit of :
(A) electric charge (B) intensity of electric field
(C) electric capacity (D) electric flux

33. Capacity of any condenser does not depend upon :
(A) shape of plates (B) size of plates
(C) charges on plates (D) distance between plates

34. The capacity of a spherical conductor is 1.0 μF. Its radius will be
(A) 1.11 metre (B) 10 metre (C) 9 km (D) 1.11 cm

35. The dielectric constant of a metal is :
(A) –1 (B) 0 (C) 1 (D) infinity

36. Which of the following is blocked by a capacitor ?
(A) *AC* (B) *DC*
(C) Both *AC* and *DC* (D) Neither *AC nor DC*

37. Two bulbs of 40 W and 60 W are connected to 220 V source. The ratio of their resistances will be :
(A) 4 : 3 (B) 3 : 4 (C) 2 : 3 (D) 3 : 2

38. The resistance of any wire is 500 Ω. its electrical conductivity will be :
(A) 0.002 ohm^{-1} (B) 0.02 ohm^{-1}
(C) 50 ohm^{-1} (B) 500 ohm^{-1}

39. n equal resistor are first connected in series and then in parallel. The ratio of maximum and minimum resistances will be :
(A) $\frac{1}{n}$ (B) n (C) $\frac{1}{n^2}$ (D) n^2

40. To increases the sensitivity of a potentiometre :
(A) the cross-section area of its wire will have to be increased
(B) current in its wire will have to be decreased
(C) current in its wire will have to be increased
(D) length of its wire have to be increased

41. Kirchhoff's second laws of electricity is related to :
(A) conservation of mass
(B) conservation of charge
(C) conservation of energy
(D) conservation of momentum

42. Which one of the following is not a unit of magnetic field ?
(A) tesla (B) weber/metre^2
(C) newton/ampere-metre (D) newton/ampere^2

43. Photocell is based on :
(A) chemical effect of current
(B) photo-electric effect
(C) magnetic effect of current
(D) electro-magnetic induction

44. Cathode rays are group of :
(A) electrons (B) protons (C) neutrons (D) atoms

45. Half-life of radioactive substance is :
(A) $0.6931 \times \lambda$ (B) $\frac{\log 10^2}{\lambda}$ (C) $\frac{0.6931}{\lambda}$ (D) $\frac{\text{Average age}}{0.6931}$

46. S.I. unit of decay constant is :
(A) metre (B) hertz
(C) per metre (D) metre^2

47. Number of neutrons in an atoms of ${}_{90}\text{Th}^{230}$ is :
(A) 320 (B) 230 (C) 140 (D) 90

48. *P-N* junction diode is used as :
(A) an amplifier (B) an oscillator
(C) a modulator (D) a rectifier

49. Instrument used to increases input voltage/current is called :
(A) oscillator (B) amplifier
(C) diode (D) rectifier

50. A magnet is situated near a closed conductor. Current can be produced in the conductor, if :
(A) only magnet is in motion
(B) only conductor is in motion
(C) both magnet and conductor are in motion
(D) there is relative motion between magnet and conductor

51. The value of current obtained in a moving coil galvanometre is proportional to :
(A) deflecting (θ) (B) resistance (R)
(C) magnetic field (B) (D) none of these

52. A galvanometre is converted into ammetre by adding :
(A) low resistance in parallel
(B) high resistance in series
(C) low resistance in series
(D) high resistance in parallel

53. The magnetic field produced at the centre of current carrying circular coil is :
(A) on the plane of coil
(B) perpendicular to the plane of coil
(C) at 45° to the plane of coil
(D) at 180° to the plane of coil

54. On dividing any magnet of magnetic moment (M) parallel to its length into n equal pieces, the moment of each pieces will be :
(A) $\frac{M}{n}$ (B) $\frac{M}{n^2}$ (C) $\frac{M}{2n}$ (D) $M \times n$

55. Which of the following shows hysteresis ?
(A) Paramagnetic materials (B) Ferromagnetic materials
(C) Diamagnetic materials (D) None of these

56. The value of magnetic potential at a distance r from a pole strength m is :
(A) $\frac{\mu_0}{4\pi}\frac{m}{r}$ (B) $\frac{\mu_0}{4\pi}\frac{m}{r^2}$ (C) $\frac{\mu_0}{4\pi}\frac{m}{r^3}$ (D) zero

57. Image formed in compound microscope is :
(A) real and erect (B) real and inverted
(C) virtual and inverted (D) virtual and erect

58. Image of any object formed at the retina of human eye is :
(A) real and inverted (B) real and erect
(C) virtual and erect (D) virtual and inverted

59. Convex lens is used in :
(A) short-sightedness (B) long-sightendness
(C) presbyopia (D) astigmatism

60. The colour of sky is blue due to :
(A) Interference (B) Scattering
(C) Refraction (D) Dispersion

61. The fringe width in interference of light due to two coherent sources is :
(A) proportional to wavelength
(B) inversely proportional to wavelength
(C) proportional to square of wavelength
(D) inversely proportional to square of wavelength

62. Two sources of monochromatic light is coherent, when their :
(A) intensities are equal (B) amplitudes are equal
(C) phase are equal (D) none of these

63. de-Broglie wavelength is :
(A) $\lambda = hmv$ (B) $\lambda = \frac{h}{mv}$ (C) $\lambda = \frac{mc^2}{v}$ (D) $h = hv$

64. The value of is $(\mu_0 \in_0)^{-1/2}$:
(A) 3×10^8 cm/second (B) 3×10^{10} cm/second
(C) 3×10^9 cm/second (D) 3×10^8 cm/second

65. An electron of charge e moves parallel to uniform lines of force in magnetic field B with velocity v. Force acting on electron is :
(A) evB (B) ev/B (C) zero (D) Bv/e

66. The nature of electron beams moving with uniform velocity in the same direction will be :
(A) converging (B) diverging
(C) parallel (D) none of theses

67. The value of torque $(\vec{\tau})$ experienced by current loop of magnetic moment $(\vec{m})$ placed in magnetic field $(\vec{B})$ is :
(A) $\vec{\tau} = \vec{m} \times \vec{B}$ (B) $\vec{\tau} = \vec{B} \times \vec{m}$
(C) $\vec{\tau} = \frac{\vec{m}}{\vec{B}}$ (D) $\vec{\tau} = \frac{\vec{B}}{\vec{m}}$

68. S.I. unit of self-induction is :
(A) coulomb (C) (B) Volt (V)
(C) ohm (Ω) (D) henry (H)

69. On oscillating any metallic sphere in the magnetic field, its oscillatory motion is :
(A) Accelerated (B) Damping
(C) Uniform (D) None of these

70. The working principle of dynamo is based on :
(A) heating effect of current
(B) electromagnetic induction
(C) induced magnetism
(D) induced current

SECTION – B (NON-OBJECTIVE TYPE QUESTIONS)

■ **Question Nos. 1 to 20 are Short Answer Type. Answer any 10 questions. Each question carries 2 marks : (10 × 2 = 20)**

1. What is critical angle ? Write down its necessary conditions.
2. 10^{19} electrons are placed on an uncharged body. Calculate the charge produced on the body.
3. Mention the difference between p-type and n-type semiconductors.
4. Write down two uses of shunt.
5. Convert binary number $(1101)_2$ into decimal system.
6. Explain www and Fax.
7. What is walttless current ?
8. What is light-emitting diode (LED) ? Write down its one application.
9. Explain the difference between nuclear fission and nuclear fusion.
10. What is Rydberg constant ? Write down its unit.
11. Define two magnetic elements of earth.
12. What is eddy current ? Write down its utilities.
13. Write down energy-losses in transformer.
14. Explain polarisation of light.
15. What is electromagnetic wave ? On which factors does its velocity in vaccum depend ?
16. What is cyclotron ? State its two limitations.
17. Find the increase in energy of a condenser of capacity 6 μF on change potential difference from 10 V to 20 V.
18. What are ohmic and non-ohmic resistances ? Write down one example of both.
19. Define intensity of electric field at any point. Write down its S.I. Unit.
20. An electric dipole of dipole moment 2×10^{-6} cm is kept inside a closed surface. What will be the net flux coming out from the surface ?

■ **Question Nos. 21 to 26 are Long Answer Type Questions. Answer any 3 questions. Each question carries 5 marks. (3 × 5 = 15)**

21. What is electric dipole ? Find an expression for electric potential at any point due to an electric dipole.
22. What is interference of light ? Find an expression for fringe width in Youngs double slit experiment.
23. Mention the defects of human vision and describe the method to correct them.
24. Write the properties of diamagnetic, paramagnetic and ferromagnetic materials.
25. Define self-inductance and write its S.I. unit. Find the self-inductance for a solenoid of N turns, length l and radius r.
26. Describe with diagram the working method p-n-p and n-p-n transistors.

ANSWER

SECTION – A

1. (A)	**2.** (B)	**3.** (A)	**4.** (A)	**5.** (D)	**6.** (A)	**7.** (C)
8. (A)	**9.** (B)	**10.** (A)	**11.** (B)	**12.** (D)	**13.** (D)	**14.** (C)
15. (A)	**16.** (A)	**17.** (D)	**18.** (C)	**19.** (C)	**20.** (A)	**21.** (B)
22. (B)	**23.** (A)	**24.** (C)	**25.** (D)	**26.** (A)	**27.** (D)	**28.** (A)
29. (B)	**30.** (A)	**31.** (B)	**32.** (C)	**33.** (C)	**34.** (C)	**35.** (D)
36. (B)	**37.** (D)	**38.** (*)	**39.** (D)	**40.** (D)	**41.** (C)	**42.** (D)
43. (B)	**44.** (A)	**45.** (C)	**46.** (B)	**47.** (C)	**48.** (D)	**49.** (B)
50. (D)	**51.** (A)	**52.** (A)	**53.** (B)	**54.** (A)	**55.** (B)	**56.** (A)
57. (C)	**58.** (A)	**59.** (B)	**60.** (B)	**61.** (A)	**62.** (C)	**63.** (B)
64. (B)	**65.** (C)	**66.** (*)	**67.** (A)	**68.** (D)	**69.** (B)	**70.** (B)

SECTION – B

1. Hint : See 2012 (A) Q. No. 1.
2. $Q = \pm ne$
$= 10^{19} \times -1.6 \times 10^{-19}$
$= -1.6 \times 10^0 = -1.6$ C; **Ans.**
3. Hint : See 2013 (A) Q. No. 7.
4. Hint : See 2015 (A) Q. No. 4.

5. $(1101)_2 = 1 \times 2^3 + 1 \times 2^2 + 0 \times 2^1 + 1 \times 2^0$
$= 8 + 4 + 0 + 1$
$= 13$
$\therefore \quad (1101)_2 = (13)_{10}$; **Ans**

6. Hint : See 2010 (A) Q. No. 10

7. If in any *A.C.* circuit is purely inductive or capacitive and the value of resistance is zero. In this case the phase angel between voltage and current is $\phi = 90°$
and $P_{av} = V_{rms} \cdot I_{rms} \cos \phi$ [$\because \cos 90° = 0$]
Hence in this case no any power less in the flowing of current and this current is called wattless current.

8. LED stands for Light Emitting Diode. LED's are the *pn* junction diode connected farword biased. LED's are made from semiconducting compound like Galium such as aresenide or Indium phosphided.
LED are used in indicator light, calculator, watch, traffic, signal etc.

9. Difference, between nuclear fission and nuclear fusion :

Nuclear fission	Nuclear fusion
(i) Nuclear fission is the splitting of a nucleus into smaller particles, releasing a high amount of energy.	(i) Nuclear fusion is the combination of two smaller atoms to created a large atom releasing energy.
(ii) It is confined to heavy nuclei only.	(ii) it is confined to lighter nuclei.
(iii) It is a chain reaction.	(iii) It is not a chain reaction.
(iv) A heavy nucleus splits into two lighter nuclei.	(iv) To lighter nuclei fuse to form a heavy nucleus.
(v) Large amount of energy is released.	(v) Energy released is far more than released in a fission control.

10. In the science of spectroscopy, under physics, the Rydberg constant is a physical constant relating to atomic spectra. It is denoted by R_∞ for heavy atoms and R_H for hydrogen. Rydberg constant was first arising from the Rydberg formula as a fitting parametre. S.I. unit of Rydberg constant is m^{-1} and value is $1.097 \times 10^7\ m^{-1}$.

11. Magnetic Declination : It is the angle between the geographic meridian and the magnetic meridian at a place on the earth. It is denoted by α.

Magnetic Inclination : It is the angle between the direction of the intensity of the total earth's magnetic field and the horizontal. It is denoted by δ.

12. Eddy currents are defined as the currents induced in the form of closed loops in the body of a conductors due to the change in the magnetic flux linked with it when placed inside a varying magnetic field. They are also called Foucault Currents.

Use of eddy currents :

(i) It is used in household current metres to measure power consumption.

(ii) It is used to check whether the material or surface has any discountinuities, fractures or faults with harming the materials.

13. Energy losses in transformer :

(i) Copper lose—Copper loss occurs in the form of heat energy lost due to the resistance of the copper coils used in the windings of a transformers.

(ii) Hysteresis loss—Loss of energy due to continous magnetization and demagnetization of the transformer is called hysteresis loss.

(iii) Flux loss—Flux loss occues in the coupling of the primary and secondary coil is not good.

(iv) Eddy Current loss—Energy loss in a metallic plate when kept in a time-varying magnetic field causes eddy current loss.

14. Polarization of light refers to the orientation of the oscillations of electromagnetic waves as they propagate. In unpolarized light, the electric field vector oscillate in all possible directions perpendicular to the direction of propagation. Polarized light, however, has its electric field vector ascillating prediominatly in a specific direction. This can occur naturally through scattering or reflection, or artificially through filters or other optical elements.

15. Electromagnetic wave are transvers in nature. In this type of wave gamma rays have minimum value of wavelength and radio waves have maximum value of wevelength.
The velocity of electromagentic waves in vacumm is 3×10^8 m/s. Hence velocity of elecromagentic wave depends on the permeability and permittivity of free space.

16. Cyclotron is a simple device used to accelerate the positive charged particles. It is based on motion of charged particles in uniform magnetic field.

Two limitations of cyclotron are—

(i) The mass of an electon is very small. Because of this reason, the cyclotron device is incapable of accelerating or speeding up the electron.

(ii) This device is also incapable of accelerating or speeding up the particles which have no charge.

17. Given,
$C = 6\mu F = 6 \times 10^{-6} F$
$V = (20 - 10)$ volt
$= 10$ volt
Increase in energy of a condenser

$$= \frac{1}{2}CV^2 = \frac{1}{2} \times 6 \times 10^{-16} \times 100 = 3 \times 10^{-4} \text{J}; \textbf{ Ans.}$$

18. A resistor is 'ohmic' if as voltage across the resistor is increased, a graph of voltage versus current shows a straight line (indicating a constant resistance). The slope of the line is the value of the resistance. Example—Wire, resistor.
A resistor is 'non-ohmic' if the graph of voltage versus current is not a straight line. Example—Vaccum tubes, thermistros.

19. Hints : 2020 (A), Q. No. 13.

20. Given, dipole moment $(P) = 2 \times 10^{-6}$ C–m
$\phi = Q$
$\because$ Total charge in closed surface $(Q) = 0$
Hence, from Gauss's theorem,
Net flux coming out from the closed Surface

$$\phi = \frac{1}{\epsilon_0} \times Q = \frac{1}{\epsilon_0} \times 0$$

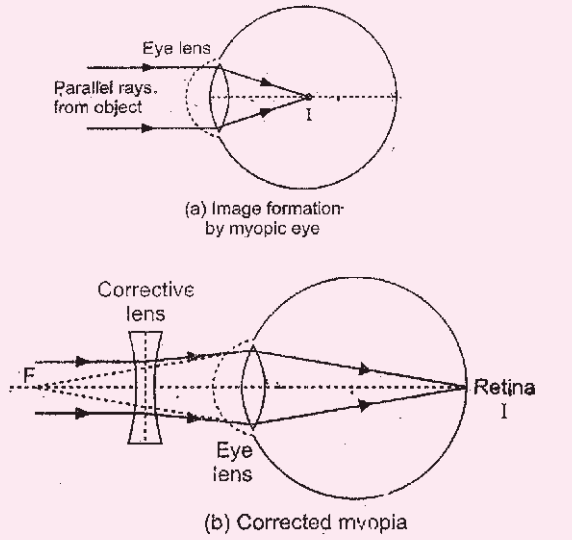
$\boxed{\phi = 0}$; **Ans.**

21. Hint : See 2009 (A) Q. No. 12.

22. Hint : See 2012 (A) Q. No. 13 (or)

23. Due to growing age or otherwise, eye may suffer the following defects :

(i) Myopia or shortsightedness : Myopia is the defect of eye in which a person can see only nearby objects, but fails to see the far away objects distinctly. This defect is due to



(a) decrease in focal length of the eye lens.
(b) spreading of the eye-sphere.

Due to these reasons the image is formed in front of the retina.

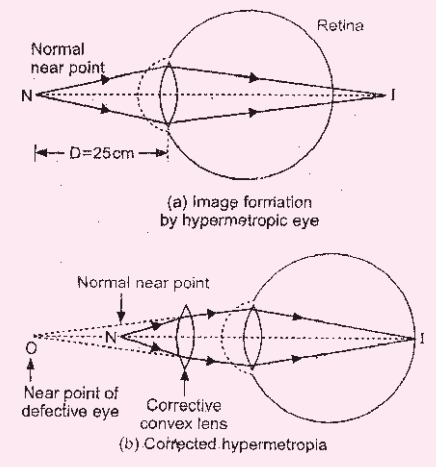
Remedy—To eliminate this defect a concave lens of suitable focal length is used. The equivalent focal length of concave lens and eye lens should be increased to a value such that the distinct image of far away objects is formed at the retina. If a myopic eye has a far point at *F*, then the parallel rays from infinity will be incident on concave lens and form its vertical image at *F*. This image will act as an object for eye lens and the final image (*I*) will be formed at the retina [Fig. (b)]. Clearly, for elimination of myopia the focal length of corrective concave lens will be equal to the distance of far point of myopic eye from the eye lens.

(ii) Farsightedness or Hypermetropia—Hypermetropia is the defect of eye in which a person can see only farther objects but fails to see nearer objects distinctly. This defect is due to

(a) Increase in focal length of eye lens.
(b) Contraction of eye-sphere.

Due to these reasons the image of a nearby object is formed behind the retina.

Remedy : The near point of hypermetropic eye is displaced from $D = 25$ cm to some distant point. To eliminate this defect a convex lens of suitable focal length is used. The equivalent focal length of corrective convex lens and eye lens should be decreased to a value such that the distinct image of nearby objects is formed at the retina.



Suppose the near point of a normal eye is at *N* and that of a hypermetropic eye is at *O*. The corrective convex lens forms the image of near point (*N*) at point *O*, then this image will act as the object for eye lens and the final image (*I*) will be formed at the retina. Therefore the corrective lens enables to form the distinct image of near point (*N*) at retina.

(iii) Presbyopia—In growing age, the eye lens loses its flexibility of changing the focal length. Consequently, the near point of an eye is displaced further and far point of the eye is displaced nearer, so that the eye is unable to see the nearby as well as far away objects. This defect of eye is called preshyopia.

This defect may be eliminated by using bifocal lenses.

(iv) Astigmatism—The defect of eye in which horizontal and vertical objects at the same distance are not focused at the retina clearly is called **astigmatism.** This arises when the cornea is not spherical in shape. For example cornea could have a larger curvature in vertical plane than in horizontal plane.

If astigmated eye sees a wire mesh or a shirt having horizontal and vertical lines, then vertical and horizontal lines are not equally well focused; if vertical lines are well focused; the horizontal lines may appear distorted or curved and vice versa. This defect may occur along with the myopia or hypermetropia.

Remedy : The astigmation is corrected by using a cylindrical lens having a cylindrical surface of a desired radius of curvature with an appropriately directed axis.

24. Hint : See 2021 (A) Q. N0. 25.

25. Self inductance of a plane coil—Suppose that a circular coil of radius '*r*' has *N* turns and a current *I* is flowing through. it. The magnetic field at the centre of the coil is given by :

$$B = \frac{\mu_0}{4\pi}\left(\frac{2\pi NI}{r}\right) \qquad \Rightarrow B = \frac{\mu_0 NI}{2r\pi}$$

Direction of $\vec{B}$ will be perpendicular to the plane of the coil and will depneds upon the direction of current in the coil. Considering $\vec{B}$ to be uniform through out the whole surface of the coil thought its is higher near the edges of the coil. Now magnetic flux ϕ linked with each of the coil is given by $\Phi = B \times A$ (where A = Area of the coil = πr^2)

$$\Phi = \frac{\mu_0 NI}{2r} \times \pi r^2 \Rightarrow \Phi = \frac{\mu_0 \pi NIr}{2}$$

But total flux linked with the coil : $N\Phi = LI$

$$\therefore \qquad N \times \frac{\mu_0 \pi NIr}{2} = LI \Rightarrow L = \frac{\mu_0 \pi N^2 r}{2} \qquad \ldots(i)$$

Now, if a core of ferromagentic substnce of relative permeability 'μ_r' is inserted in the coil then the magenetic flux linked with the coil increases by the factor μ_r, hence the coefficient of self inductance will also increases in the same ratio. Thus in this case the coefficient of self induction of the coil is given by :

$$L = \frac{\mu_r \mu_0 \pi N^2 r}{2} \qquad \ldots(ii)$$

In this way the coefficient of self inductance of a coil depends upon the shape, size and number of turns of the coil. Larger the number of turns and area of cross-section, large will be the value of self inductance.

It also depends upon the relative permeability of the material of the core around which coil is wound.

Self Inducatance of a long soleniod

A solenoid whose length is very large as compared to its radius *i.e.* its area of cross-section is known as long solenoid. Magnetic field at any point on its axis inside the long solenoid is uniform and is given by :

$$B = \frac{\mu_0 NI}{l}$$

where l = Length of the solenoid; N = number of turns in the total length of the solenoid and I is the current throught the solenoid.

Therefore the magnetic flux linked with each turn of the solenoid is given by :

$$\Phi = B \times A$$

where, $A = \pi r^2$ = Arc of each turn in which r is the radius of the solenoid.

$$\therefore \quad \Phi = \frac{\mu_0 NI}{l} \times \pi r^2 \Rightarrow \Phi = \frac{\mu_0 \pi N r^2 I}{l}$$

But total magnetic flux linked with the solenoid is NΦ which is given by : N Φ = LI

$$\Rightarrow \quad N \times \left(\frac{\mu_0 \pi N r^2 I}{l} \right) = LI \Rightarrow L = \frac{\mu_0 \pi N^2 r^2}{l} \qquad \ldots(i)$$

If a core of ferromagnetic of relative permeability μ_r is inserted inside the solenoid then equation (i) for self inductance is written as follows ;

$$L = \frac{\mu_r \mu_0 \pi N^2 r^2}{l} \qquad \ldots(ii)$$

In the above equation (i) and (ii) πr^2 = A which is the area of cross-section of solenoid. Hence these can be written as follows in terms of A, respectively :

$$L = \frac{\mu_0 N^2 A}{l} \qquad \ldots(iii)$$

and

$$L = \frac{\mu_r \mu_0 N^2 A}{l} \qquad \ldots(iv)$$

From these formulae it is abvious that self inductance of a solenoid depends upon the following factors :

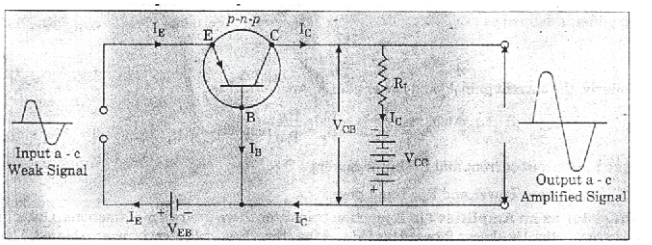
(i) **Number of turns in the solenoid** : $L \propto N^2$
i.e. Larger the number of turns N in the solenoid, larger will be its self inductance.

(ii) **Area of cross-section of the solenoid** : $L \propto A$
i.e. Larger the area of cross-section of the solenoid larger will be its inductance.

(iii) **Permeability of the material of the core of solenoid** : $L \propto \mu_r$
i.e. the self inductance of the solenoid increases μ_r time if it is wound over a core of ferromagnetic materials of relative permeability μ_r.

26. Common-Base p-n-p Transistor Amplifier.

Circuit Diagram : For common base *p-n-p* transistor amplifier circuit is shown in fig. in which common to input and output circuits.



Action : In this circuit input circuit *i.e.,* emitter-base cirucuit is made forward baised by a low voltage biasing battery V_{EB} and the output circuit *i.e.* base-collector circuit is made reverse biased by a high voltage biasing battery V_{CC}. Therefore the reistance of input circuit is low, of the order of 100 Ω and and that of output circuit is high, of the order of 10000 Ω. Resistance R_L is a loade resistance connected in the base-collector circuit in series with V_{CC}. The weak input a.c signal is applied in emitter-base circuit which does not affect the biasing voltage V_{EB} regardless of the polarity of the signal. The amplified output signal is obtained across the load resistance R_L base-collector circuit.

I_E, I_B and I_C represent emitter current, base current and collector current, respectively when no a.c. input signal is applied. By Kirchhoffs current law, we have

$$I_E = I_B + I_C \qquad \ldots(1)$$

Now, according to Ohm's law, the potential drop across load resistance R_L due to collector current :

$$V_L = I_C + R_L \qquad \ldots(1)$$

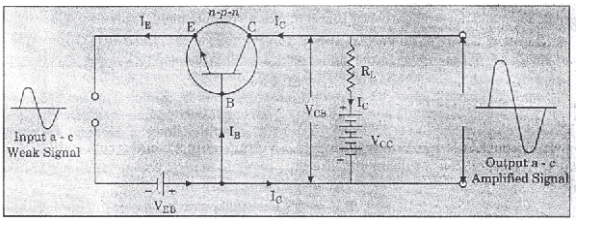
Therefore, the potential difference between collector and base *i.e.,* collector-base voltage :

$$V_{CB} = V_{CC} - V_L \Rightarrow V_{CB} = V_{CC} - I_C R_L \qquad \ldots(2)$$

But when the input a.c. signal is applied in the input circuit it will change emitter-base voltage V_{EB} due for which emittter current I_E will be changed. Hence due to this change in I_E, collector current I_C would be changed, due to which the collector-base voltage V_{CB} will vary in accordance with equation (2). This variation in V_{CB} due to the application of input signal appears as amplified output through load R_L.

Common-Base n-p-n Transistor amplifier

The circuit diagram for the transistor amplifier is shown in Fig. The polarities of the biasing batteries V_{EB} and V_{CC} both are reversed of those as in case of *p-n-p* transistor amplifier becuase intput circuit (emitter-bases circuit) is kept always forward baised and output circuit collector-base circuit) is reverse biased.



The description of action of this transistor is the same as that of C.B. *p-n-p* transistor amplifier. Hence the above two equations (1) and (2) are valid for this amplifier also.

■■■

CHEMISTRY – XII, 2024 (A)

Time : 3 Hours 15 Minutes] **[Total Marks : 70**
Instructions to the candidates : See previous paper

SECTION–A (OBJECTIVE TYPE QUESTIONS)

■ **Question No. 1 to 35 have four options, out of which only one is correct. You have to mark, Your selected option on the OMR-sheet.** **(35 × 1 = 35)**

1. Isotonic solutions have the same :
(A) Density (B) Normality
(C) Strength (D) Molar concentration

2. An azeotropic mixture of HCl and H_2O has :
(A) 48% HCl (B) 36% HCl
(C) 22.2% HCl (D) 20.2% HCl

3. A charge of 96500 coulomb liberates ..... from the solution of $CuSO_4$.
(A) 63.5 gm copper (B) 31.76 gm copper
(C) 96500 gm copper (D) 100 gm copper

4. The cell constant of a conductivity cell is :
(A) $\frac{l}{A}$ (B) $\frac{A}{l}$ (C) $l \cdot A$ (D) $\frac{R}{A}$

5. The electromotive force of the cell $Zn \mid ZnSO_4 \parallel CuSO_4 \mid Cu$ is 1.1 volt. Its cathode is :
(A) Zn (B) Cu (C) $ZnSO_4$ (D) $CuSO_4$

6. Who gave the theory of ionisation ?
(A) Faraday (B) Arrhenius
(C) Ostwald (D) Rutherford

7. The rate of reaction of a substance depends upon :
(A) Atomic mass (B) Equivalent mass
(C) Molecular mass (D) Active mass

8. Which of the following metals is generally found in free state ?
(A) Cu (B) Au (C) Al (D) Fe

9. Which of the following statements is true ?
(A) All ores are minerals
(B) All minerals are ores
(C) A mineral cannot be an ore
(D) An ore cannot be a mineral

10. Electrometallurgical process is used for the extraction of which of the following metals ?
(A) Iron (B) Lead (C) Silver (D) Sodium

11. An ore having two different metal atoms is :
(A) Haematite (B) Galena
(C) Magnetite (D) Copper pyrite

12. Which of the following elements has electronic configuration $1s^2\ 2s^2\ 2px^1\ 2py^1\ 2pz^1$?
(A) Oxygen (B) Hydrogen
(C) Nitrogen (D) Fluorine

13. Which of the following oxides of nitrogen is called laughing gas ?
(A) Nitric oxide (B) Nitrous oxide
(C) Dinitrogen trioxide (D) Dinitrogen pentoxide

14. Which of the following has highest bond energy ?
(A) O – O (B) S – S (C) Se – Se (D) Te – Te

15. The oxidation state of Ni $(CO)_4$ is :
(A) 0 (B) 1 (C) 2 (D) 4

16. Which of the following has the highest molar electrical conductor in aqueous solution ?
(A) $[Pt(NH_3)_6]Cl_4$ (B) $[Pt(NH_3)_5Cl]\ Cl_3$
(C) $[Pt(NH_3)_4Cl_2]Cl_2$ (D) $[Pt(NH_3)_3Cl_3]Cl$

17 The IUPAC name of $K_3[Fe(CN)_6]$ is :
(A) Potassium ferrocyanide
(B) Potassium ferricyanide
(C) Potassium hexacynaoferrate (II)
(D) Potassium hexacynanoferrate (III)

18. Vitamin B_{12} contains :
(A) Cobalt (B) Magnesium
(C) Iron (D) Nickel

19. The coordination number of Ni in $[Ni(C_2O_4)_3]^{4-}$ is :
(A) 3 (B) 6 (C) 4 (D) 5

20. The IUPAC name of

$$CH_3—\underset{\displaystyle CH_3}{\underset{|}{CH}}—CH_2—CH_2Cl \text{ is :}$$

(A) 1–chloro-2-methyl butane
(B) 1–chloroisopentane
(C) 1–chloro-3-methyl butane
(D) None of these

21. $C_2H_5Br + NaOH \rightarrow C_2H_5OH + NaBr$ is an examples of which of following types of reaction ?
(A) Electrophilic substitution
(B) Nucleophilic substitution
(C) Both (A) and (B)
(D) None of these

22. Which of the following types of crystal is diamond ?
(A) Ionic crystal (B) Covalent crystal
(C) Molecular crystal (D) Metallic crystal

23. The structure of NaCl crystal is :
(A) Hexagonal close packing
(B) Face centred cubic
(C) Square planar
(D) Body centred cubic

24. Which of the following is an amorphous solid ?
(A) Diamond (B) Graphite
(C) Common salt (D) Glass

25. An octahedral void is surrounded by how many spheres ?
(A) 6 (B) 4 (C) 8 (D) 12

26. Which of the following modes of expressing concentration of a solution does not depend upon temperature ?
(A) Molarity (B) Normality
(C) Formality (D) Molality

27. Which of the following show positive deviation from Raoult's law ?
(A) C_6H_6 and $C_6H_5CH_3$ (B) C_6H_6 and CCl_4
(C) $CHCl_3$ and C_2H_5OH (D) $CHCl_3$ and CH_3COCH_3

28. The osmotic pressure of a solution is represented by which of the following equations ?
(A) $\pi = \frac{CR}{T}$ (B) $\frac{\pi}{C} = RT$ (C) $\pi = \frac{CT}{R}$ (D) $\pi = \frac{RT}{C}$

29. Alkyl halides from ethers by reacting with which of the following ?
(A) Dry Ag_2O (B) Moist Ag_2O
(C) Dry ZnO (D) Moist ZnO

30. The IUPAC name of

$$CH_3—\underset{\displaystyle OH}{\underset{|}{CH}}—CH_2—CHO \text{ is :}$$

(A) 2–Hydroxybutanal (B) 3–Hydroxybutanal
(C) 2–Hydroxypropanal (D) None of these

31. Formalin is the commercial name of :
(A) Formic acid (B) Fluoroform
(C) 40% aqueous solution of methanal
(D) Paraformaldehyde

32. An aldehyde on oxidation gives :
(A) an alcohol (B) a ketone
(C) an ether (D) an acid

33. Chloretone is formed when chloroform reacts with :
(A) Formaldehyde (B) Acetaldehyde
(C) Acetone (D) Benzaldehyde

34. The general molecular formula of saturated monocarboxylic acids is :
(A) $C_nH_{2n+2}O$ (B) $C_nH_{2n}O$
(C) $C_nH_{2n}O_2$ (D) $C_nH_{2n+1}O_2$

35. By which of the following formic acid and formaldehyde can be distinguished ?
(A) Benedict solution (B) Fehling solution
(C) Tollen's reagent (D) Sodium bicarbonate

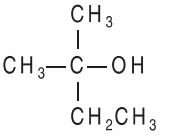
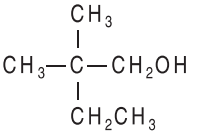
36. Which of the following alkyl halides is hydrolysed by S_N1 mechanism ?
(A) $(CH_3)_2CHX$ (B) CH_3CH_2X
(C) $CH_3CH_2CH_2X$ (D) $(CH_3)_3CX$

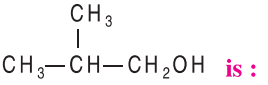
37. Chloroform on reduction with Zn and water gives :
(A) Acetylene (B) Ethylene
(C) Ethane (D) Methane

38. When ethyl bromide is treated with dry silver oxide, then we get :
(A) Diethyl ether (B) Ethanal
(C) Ethane (D) Ethene

39. Lucas reagent is :
(A) Anhydrous $CaCl_2$ and conc. HCl
(B) Anhydrous $ZnCl_2$ and conc. HCl
(C) Anhydrous $AlCl_3$ and conc. HCl
(A) Anhydrous $PdCl_2$ and conc. HCl

40. Butan-2-ol is a
(A) Primary alcohol (B) Secondary alcohol
(C) Tertiary alcohol (D) Dihydric alcohol

41. Which of the following is a tertiary alcohol ?
(A) CH_3CH_2OH
(B) 
(C) 
(D) 

42. The IUPAC name of  **is :**
(A) 2–methyl–1–propanal (B) Isobutyl alcohol
(C) 2–methyl–1–butanal (D) None of these

43. A vitamin which plays a vital role in the coagulating property of blood is :
(A) Vitamin *A* (B) Vitamin *B*
(C) Vitamin *E* (D) Vitamin *K*

44. Chloramine–*T* is a/an :
(A) Disinfectant (B) antiseptic
(C) Analgesic (D) Antipyretic

45. Hydrazine is a drug which is used in the treatment of which of the following ?
(A) Malaria (B) Typhoid
(C) Cholera (D) Tuberculosis

46. Which of the following is an alkaloid ?
(A) Nicotine (B) Atropine (C) Cocaine (D) All of these

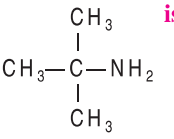
47. Which of the following is an natural rubber ?
(A) Isoprene (B) Nitrocellulose
(C) Polyethylene (D) Bakelite

48. A raw material used in making nylon is :
(A) ethylene (B) butadine
(C) adipic acid (D) isoprene

49. $F_2C = CF_2$ is monomer of which of the following ?
(A) Teflon (B) Glyptal (C) Nylon-6 (D) Buna-s

50. With which of the following does acetic acid not from acetyl chloride ?
(A) PCl_5 (B) PCl_3 (C) $SOCl_2$ (D) Cl_2

51. Acetamide is :
(A) Acidic (B) Alkaline
(C) Amphoteric (D) Neutral

52.  **is a :**
(A) Primary amine (B) Secondary amine
(C) Tertiary amine (D) Quaternary amine

53. Methylamine on heating with chloroform and alcoholic KOH gives :
(A) CH_3OH (B) CH_3CN (C) CH_3CHO (D) CH_3NC

54. Which of the following is the most basic ?
(A) $C_6H_5NH_2$ (B) $(C_6H_5)_2NH$
(C) $C_2H_5NH_2$ (D) $(C_2H_5)_2NH$

55. The helical structure of protein is stablized by which of the following ?
(A) Ionic bond (B) Covalent bond
(C) van der Waals forces (D) Hydrogen bond

56. Which of the following is a ketohexose ?
(A) Glucose (B) Fructose (C) Sucrose (D) Starch

57. Which of the following is not a first order reaction ?
(A) $CH_3COOCH_3 + H_2O \xrightarrow{H^+} CH_3COOH + CH_3OH$
(B) $CH_3COOC_2H_5 + NaOH \rightarrow CH_3COONa + C_2H_5OH$
(C) $2H_2O_2 \rightarrow 2H_2O + O_2$
(D) $2N_2O_5 \rightarrow 4NO_2 + O_2$

58. The unit of rate constant of a second order reaction is :
(A) Mol L^{-1} sec^{-1} (B) mol^{-1} L^{-1} sec^{-1}
(C) mol^{-1} L sec^{-1} (D) mol L sec^{-1}

59. If the rate equation for a reaction is $\frac{dx}{dt} = k[H]^{1/2}[B]^{1/2}$ the order of reaction is :
(A) 2 (B) $\frac{1}{2}$ (C) $\frac{3}{2}$ (D) 1

60. According to Freundlich adsorption isotherm :
(A) $\frac{x}{m} = kp^{1/n}$ (B) $\frac{m}{x} = k.p^{1/n}$
(C) $xm = kp^{1/n}$ (D) $\frac{x}{m} = \frac{k}{p^{1/n}}$

61. Milk is :
(A) fat disperesed in water (B) water disperesed in fat
(C) water disperesed in oil (D) fat disperesed in fat

62. Which of the following is a lyophilic colloid ?
(A) Milk (B) Gum (C) Fog (D) Blood

63. Which of the following catalysts is used in the manufature of ammonia by haber's process ?
(A) Al_2O_3 (B) Fe + Mo (C) CuO (D) Pt

64. Which of the following is the molecular formula of Orthophosphoric acid ?
(A) H_3PO_3 (B) H_3PO_4 (C) HPO_3 (D) $H_4P_2O_7$

65. The structure of XeF_4 is :
(A) Tetrahedral (B) Octahedral
(C) Square planar (D) None of these

66. Which of the following halogens does not exhibit a position oxidation state ?
(A) I (B) Br (C) Cl (D) F

67. Which of the following has the smallest bond angle ?
(A) H_2O (B) H_2S (C) H_2Se (D) H_2Te

68. Which of the following has maximum number of unpaired electrons ?
(A) Mg^{2+} (B) Ti^{3+} (C) V^{3+} (D) Fe^{3+}

69. The maximum oxidation state of chromium is :
(A) +2 (B) +3 (C) +4 (D) +6

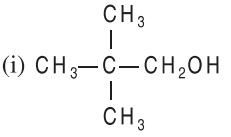
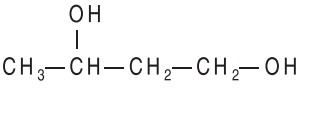
70. The number of unpaired electrons in Cu^{2+} (Z = 29) is :
(A) 0 (B) 1 (C) 2 (D) 2

SECTION–B (NON-OBJECTIVE TYPE QUESTIONS)

■ Question Nos. 1 to 20 are short Answer Type. Answer any 10 questions. Each question carries 2 marks (10 × 2 = 20)

1. What is carbyl amine reaction ?

2. Wrtie the IUPAC name of the following compounds :

(i)  (ii) 

3. Discuss the utility of DNA fingerprinting.

4. Give one example of each of the following
(i) Synthetic polymer (ii) Condensation polymer

5. Why do transition elements form complex compounds ?

6. Explain effective atomic number.

7. Arrange F_2, Cl_2, Br_2 and I_2 in the increasing order of electron affinities.

8. Write the electronic configurations of Kr (Z=36) and Xe (Z=54)

9. What is mole fraction ?

10. Write Raoult's law of relative lowering of vapour pressure.

11. What are network solids ? Give an example.

12. What is Schottky defect ? Explain with example.

13. Which is Reosenmund reduction ?

14. How is polypeptide bond formed ?

15. Write the names and formulae of two ores of iron.

16. Why is cryolite ore used during the extaction of Al metal ?

17. Discuss electrochemical principal regarding rusting of iron.

18. What is the effect of dilution on molar conductance ?

19. What are the main differences between physical adsorption and chemical adsorption ?

20. What is Brownian movement ?

■ Question Nos. 21 to 26 are Long Answer Type Questions. Answer any 3 questions. Each question carries 5 marks : (3 × 5 = 15)

21. What do you understand by rate of a reaction ? What factors affect the rate of a reaction ? Discuss.

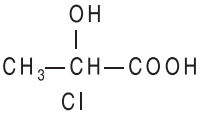
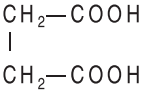
22. What is soap ? How does it act in the cleansing of clothes ?

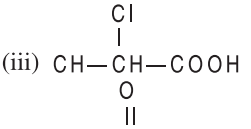
23. Write the principle of manufacture of ammonia by Haber's process. How does it react with $CuSO_4$ solution ?

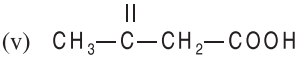
24. How would you distinguished among primary, secondary and tertiary alcohols ?

25. Explain the following with examples :
(i) Aldol condensation (ii) Cannizzaro's reaction

26. Write IUPAC names of the following

(i)  (ii) 

(iii)  (iv) $CH_3—CH=CH—COOH$

(v) 

ANSWERS

SECTION – A

1. (D)	**2.** (C)	**3.** (B)	**4.** (A)	**5.** (B)	**6.** (B)	**7.** (D)
8. (B)	**9.** (A)	**10.** (D)	**11.** (D)	**12.** (C)	**13.** (B)	**14.** (B)
15. (A)	**16.** (A)	**17.** (D)	**18.** (A)	**19.** (B)	**20.** (C)	**21.** (B)
22. (B)	**23.** (B)	**24.** (D)	**25.** (A)	**26.** (D)	**27.** (C)	**28.** (B)
29. (A)	**30.**(B,D)	**31.** (C)	**32.** (D)	**33.** (C)	**34.** (C)	**35.** (D)
36. (D)	**37.** (D)	**38.** (A)	**39.** (B)	**40.** (B)	**41.** (B)	**42.**(A,D)
43. (D)	**44.** (A)	**45.** (D)	**46.** (D)	**47.** (A)	**48.** (C)	**49.** (A)
50. (D)	**51.** (D)	**52.** (A)	**53.** (D)	**54.** (D)	**55.** (D)	**56.** (B)
57. (B)	**58.** (C)	**59.** (D)	**60.** (A)	**61.** (A)	**62.** (B)	**63.** (B)
64. (B)	**65.** (C)	**66.** (D)	**67.** (D)	**68.** (D)	**69.** (D)	**70.** (B)

SECTION – B

1. Hint : See 2010 (A) Q. No. 14 (or) (i).

2. (i) 2, 2–Dimethyl–1– Propanol (ii) 1, 3–butanediol

3. Utility of DNA finger printing :
(i) establish paternity and parentage.
(ii) identify victims of war and large scale disasters.
(iii) study biodiversity of species.
(iv) track geneticaly modified crops.
(v) settle immigration disputes etc.

4. (i) Synthetic polymers—They are man-made high molecular mass macromolecules. These include synthetic plastics, fibers and synthetic rubber. Example—polyethelin, dacron.

(ii) Condensation polymer—Condensation polymres are polymers made in a condensation reaction between two monomers, releasing a small molecule in the process. Examles—Polyester, polymaides, polypeptides etc.

5. Transition metals generally form more complex or coordination compound because they are empty valence shell ortibals that can accepts pair of an electron from lewis base (ligand). That means ligands must obtain one pair (at least) of the non-bonding electron that can be donated to the metal ion.

6. Hint : See 2016 (A), Q. No.7 (b).

7. $I_2 < Br_2 < Cl_2 < F_2$

8. Electronic configuration of Kr (Z = 36)
$= 1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^6$
Electronic configuration of Xe (Z = 54)
$= 1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^2\ 4p^6\ 4d^{10}\ 5s^2\ 5p^6$

9. Mole fraction—Mole fraction may be defined as the ratio of the number of moles of one compoents (solute of solvent) to the total number of all the components present in the solution

$$= \frac{\text{Number of moels of component}}{\text{The number of moles of all the components}}$$

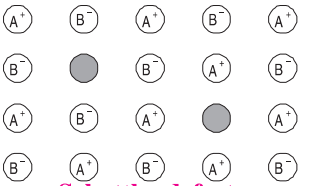
For example, in a binary mixture, if the number of moles of A and B are n_A and n_B respectively, the mole fraction of A and B will be x_A and x_B [Mole fraction is a ratio, so it has not unit.]

$$x_A = \frac{n_A}{n_A + n_B}; x_B = \frac{n_B}{n_A + n_B}$$

10. Hint : See 2014 (A) Q. No. 26

11. Hint : See 2022 (A) Q. No. 6

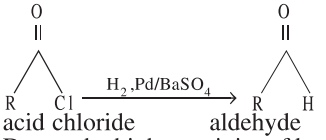
12. Schottky defect—This defect arises when equal number of cations and anions are missing from the lattice. It is a common defect in ionic compoiunds of high coordination number where both cations and anions



Schottky defect

are of the same size e.g. KCl, NaCl, KBr, etc. Due to this defect, density of crystal decreases and it begins to conduct electricity to a small extent.

13. Rosenmuund reduction is a reaction where acid chloride are converted into aldehydes by empolying hydrogen gas over palladium poisoned by barium sulphate. An example of this catelystic hydrogenation of acyl chlorides forming aldehydes is shown below :



acid chloride aldehyde

Due to the high reactivity of hydrogen gas, it readily intiates a substitution in the acyl chloride, forming HCl and the required aldehyds.

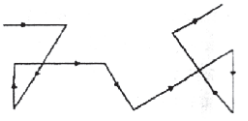
14. A polypeptide bond, also known as a peptide bond, forms through a condensation reaction between the carboxyl group of one amino acid and the amino group of another acid. During this process, a molecule of water is released, and the carbon from the carboxyl group bonds with the nitrogen from the amino group, creating a peptide bond between the two amino acids. This process repeats a amino acids are added to the growing polypeptided chain during protein synthesis.

15. **Ores of Iron** : Hematite (Fe_2O_3); Magnetite (Fe_2O_4).

16. **Hint :** See 2019 (A) Q. No. 18

17. **Electro-chemical theory of corrosion**—According to this theory corrosion posits that corrosion (rusting of iron) arises from electrochemical reactions at a metals surface. It involves anodic oxidation, where metal atoms release electrons and cathodic reduction, often involving oxygen or other speices, consuming these electrons. This process generates metal ions and corrosion products. Factors like metal type environment acidity and temperature influcence corrosion rates. Prevention strategies include using corrosion resistant materials, coatings or altering the environment. Understanding and controlling these eletrochemical processes are crucial in mitigating corrosion damage in various industries from infrastructure to electronics and beyond.

18. Dilution generally increases the molar conductance of an electrolyte solution. This effect is due to the decreases in the concentration of ions in the solution as it diluted. With lower ion concentration, there is less interference between ions, reduing the chance of ion pairing or aggregation, thereby increasing the mobility of ions and thus the molar conductance.



19. **Hint :** See 2013 (A) Q. No. 4.

20. Brownian movement named after the botanist Robert Brown who first observed it in 1827, refers to random motion of partils suspended in a fluid (liquid or gas) resulting from their collision with molecules of the fluid. The movement occurs due to the continuous bombardment of the particles by surrounding fluid molecules, causing them to more in a zigzag, erratic fashion. Brownian movement is a fundamental concept in physics and plays a significant role in various fields, including colloidal science, statistical physics and study of diffusion.

21. **Hint :** See 2022 (A), Q. No. 24.

22. **Hint :** See 2023 (A), Q. No. 19.

23. **Hint :** See 2022 (A), Q. No. 22.

24. **Hint :** See 2022 (A), Q. No. 23.

25. **(i) Aldol Condensation.** The term aldol is derived from the combination of words aldehyde and alcohol, are two functional groups present in the products. The combination of two or more molecules of the same or different compounds generally with elimination of simple molecule such as H_2O, NHs, HC*l*, ROH etc. is called as condensation.

Aldehydes and ketones containing oc-hydrogen atom (s) undergo condensation reactions in presence of dilute base such as NaOH, $Ba(OH)_2$, $Ca(OH)_2$, K_2CO_3 etc. to form products called aldol or ketols and hence the reaction is known as aldol condensation.

Characteristics of Aldol Condensation :

(i) New carbon to carbon linkage is set up. (ii) The condensation product i.e., aldol (or ketol) loses a molecule of water to form unsaturated aldehyde or ketone. (iii) Molecular weight of the product may or may not be exact multiple of the molecular weight of the original compound. (iv) Aldol condensation is given by compounds having α-hydrogen atom (v) This reaction may take place between (a) same or different aldehydes, (b) an aldehyde and a ketone and (c) same or different ketones.

(ii) Hint : See 2022 (A), Q. No. 14.

26. (i) 2-hydroxy propanoic acid
(ii) butane 1, 4,-dioic acid
(iii) 2, 2-dichloro ethanoic acid
(iv) 2-butenoic acid or but-2-enoic acid
(v) 3-oxo butanoic acid.

BIOLOGY – XII, 2024 (A)

Time : 3 Hours 15 Minutes] [Total Marks : 70
Instructions to the candidates : See Previous Paper

SECTION – A (OBJECTIVE TYPE QUESTIONS)

■ **Question No. 1 to 70 have four options, out of which only one is correct. You have to mark, your selected option, on the OMR-Sheet. Answer any 35 questions.**

1. What is the use of alpha-1-antitrypsin ?
(A) In treatment of emphysema
(B) In treatment of asthma
(C) As insecticidal protein
(D) In treatment of diabetes

2. Which of the following methods is used for the amplification of nucleic acid ?
(A) Transformation (B) Transfection
(C) PCR (D) Micropropagation

3. At what pH insecticidal protein synthesized by Bacillus thruinginesis becomes active ?
(A) Acidic pH (B) Alkaline pH
(C) Neutral pH
(D) First acidic then alkaline pH

4. RNA interference is utilized to prevent nematode infestation in tobacco plants. By which vector are nematode specific genes introduced ?
(A) Bacteriophage (B) Retrovirus
(C) Escherichia coli (D) Agro bacterium

5. How many varieties of Basmati rice are grown in India ?
(A) 20 (B) 15 (C) 27 (D) 5

6. Which of the following organizations makes decision regarding the validity of GM research and the safety of introducing GM organisms ?
(A) Department of Science and Technology
(B) Department of Biotechnology
(C) GEAC
(D) Indian Patent Office

7. Name of Ramdeo Mishra is associated with which field of research ?
(A) Ecology (B) Biotechnology
(C) Green revolution (D) Genetics

8. HIV attacks on which of the following cells ?
(A) *B*–cells (B) *T*-cells
(C) Epithelial cell (D) *T*–helper cell

9. Going down of inorganic water soluble nutrients into the soil nutrients is called as :
(A) Fragmentation (B) Leaching
(C) Catabolism (D) Humification

10. According to Robert May how much is the global species diversity ?
(A) 7 Million (B) 1.5 Million
(C) 20–25 Million (D) 2 Million

11. Biodiversity of India is what percentage of the total global species diversitiy ?
(A) 2.4% (B) 8.1% (C) 5% (D) 9%

12. What was the reason for extinction of more than 200 species of Cichlid fish in Lake Victoria ?
(A) Co-extinction (B) Alien species invasion
(C) Overexploitation (D) habitat loss

13. Which of the following is not the reason for global warming ?
(A) Use of fossil fuels (B) Deforestation
(C) Population explosion
(D) Improvement in the efficiency of energy use

14. Which of the following statements is incorrect about organic farming ?
(A) It is cycle
(B) Zero waste is generated
(C) maximum utilization of resources
(D) Use of chemical fertilizers

15. Which of the following statements is incorrect about temperature ?
(A) Temperature is the most important environmental factor
(B) Temperature decreases from the equator towards the pole
(C) Temperature increases with increase in height
(D) Temperature is low at the summit of a mountain

16. At which level is natural selection operated to evolve the desired orates ?
(A) Individual level (B) Population level
(C) Community level (D) Ecosystem level

17. When percentage of individuals of pre-reproductive, reproductive and post-reproductive phase is in decreasing order in the age pyramid of human population, it shows that population is :
(A) expanding (B) decreasing
(C) stable (D) unstable

18. Which of the following reproduces once in a lifetime ?
(A) Pacific salmon fish and bamboo
(B) Mammals
(C) Birds and mammals (D) Litchi and mango

19. What was the reason for co-existence of five closely related species of Warblers ?
(A) Competitive exclusion (B) Resources partitioning
(C) Parasitism (D) Commensalism

20. Which of the following plants produces poisonous cardiac glycoside ?
(A) Cactus (B) Calotropic
(C) Coffee plant (D) Tobacco

21. Which of the following are decomposers ?
(A) Fungi and algae (B) Fungi and virus
(C) Fungi and bacteria (D) Fungi, bacteria and virus

22. Which of the following is not a cloning vector for bacteria ?
(A) Bacteriophage (B) Plasmid
(C) pBR322 (D) T-DNA

23. Which of the following methods is used to inject recombinant DNA into nucleus of animals cell directly ?
(A) Transfection (B) Transformation
(C) Gene gun (D) Microinjection

24. For isolation of DNA a fungus is treated with which enzyme ?
(A) Lysozyme (B) Cellulase
(C) Dnase (D) Chitinase

25. Which of the followig is absent in pBR322 ?
(A) Origin of replication (B) Restriction site
(C) T-DNA (D) Antibiotic resistant genes

26. If a foreign DNA is inserted in tetracycline resistant gene, the recombinant plasmid :
(A) Will lose ampicillin resistance
(B) Will lose tetracycline resistance
(C) Cloning would become easier
(D) Amplicillin resistance will become stronger

27. From which of the following bacteria, thermostable DNA polymerase is isolated ?
(A) Agrobacterium (B) Thermus aquaticus
(C) Methanobacterium (D) Archaebacteria

28. Which of the following bacteria synthesizes insecticidal protein ?
(A) Agrobacterium (B) Bacillus thuringiensis
(C) Escherichia coli (D) Archaebacteria

29. Which of the following statements is incorrect about DNA replication ?

(A) DNA replication is semi-conservative.
(B) Main enzyme for DNA replication is DNA Polymerase
(C) Mutation appears due to error in replication
(D) Replication on both strands of DNA is continuous

30. Which of the following enzymes is responsible for transcription of ribosomal RNA ?
(A) RNA polymerase (B) RNA polymerase I
(C) RNA polymerase II (D) RNA polymerase III

31. Some amino acids are coded by more than one codon. Such code is known as.
(A) unambiguous (B) degenerate/redundant
(C) universal (D) specific

32. What is the role of *y* gene in lac operon ?
(A) Codes for β-galactosidase
(B) Codes for permease
(C) Codes for repressor gene
(D) Codes for transacetylase

33. Paleontological evidence is based on the study of :
(A) embryological development
(B) comparative anatomy
(C) fossiles
(D) divergent evolution

34. What do analogous structures show ?
(A) Divergent evolution (B) Convergent evolution
(C) Parallel evolution (D) Saltation

35. When did pre-historic cave art develop ?
(A) 18,000 years ago (B) 10,000 years ago
(C) 75,000 years ago (D) 40,000 years ago

36. Amount of which vitamin increases after conversion of milk into curd ?
(A) Vitamin B_{12} (B) Vitamin *A*
(C) Vitamin *C* (D) Vitamin B_6

37. Alexander Fleming discovered pencillin while working on which of the following bacteria?
(A) Streptococus (B) Acetobacter
(C) Staphylococcus (D) Lactobacillus

38. Which of the following inhibits synthesis of cholesterol ?
(A) Protease (B) Streptokiase
(C) Penicillin (D) Statin

39. Capacity of generate a whole plant from a plant cells is called as :
(A) Tissue culture (B) Pluripotency
(C) Totipotency (D) Micropropagation

40. Hisardale is a breed of which of the following animals ?
(A) Cow (B) Buffalo (C) Sheep (D) Chicken

41. Which of the following techniques was used to get yellow mosaic virus resistant mung lentil ?
(A) Mutation breeding (B) Introduction
(C) Hybridisation (D) Tissue culture

42. Reason for movement of DNA fragments towards anode in electrophoresis is DNA fragments being
(A) Negatively charged (B) Positively charged
(C) Charged
(D) Charged with charges of both types

43. Which of the following is not responsible for vegetative propagation of plants ?
(A) Offset (B) Bulb (C) Rhizome (D) Gemmule

44. Which of the following statements is incorrect ?
(A) Antheridia are present on antheridiophore of female thallus of Marchantia
(B) Chara is monoecious
(C) Diploid gene forms gamete after meiosis
(D) Zoospores are formed in Chlamydomonas

45. Which of the following plants is referred to as 'Terror of Bengal' ?
(A) Water hyacinth (B) Bamboo
(C) Lantana (D) Parthenium

46. Which of the following is not a part of microsporangium ?
(A) Endothecium (B) Tapetum
(C) Epidermis (D) Micropyle

47. Which of the following cells divides to form two male gametes in angiospermic plant ?
(A) Vegetative cell (B) Generative Cell
(C) Microspore mother cell (D) Microspore

48. Which of the following is not associated with egg apparatus ?
(A) Synergid (B) Egg
(C) Antipodal cells (D) Filiform apparatus

49. Scutellium present in the seeds of grass is called :
(A) Endosperm (B) Cotyledon
(C) Seed coat (D) Embryonal axis

50. In a cross between true breeding red flowered and true breeding white flowered plants of antirrhinum the F_1 generation was pink flowered which is an example of :
(A) Dominance (B) Codominance
(C) Incomplete dominance
(D) Blending of contrasting forms of a character

51. Which of the following statements is incorrect ?
(A) Characters are controlled by factors
(B) Factors are discrete
(C) In peas factors are in pairs
(D) Alleles blend with each other

52. What is the cytological basis of law of independent assortment ?
(A) There is no blending of alleles
(B) Alleles of a pair separate during gamete formation
(C) Alleles may be dominant or recessive
(D) Pair of chromosomes arrange themselves in line independently in metaphase I

53. Who propounded the chromosomal theory of inheritance ?
(A) Mendel (B) Sutton and Boveri
(C) Morgan (D) Henking

54. Which of the following is not a chromosomal disorder ?
(A) Down's syndrome (B) Klinefelter's syndrome
(C) Turner's syndrome (D) Haemophilia

55. Who provided X-ray diffraction data of DNA ?
(A) Maurice Wilkins & Rosalind Franklin
(B) Chargaff
(C) Wastson and Crick
(D) Holley

56. What was the conclusion of Hershey and Chase experiment ?
(A) Genetic material of bacteria is DNA
(B) Genetic material of virus is DNA
(C) Genetic material of bacteria is RNA
(D) Genetic material of virus is RNA.

57. Which of the following is not a termination codon ?
(A) UAG (B) UGA (C) AUG (D) UAA

58. What is the meaning of charging of *t*-RNA ?
(A) Linking of amino acid with cognate *t*-RNA
(B) Attachment of *t*-RNA with ribosome
(C) Translation of RNA (D) Modification RNA

59. Which of the following is a non-infectious disease ?
(A) AIDS (B) Malaria (C) Cancer (D) Typhoid

60. Which of the following blood cells is known as PMNL ?
(A) Lymphocyte (B) Monocyte
(C) Neutrophil (D) Platelets

61. Which of the following is abundantly found in colostrum ?
(A) IgA (B) IgG (C) IgM (D) IgD

62. What is diacetyl morphine?
(A) Codeine (B) Heroin
(C) Cannabinoid (D) Coke

63. Which fever is confirmed by Widal test ?
(A) Malaria (B) Typhoid (C) AIDS (D) Pneumonia

64. After how many months of pregnancy, do limbs and digits of embryo develop ?
(A) 2 months (B) 3 months (C) 1 months (D) 6 months

65. Which of the following secretes large amount of progesterone ?
(A) Graafian follicle (B) Corpus albicans
(C) Corpus lutenum (D) Primary follicle

66. After ovulation the ovume is surrounded by a group of cells called :
(A) Corona radiata (B) Zona pellucida
(C) Granulosa cells (D) Theca layer

67. Which of the following cells is haploid ?
(A) Oogonia (B) Primary oocyte
(C) Secondary oocyte (D) Zygote

68. A new contraceptive pill which is non-steroidal is referred as :
(A) LNG 20 (B) Progestaset
(C) Saheli (D) Lippes loop

69. What is the population growth rate of India as per 2001 census ?
(A) 1.1 % (B) 3.7%
(C) Approximately 2% (D) 3%

70. Which of the following IUDs is hormone releasing ?
(A) Multiload 375 (B) LNG–20
(C) Lippes loop (D) Copper-T

SECTION – B (NON-OBJECTIVE TYPE QUESTIONS)

■ **Question No. 1 to 20 are Short Answer Type. Answer any 10 questions. Each question carries 2 marks.(10 × 2 = 20)**

1. What is incomplete dominance ?
2. What would be the blood group of offspring, if the blood group of mother is *AB* and blood group of father is O ?
3. Draw the symbols used for male, female, mating and consanguineous mating in human pedigree analysis.
4. What are the goals of Human Genome Project ?
5. What is the relationship between thorns of Bougainvillea and tendrils of Cucurbita ?
6. Name the different speices of Plasmodium. Which species is responsible for malignant malaria ?
7. What are the factors which affect population growth ?
8. Explain parasitic adaptations.
9. What is cell mediated immunity ?
10. What is cyclosporing-*A* and what is its use ?
11. What are the primary and secondary productivities ?
12. What is Dobson unit ?
13. How are DNA fragments separated and isolated ?
14. What is ELISA ?
15. What is MOET ?
16. How is the name given to restriction endonucleases ?
17. Describe the structure of microsporangium.
18. Explain double fertilization.
19. What are spermatogonia, primary spermatocytes and secondary spermatocytes ?
20. What are contraceptive pills ? How do they function ?

■ **Question Nos. 21 to 26 are Long Answer Type. Answer any 3 questions. Each question carries 5 marks. Give your answer in about 120 words.** [3 × 5 = 15]

21. Explain the causes of biodiversity loss.
22. Write short notes on the following
(A) Phosphorus cycle (B) Primary immunity
23. Write short notes on the following :
(A) Allergy
(B) Chemical composition of DNA
24. How is gene of interest amplified by using PCR ?
25. Answer the following questions :
(A) Stability of DNA is higher than that of RNA. How ?
(B) What are the roles of three parts of transcription unit ?
26. Write brief notes on the following ?
(A) Implantation (B) Autogamy

ANSWER

SECTION – A

1. (A)	**2.** (C)	**3.** (B)	**4.** (D)	**5.** (C)	**6.** (C)	**7.** (A)
8. (D)	**9.** (B)	**10.** (A)	**11.** (B)	**12.** (B)	**13.** (D)	**14.** (D)
15. (C)	**16.** (B)	**17.** (A)	**18.** (A)	**19.** (B)	**20.** (B)	**21.** (C)
22. (D)	**23.** (D)	**24.** (D)	**25.** (C)	**26.** (B)	**27.** (B)	**28.** (B)
29. (D)	**30.** (B)	**31.** (B)	**32.** (B)	**33.** (C)	**34.** (B)	**35.** (A)
36. (A)	**37.** (C)	**38.** (D)	**39.** (C)	**40.** (C)	**41.** (A)	**42.** (A)
43. (D)	**44.** (A,C)	**45.** (A)	**46.** (D)	**47.** (B)	**48.** (C)	**49.** (B)
50. (C)	**51.** (D)	**52.** (D)	**53.** (B)	**54.** (D)	**55.** (A)	**56.** (B)
57. (C)	**58.** (A)	**59.** (C)	**60.** (C)	**61.** (A)	**62.** (B)	**63.** (B)
64. (A)	**65.** (C)	**66.** (A)	**67.** (C)	**68.** (C)	**69.** (C)	**70.** (B)

SECTION – B

1. Hint : See 2018 (A) Q. No. 1.

2. If the blood group of mother is AB and blood group of father is O, then the blood group of offspring will be *A* or *B*.

3. Symbols used in human pedigree analysis :

For Male — ♂, For Female ♀

For Mating ⚥ For consanguinesou mating ⚲

4. Goals of human genome project :
(i) To develop ways of mapping the human genome at increasing fine level of precision.
(ii) Identify all the genes in human DNA.
(iii) Determine the sequence of the 3 billion chemical base pairs that make up human DNA.
(iv) To store this information in database and tools for data analysis.
(v) To address the ethical, legal social issues that may arise from this projects.
(vi) Transfer related technologies to other sectors such as industries.

5. Tendril of cocurbita and thorns of Bougainvillea are homologous organs because they are similar in origin as they are modified branches and axial in position. Their different function is modified for protection and in cucurbita, thendrils are for climbing.

6. Different speices of Plasmodium :
Plasmodium falciparum Plasmodium vivax
Plasmodium ovale Plasmodium malariae
Plasmodium knowlesi
Plasmodium faciparaium is responsible for malignant malaria.

7. There are many factors which affect population growth. These are—
(i) food availability (ii) predation pressure
(iii) weather conditions (iv) birth rate
(v) death rate, etc.

8. Parasitic adaptation refers to the evolutionary traits and behaviors that parasites develop to survive within their host organism. these adaptations can include specialized structure for attachement, evasion of host immune responses and machanism for obtaining nutrients from the host. Essentially, parasites have evolved to exploit their hosts for survival and resproduction.

9. Cell mediated immunity is a branch of the immune system that involves the activation of immune cells, particulary T lymphocytes (T cells), to defend the body against intracellular pathogens such as some bacteria and parasites, as well as abnormal cells like cancer cells.

10. Cyclosporine—A is a medication that belongs to a cells of drugs called immunosuppessants. It is derived from a fungus and is used primarily to prevent rejection of transplanted organs, such as kidneys, hearts and livers. It works by suppressing the immune system's response to the transplanted organ, thereby reducing the risk of rejection.

11. **Primary Productivity**—Primary productivity refers to the rate at which energy is converted by photosynthetic organism (like plants and algae) into organic substances through the process of photosynthesis. This energy is stored in the form of chemical bonds in organic matter, such as carbohydrates.
Secondary Productivity—Secondary preductivity refers to the rate at which consumers (heterotrophic organisms) convert organic matter in biomass. This includs herbivores consuming plants, carnivores consuming herbivores and so on within a food chain or food web.

12. A Dobson unit (DU) is a unit of measurement used to quantify the concentration of ozone in the Earth's atmosphere. It represnets the thickness of a layer of ozone that would be equivalent to 0.01 millimeters if compressed to standard temperature and pressure conditions.

13. DNA fragments are separated and isolated using techniques like gel-electrophoresis or chromatography based on size, charge or affinity.

14. **Enzyme Linked Immun-Sorbent Assay (ELISA):**
(i) It is based on the principle of antigen-antibody interaction.
(ii) Infection by pathogens can be detected by the presence of their antigens (proteins, glycoproteins, etc.) in body fluids/tissues or by detecting the antibodies synthesised by the host against the pathogen.

15. **MOET** stands for Multiple Ovulation and Embryo Transfer. It is a reproductive technology used in animal breeding to accelerated genetic improvement by inducing multiple ovulations in a female animal, inseminating her with seman from a superior male and transferring ensulating embryos to recipient females.

16. Restriction endonucleases are typically named after the organism they were first isolated from, followed by a Roman numeral indicating the order of discovery. For example, EcoRI was the first enzyme isolated from Escherichia coli.

17. The microsporangium located within the anthers of flowering plants, is composed of several layers of specialized cells. The outermost layer the epidermis, provides protection. Beneath it, the endothecium undergoes secondary thickening to aid in anther dehiscence. The middle layer compresed of parenchyma cells, may offer structural support. The innermost layer, the tapetum, nourishes developing microspores by producing and secreting essential substances. These layers collectively facilitate microspore development, culmination in the production of pollen grains. The microsporangium's intricate structure ensours the successful progagation of flowering plants through pollen dispersal and subsequent fertilization.

18. **Hints :** See 2017 (A) Q. No. 12.

19. Spermatogonia are diploid cells found in testes that undergoes mitosis to produce primary spermatocytes.
Primary spermocytes are also diploid and undergoes meiosis I to from secondary spermocytes.
Secondary spermocytes are haploid cells that undergo meiosis II to produces spermatids, which eventually differentiate into sperm cells.

20. Contraceptive pills are oral medications containing hormones, usually a combination of estrogen and progestin or progestion alone. They prevent pregnancy by inhibiting ovulation, thickening cervical mucus to prevent sperm from reaching the egg and thinning the uterine lining to reduce the likelihood of implantation if fertilization does occur.

21. **Hint :** See 2018 (A) Q. No. 18 (or).

22. **(A)** **Phosphorus Cycle**—Phosphorus is a major constituent of biological membranes, nucleic acids, cellular energy transfer systems (ATP) and also of shells, bones and teeth. The natural reservoir of phosphorus is rock, which contains phosphorus in the form of phosphates. When rocks are weathered, minute amount of these phosphates dissolve in solution and are absorbed by the roots of the plants. Herbivores and other animals obtain this element from plants. The waste products and the dead organisms are decomposed by phosphate solubilising bacteria releasing phosphorus.
(B) **Primary Immunity**—Primary immunity refers to the intial immune response mounted by the body upon encountering a specific pathogen or antigen for the first time. This response involves the activation and proliferation of immune cells, such as T cells and B cells, and the production of antibodies tailored to target the specific pathogen.

23. **(A)** **Hints :** See 2019 (A), Q No.–16.
(B) **DNA** (deoxyribonucleic acid) is composed of nucleotides which constist of three main components L a sugar molecule (deoxyribose), a phosphate group and one of four nitrogenoues bases—adenine (A), thymine (T), cytosine (C) or guanine (G)
These nucleotides are arranged in a double helix structure, with the sugar-phosphate backbone forming the sides and the nitrogenous bases pairing in the centre via hydrogen bonds (A with T and C with G).

24. PCR is a technique used to amplify a specific segment of DNA, including a gene of interests. Here's a brief explanation of how PCR amplifies the gene of interest—
(i) **Denaturation**—The double-stranded DNA containing the gene of interest is heated to a high temprature, typically around 95° C causing the two strands to seprated or denatured, into single strands.
(ii) **Annealing**—The reaction mixture is cooled to a temperature typically between 50–65°C. At his lower temperature, short DNA primers that are complementary to sequence flanking the genes of interest annela, or bind to their complementary sequences on each single-stranded DNA template.
(iii) **Extension**—The reaction temperature is increased to around 72°C, which is the optimal temperature for DNA polymerase activity. A heat-resistance DNA polymerase enzymes synthesis new DNA strands by extendign from the primers along the template strands, generating complementay copies of the gene of interest.
(iv) **Repeat**—The denaturation , annealing and extension steps are repeated in cycles, typically 20-40 times, resulting in exponential amplification of the target DNA sequence. Each cycle doubles the number of DNA molecules, leading to a significant increases in the amount of the gene of interest.
By the end of the PCR process, the gene of interest is amplified to a level that is detectable and suitable for downstream application, such as sequencing, cloning or analysis.

25. **(A)** DNA is more stable than RNA due to the absence of a hydroxyl group at the 2' position of deoxyribose sugar, the double stranded helical structure and fewer secondary structure formation, making it less prove to degradation.
(B) The three main parts of a transcription unit—
(i) **Prometer**—Intitiates transcription by bind RNA polymerase.
(ii) **Coding region**—Contains the gene sequence for mRNA synthesis.
(iii) **Terminator**—Singals the end of transcription and release RNA polymerase.

26. **(A)** **Implantation**—Implantation is the process by which a fertilized egg, or embryo, attaches to the lining of the uterus, where it then embed and begins to grow and develop.
(B) **Autogamy**—Autogamy is a type of self-fertilization where the egg and sperm come from the same individual organism.

■■■

MATHEMATICS – XII, 2024 (A)

Time : 3 Hours 15 Minutes] **[Full Marks 100**
Instructions for the candidates : See Previous Paper

Section – A (Objective Type Questions)

■ ***Question Nos. 1 to 100 have four options, out of which only one is correct. Answer any 50 questions. You have to mark your selected option on the OMR Sheet.***

(50 × 1 = 50)

1. $\int \frac{dx}{a^2+x^2} =$

(A) $\frac{1}{a}\tan^{-1}\frac{a}{x}+c$ (B) $\tan^{-1}\frac{x}{a}+c$

(C) $\frac{1}{a}\tan^{-1}\frac{x}{a}+c$ (D) $\frac{1}{a}\tan^{-1}x+c$

2. $\int \sec x\,dx =$

(A) $\log|\sec x+\tan x|+c$ (B) $\log|\sec x-\tan x|+c$

(C) $\log\sec x+c$ (D) $\tan^5 x+c$

3. $\int \sec^5 x\tan x\,dx =$

(A) $5\tan^5 x+c$ (B) $\frac{1}{5}\sec^5 x+c$

(C) $5\log|\cos x|+c$ (D) $\tan^5 x+c$

4. $\int \tan^2 x dx =$

(A) $\tan x+x+c$ (B) $\tan x-x+c$

(C) $\cot x+x+c$ (D) $\cot x-x+c$

5. $\int \frac{\cos 2x}{\cos^2 x.\sin^2 x}dx =$

(A) $\cot x-\tan x+c$ (B) $\tan x-\cot x+c$

(C) $-\cot x-\tan x+c$ (D) $-\tan x+c$

6. $\int \frac{x^4+1}{x^2+1}dx =$

(A) $\frac{x^3}{3}+c$ (B) $\frac{x^3}{3}-x+2\tan^{-1}x+c$

(C) $2\tan^{-1}x+c$ (D) $\frac{x^3}{3}+x+2\tan^{-1}x+c$

7. $\int \frac{1-\cos 2x}{1+\cos 2x}dx =$

(A) $\tan x+c$ (B) $\tan x+x+c$

(C) $\tan x-x+c$ (D) $-\tan x+x+c$

8. $\int \frac{dx}{2-3x} =$

(A) $-3\log|2-3x|+c$ (B) $-\frac{1}{3}\log|2-3x|+c$

(C) $-\log|2-3x|+c$ (D) $2\tan^{-1}x^4+c$

9. $\int \frac{x^3dx}{1+x^8} =$

(A) $\tan^{-1}x^4+c$ (B) $4\tan^{-1}x^4+c$

(C) $\frac{1}{4}\tan^{-1}x^4+c$ (D) $2\tan^{-1}x^4+c$

10. $\int xe^x dx =$

(A) e^x+c (B) $x-1+c$

(C) $e^x(x-1)+c$ (D) $e^x(x+1)+c$

11. The order and degree of the differential equation

$xy\left(\frac{d^2y}{dx^2}\right)+x\left(\frac{dy}{dx}\right)^2-y\frac{dy}{dx}=0$ is :

(A) order = 2, degree = 1 (B) order = 2, degree = 2

(C) order = 1, degree = 2 (D) order = 1, degree = 1

12. The integrating factor of the differential equation $\frac{dy}{dx}+2y=\sin x$ is :

(A) e^x (B) e^{3x} (C) e^{2x} (D) e^{4x}

13. The solution of the differential equation $\frac{dy}{dx}=e^{x+y}$ is :

(A) $e^x+e^{-y}=c$ (B) $e^x+e^y=c$

(C) $e^{-x}+e^y=c$ (D) $e^{-x}+e^{-y}=c$

14. The solution of differetial equation $\frac{dy}{dx}=\frac{y}{x}$ is :

(A) $y=\log|x|+c$ (B) $y=cx$

(C) $y=x\log|x|+cx$ (D) $y=\log|x|+cx$

15. The integrating factor of the differential equation $\frac{dy}{dx}+2y=e^{3x}$ is :

(A) e^{3x} (B) e^{2x} (C) e^x (D) e^{4x}

16. $(4\vec{i}+3\vec{j}+3\vec{k}).(6\vec{i}-4\vec{j}+\vec{k}) =$

(A) 22 (B) 15 (C) 21 (D) 18

17. $(\vec{i}+3\vec{j}-2\vec{k})\times(-\vec{i}+3\vec{k}) =$

(A) $9\vec{i}-\vec{j}+3\vec{k}$ (B) $9i+\vec{j}-3\vec{k}$

(C) $\vec{i}-\vec{j}+3\vec{k}$ (D) $\vec{i}+\vec{j}-3\vec{k}$

18. $|\vec{i}-\vec{j}-\vec{k}| =$

(A) $\sqrt{3}$ (B) 3 (C) $\sqrt{2}$ (D) 2

19. $\vec{j}.\vec{j} =$

(A) 0 (B) 1 (C) –1 (D) $\vec{k}$

20. $\vec{k}\times\vec{j} =$

(A) $-\vec{j}$ (B) $\vec{j}$ (C) 0 (D) $\vec{k}$

21. The slope of the tangent to the curve $y = 2x^2 + 3\sin x$ at $x = 0$ is :

(A) 3 (B) $-\frac{1}{3}$ (C) $\frac{1}{3}$ (D) – 3

22. The rate of change of the area of a circle with respect to its radius r (in cm^2/cm) at $r = 6$ cm is

(A) 10π (B) 12π (C) 8π (D) 11π

23. If events A and B are independent then :

(A) $P(A\cap B)=P(A)P(B)$

(B) $P(A\cup B)=P(A)+P(B)-P(A\cap B)$

(C) $P(A\cup B)=0$

(D) $P(A\cap B)=P(A)+P(B)$

24. The probability of drawing a king from a pack of 52 cards is :

(A) $\frac{1}{13}$ (B) $\frac{4}{13}$ (C) $\frac{1}{52}$ (D) $\frac{1}{4}$

25. $P(A)=\frac{1}{3}, P(B)=\frac{1}{4}, P(A\cap B)=\frac{1}{5} \Rightarrow P(B/A)=$

(A) $\frac{2}{5}$ (B) $\frac{3}{5}$ (C) $\frac{1}{5}$ (D) $\frac{4}{5}$

26. A coin is tossed 10 times. The probability of getting exactly six heads is :

(A) ${}^{10}C_6\left(\frac{1}{2}\right)^6$ (B) ${}^{10}C_6\left(\frac{1}{2}\right)^7$

(C) ${}^{10}C_6\left(\frac{1}{2}\right)^8$ (D) ${}^{10}C_6\left(\frac{1}{2}\right)^{10}$

27. $P(A)=\frac{6}{11}, P(B)=\frac{5}{11}, P(A\cup B)=\frac{7}{11} \Rightarrow P(A\cap B)=$

(A) $\frac{4}{11}$ (B) $\frac{5}{11}$ (C) $\frac{7}{11}$ (D) $\frac{9}{11}$

28. The equation of the xy-plane is :

(A) $x = 0$ (B) $y = 0$
(C) $z = 0$ (D) None of these

29. The direction cosines of z-axis are :

(A) (1, 0, 1) (B) (0, 0, 1)
(C) (0, 1, 0) (D) (0, 0, 0)

30. The distance between the points (4, 3, 7) and (1, –1, –5) is :

(A) 13 (B) 15 (C) 12 (D) 5

31. $\int (x+\cos 2x)\,dx =$

(A) $\frac{1}{2}x\sin 2x+\frac{1}{4}\cos 2x+c$ (B) $\frac{1}{2}x\sin 2x-\frac{1}{4}\cos 2x+c$

(C) $2x\sin 2x+4\cos 2x+c$ (D) $\frac{x^2}{2}+\frac{\sin 2x}{2}+c$

32. $\int e^x\left\{\sin^{-1}x+\frac{1}{\sqrt{1-x^2}}\right\}dx =$

(A) $e^x.\frac{1}{\sqrt{1-x^2}}+c$ (B) $e^x.\sin^{-1}x+c$

(C) $\frac{e^2}{2}+c$ (D) $e^x.\cos^{-1}x+c$

33. $\int \frac{dx}{x(x+2)} =$

(A) $\log\left|\frac{x}{x+2}\right|+c$ (B) $\frac{1}{2}\log\left|\frac{x}{x+2}\right|+c$

(C) $\log|x|+c$ (D) $\log|x+2|+c$

34. $\int \sqrt{a^2-x^2}\,dx =$

(A) $\frac{x}{2}\sqrt{a^2-x^2}\,dx$ (B) $\frac{a^2}{2}\sin^{-1}\frac{x}{a}+c$

(C) $\frac{x}{2}\sqrt{a^2-x^2}+\frac{a^2}{2}\sin^{-1}\frac{x}{a}+c$

(D) $\frac{x}{2}\sqrt{x^2-a^2}-\frac{a^2}{2}\sin^{-1}\frac{x}{a}+c$

35. $\int_{-\pi/2}^{\pi/2}\sin^7 x\,dx =$

(A) – 1 (B) 0 (C) 1 (D) 2

36. $\int_0^a \frac{\sqrt{x}}{\sqrt{x}+\sqrt{a-x}}dx =$

(A) a (B) $\frac{a}{2}$ (C) $2a$ (D) $3a$

37. $\int_0^{\pi/2}\cos 2x\,dx =$

(A) 0 (B) 1 (C) –1 (D) 2

38. $\int_0^{\pi/6}\cos x.\cos 2x\,dx =$

(A) 5/6 (B) 1/6 (C) 5/12 (D) –5/12

39. $\int_{-\pi}^{\pi}\tan x\,dx =$

(A) –1 (B) 0 (C) 2 (D) –2

40. $\int_4^9 \frac{1}{\sqrt{x}}dx =$

(A) 2 (B) $\pi/6$ (C) $\pi/4$ (D) $\pi/2$

41. $\cos^{-1}\left(-\frac{1}{2}\right)=$

(A) $\frac{2\pi}{3}$ (B) $\frac{\pi}{3}$ (C) $\frac{\pi}{6}$ (D) $\frac{\pi}{2}$

42. $x\in[-1,1], \cos^{-1}x =$

(A) $\frac{\pi}{2}-\cot^{-1}x$ (B) $\frac{\pi}{2}-\sin^{-1}x$

(C) $\frac{\pi}{2}-\tan^{-1}x$ (D) $\frac{\pi}{2}-\sec^{-1}x$

43. $x\in[-1,1], \sin^{-1}(-x) =$

(A) $-\sin^{-1}x$ (B) $\sin^{-1}x$ (C) $-\cos^{-1}x$ (D) $\cos^{-1}x$

44. $\operatorname{cosec}^{-1}x =$ ..... ; $x\geq 1$ or ≤ -1

(A) $\sin^{-1}x$ (B) $\sin^{-1}\frac{1}{x}$

(C) $\cos^{-1}x$ (D) $\cos^{-1}\frac{1}{x}$

45. $\tan\left[\tan^{-1}\frac{1}{3}+\tan^{-1}\frac{1}{2}\right]=$

(A) 1 (B) 0 (C) 2 (D) 3

46. $\sin(\cot^{-1}x) =$

(A) $\sqrt{1+x^2}$ (B) x

(C) $(1+x^2)^{-3/2}$ (D) $\frac{1}{\sqrt{1+x^2}}$

47. $\cos^{-1}\left(\cos\frac{7\pi}{6}\right)=$

(A) $\frac{7\pi}{6}$ (B) $\frac{5\pi}{6}$ (C) $\frac{\pi}{3}$ (D) $\frac{\pi}{6}$

48. $\frac{\pi}{3}-\sin^{-1}\left(-\frac{1}{2}\right)=$

(A) 0 (B) $\frac{2\pi}{3}$ (C) $\frac{\pi}{2}$ (D) π

49. $\tan^{-1}\sqrt{3}-\sec^{-1}(-2) =$

(A) $-\frac{\pi}{3}$ (B) $\frac{\pi}{3}$ (C) $\frac{2\pi}{3}$ (D) π

50. Let R be the relation in the set N given by $R = \{(a, b) : a = b - 2, b > 6\}$. The correct answer in the following is :

(A) $(6, 8) \in R$ (B) $(2, 4) \in R$

(C) $(3, 8) \in R$ (D) $(8, 7) \in R$

51. $\vec{a} \times (\vec{b} + \vec{c}) + \vec{b} \times (\vec{c} + \vec{a}) + \vec{c} \times (\vec{a} + \vec{b}) =$

(A) 1 (B) 0 (C) –1 (D) 3

52. $\vec{i} . (\vec{j} \times \vec{k}) =$

(A) 1 (B) 0 (C) –1 (D) $\vec{i}$

53. If $\vec{a} = \vec{i} + \vec{j} + 2\vec{k}$, then the corresponding unit vector $\hat{a}$ in the direction of $\vec{a}$ is :

(A) $\frac{\vec{i} + \vec{j} + \vec{k}}{\sqrt{6}}$ (B) $\frac{\vec{i} + \vec{j} + 2\vec{k}}{\sqrt{6}}$

(C) $\frac{\vec{i} + \vec{j} + 2\vec{k}}{6}$ (D) $\frac{\vec{i} + \vec{j} + \vec{k}}{6}$

54. If $3\vec{i} + \vec{j} - 2\vec{k}$ and $\vec{i} + \lambda\vec{j} - 3\vec{k}$ are perpendicular to each other :

(A) –3 (B) –6 (C) –9 (D) –1

55. $\int \cot^2 x dx =$

(A) $\cot x + x + k$ (B) $-\cot x + x + k$

(C) $-\cot x - x + k$ (D) $\cot x - x + k$

56. The angle between the vectors $2\vec{i} - 3\vec{j} + 2\vec{k}$ and $\vec{i} + 4\vec{j} + 5\vec{k}$ is :

(A) 30° (B) 90° (C) 45° (D) 60°

57. $|\vec{a} + \vec{b}| = |\vec{a} - \vec{b}| \Rightarrow$

(A) $|\vec{a}| = |\vec{b}|$ (B) $\vec{a} \| \vec{b}$ (C) $\vec{a} \perp \vec{b}$ (D) $|\vec{a}| = 0$

58. The projection of the vector $\vec{i} - 2\vec{j} + \vec{k}$ on the vector $4\vec{i} - 4\vec{j} + 7\vec{k}$ is :

(A) 9 (B) 19/9 (C) 9/19 (D) 19

59. The minimum value of $Z = 3x + 5y$ subject to the constraints where $x + y \le 2, x \ge 0, y \ge 0$ is

(A) 16 (B) 15

(C) 0 (D) none of these

60. The maximum values of $Z = 3x + 2y$ subject to the constraints where $3x + y \le 15, x \ge 0, y \ge 0$ is :

(A) 30 (B) 15

(C) 10 (D) none of these

61. $\begin{vmatrix} x & x+1 \\ x-1 & x \end{vmatrix} =$

(A) 1 (B) 0 (C) 2 (D) –1

62. If the operation $*$ is defined as $a * b = 2a + b$ then $(2 * 3) * 4$ is :

(A) 30 (B) 20 (C) 18 (D) 15

63. $\begin{vmatrix} 1 & 1 & -2 \\ 2 & 1 & -3 \\ 5 & 4 & -9 \end{vmatrix} =$

(A) 2 (B) 1 (C) 0 (D) –1a

64. $\begin{vmatrix} 3 & -4 & 5 \\ 1 & 1 & -2 \\ 2 & 3 & 1 \end{vmatrix} =$

(A) 0 (B) 46 (C) –46 (D) 1

65. $5\begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix} =$

(A) $\begin{bmatrix} 25 & 30 \\ 35 & 8 \end{bmatrix}$ (B) $\begin{bmatrix} 25 & 30 \\ 35 & 40 \end{bmatrix}$ (C) $\begin{bmatrix} 5 & 6 \\ 35 & 40 \end{bmatrix}$ (D) $\begin{bmatrix} 25 & 30 \\ 25 & 40 \end{bmatrix}$

66. $f : A \to B$ will be can onto function, if :

(A) $f(A) \subset B$ (B) $f(A) = B$

(C) $f(A) \supset B$ (D) none of these

67. $A = [a_{ij}]_{m \times n}$ is a square matrix if :

(A) $m = n$ (B) $m < n$

(C) $m > n$ (D) none of these

68. $\begin{bmatrix} -3 \\ 5 \\ 2 \end{bmatrix} [1 \quad 6 \quad -4] =$

(A) $\begin{bmatrix} -3 & -18 & 12 \\ 5 & 30 & -20 \\ 2 & 12 & -8 \end{bmatrix}$ (B) $\begin{bmatrix} -3 & -18 & 12 \\ 2 & 12 & -8 \\ 5 & 30 & -20 \end{bmatrix}$

(C) $\begin{bmatrix} 5 & 30 & -20 \\ -3 & -18 & 12 \\ 2 & 12 & -8 \end{bmatrix}$ (D) $\begin{bmatrix} 3 & 18 & 12 \\ 5 & 30 & 20 \\ 2 & 12 & 8 \end{bmatrix}$

69. $A = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix} \Rightarrow A^5 =$

(A) $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ (B) $\begin{bmatrix} 0 & 1 \\ 0 & 1 \end{bmatrix}$

(C) $\begin{bmatrix} 0 & 5 \\ 5 & 0 \end{bmatrix}$ (D) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

70. If $A = \begin{bmatrix} 3 & -5 \\ -1 & 2 \end{bmatrix}$ then adjoint $A =$

(A) $\begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$ (B) $\begin{bmatrix} 2 & 3 \\ 1 & 5 \end{bmatrix}$ (C) $\begin{bmatrix} 1 & 3 \\ 2 & 5 \end{bmatrix}$ (D) $\begin{bmatrix} 2 & 1 \\ 5 & 3 \end{bmatrix}$

71. $\frac{d}{dx} \log(\sec x + \tan x) =$

(A) $\frac{1}{\sec x + \tan x}$ (B) $\sec x$

(C) $\tan x$ (D) $\sec x + \tan x$

72. $\frac{d}{dx} (\sec^{-1} x + \operatorname{cosec}^{-1} x) =$

(A) 1 (B) 0 (C) 2 (D) –1

73. If $y = \tan^{-1} \left(\frac{1 - \cos x}{\sin x} \right)$ then $\frac{dy}{dx} =$

(A) 1 (B) –1 (C) $\frac{1}{2}$ (D) $-\frac{1}{2}$

74. If $x = a \sec \theta$, $y = b \tan \theta$ then $\frac{dy}{dx} =$

(A) $\frac{b}{a} \sec\theta$ (B) $\frac{b}{a} \operatorname{cosec}\theta$ (C) $\frac{b}{a} \cot\theta$ (D) $\frac{b}{a}$

75. If $y = \sqrt{\sin x + \sqrt{\sin x + \sqrt{\sin x + ... \infty}}}$ then $\frac{dy}{dx} =$

(A) $\frac{\sin x}{2y - 1}$ (B) $\frac{\cos x}{y - 1}$ (C) $\frac{\cos x}{2y - 1}$ (D) $\frac{1}{2y - 1}$

76. If $y = x^{20}$ then $\frac{d^2y}{dx^2} =$

(A) x^{18} (B) $20x^{19}$ (C) $380x^{18}$ (D) x^{10}

77. $\int \sqrt{1+\cos 2x}\,dx =$

(A) $\sqrt{2}\cos x + c$ (B) $\sqrt{2}\sin x + c$

(C) $\frac{2}{x^2} + c$ (D) $\sqrt{2}\sin\frac{x}{2} + c$

78. $\int \frac{\log x}{x}dx =$

(A) $\frac{1}{2}(\log x)^2 + c$ (B) $-\frac{1}{2}(\log x)^2 + c$

(C) $\frac{2}{x^2} + c$ (D) $-\frac{2}{x^2} + c$

79. $\int \frac{\cos\sqrt{x}}{\sqrt{x}}dx =$

(A) $2\sin\sqrt{x} + c$ (B) $\sin\sqrt{x} + c$

(C) $\cos\sqrt{x} + c$ (D) $2\cos\sqrt{x} + c$

80. $\int \sqrt{\cos x}.\sin x\,dx =$

(A) $\frac{2}{3}(\cos x)^{3/2} + c$ (B) $-\frac{2}{3}(\cos x)^{3/2} + c$

(C) $(\cos x)^{3/2} + c$ (D) $-(\cos x)^{3/2} + c$

81. The direction ratios of two straight lines are l, m, n and l_1, m_1, n_1. The lines will be perpendicular to each other if :

(A) $\frac{l}{l_1} = \frac{m}{m_1} = \frac{n}{n_1}$

(B) $\frac{l}{l_1} + \frac{m}{m_1} + \frac{n}{n_1} = 0$

(C) $l^2 + m^2 + n^2 = l_1^2 + m_1^2 + n_1^2$

(D) $ll_1 + mm_1 + nn_1 = 0$

82. The direction ratios of a straight line are 1, 3, 5. Then its direction consines are :

(A) $\frac{1}{9}, \frac{1}{3}, \frac{1}{5}$ (B) $\frac{1}{\sqrt{35}}, \frac{3}{\sqrt{35}}, \frac{5}{\sqrt{35}}$

(C) $\frac{5}{\sqrt{35}}, \frac{3}{\sqrt{35}}, \frac{1}{\sqrt{35}}$ (D) none of these

83. The equation of the plane parallel to the plane $3x - 5y + 4z = 11$ is :

(A) $3x - 5y + 4z = 21$ (B) $3x + 5y + 4z = 25$

(C) $3x + 5y + 4z = 35$ (D) none of these

84. The angle between two planes $2x + y - 2z = 5$ and $3x - 6y - 2z = 7$ is :

(A) $\frac{\pi}{2}$ (B) $\frac{\pi}{4}$

(C) $\cos^{-1}(4/21)$ (D) $\cos^{-1}(16/61)$

85. The distance of the plane $x - 2y + 4z = 9$ from the point $(2, 1, -1)$ is :

(A) $\frac{13}{21}$ (B) $\frac{13\sqrt{21}}{21}$

(C) $\frac{21}{13}$ (D) none of these

86. If two planes $2x - 4y + 3z = 5$ and $x + 2y + \lambda z = 12$ are mutually perpendicular to each other then $\lambda =$

(A) -2 (B) 2

(C) 3 (D) none of these

87. If the line $\frac{x-3}{a} = \frac{y-4}{b} = \frac{z-5}{c}$ is parallel to the line $\frac{x}{5} = \frac{y}{3} = \frac{z}{2}$, then :

(A) $5a + 3b + 2c = 0$ (B) $\frac{a}{5} = \frac{b}{3} = \frac{c}{2}$

(C) $5a = 3b = 2c$ (D) none of these

88. If the line $\frac{x-x_1}{a_1} = \frac{y-y_1}{b_1} = \frac{z-z_1}{c_1}$ is parallel to the plane $a_2x + b_2y + c_2z + d = 0$, then :

(A) $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ (B) $a_1x + b_1y + c_1z = 0$

(C) $a_1a_2 + b_1b_2 + c_1c_2 = 0$ (D) none of these

89. If $\begin{vmatrix} x & 2 \\ 18 & x \end{vmatrix} = \begin{vmatrix} 6 & 2 \\ 18 & 6 \end{vmatrix}$ then x is equal to :

(A) 6 (B) ± 6 (C) -6 (D) 0

90. $\int \sqrt{1-\sin 2x}\,dx =$

(A) $\sin x + \cos x + c$ (B) $\sin x - \cos x + c$

(C) $\cos x - \sin x + c$ (D) $\tan x - \cot x + c$

91. If $A = \begin{bmatrix} 2 & -3 \\ 4 & 6 \end{bmatrix}$ then $A^{-1} =$

(A) $\begin{bmatrix} \frac{1}{4} & \frac{1}{8} \\ \frac{1}{6} & \frac{1}{12} \end{bmatrix}$ (B) $\begin{bmatrix} \frac{1}{4} & \frac{1}{8} \\ -\frac{1}{6} & \frac{1}{12} \end{bmatrix}$

(C) $\begin{bmatrix} 4 & 8 \\ 6 & 12 \end{bmatrix}$ (D) $\begin{bmatrix} 4 & 8 \\ -6 & 12 \end{bmatrix}$

92. If $A = \begin{bmatrix} 3 & 6 \\ -5 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 7 & 8 \\ 5 & 6 \end{bmatrix}$ then $6A - 5B =$

(A) $\begin{bmatrix} 17 & 4 \\ 5 & 54 \end{bmatrix}$ (B) $\begin{bmatrix} 17 & -4 \\ 5 & 54 \end{bmatrix}$

(C) $\begin{bmatrix} -17 & -4 \\ -55 & -6 \end{bmatrix}$ (D) $\begin{bmatrix} 17 & -4 \\ -55 & -54 \end{bmatrix}$

93. If $A = \begin{bmatrix} 2 & \sqrt{2} & 0 \\ 3 & -2 & \frac{2}{5} \end{bmatrix}$ then $A' =$

(A) $\begin{bmatrix} 2 & -3 \\ \sqrt{2} & 2 \\ 0 & 2/5 \end{bmatrix}$ (B) $\begin{bmatrix} 2 & 3 \\ \sqrt{2} & -2 \\ 0 & 2/5 \end{bmatrix}$

(C) $\begin{bmatrix} 3 & 2 \\ -2 & \sqrt{2} \\ -2/5 & 0 \end{bmatrix}$ (D) $\begin{bmatrix} 3 & -2 & 2/5 \\ 3 & \sqrt{2} & 0 \end{bmatrix}$

94. If $2A + B + X = 0$, where $A = \begin{bmatrix} -1 & 2 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & -2 \\ 1 & 5 \end{bmatrix}$ then $X =$

(A) $\begin{bmatrix} 1 & 2 \\ -7 & -13 \end{bmatrix}$ (B) $\begin{bmatrix} 1 & 2 \\ 7 & 13 \end{bmatrix}$

(C) $\begin{bmatrix} -1 & -2 \\ -7 & -13 \end{bmatrix}$ (D) $\begin{bmatrix} -1 & -2 \\ 7 & 13 \end{bmatrix}$

95. $[x\ y] = [2x - 1 \quad 9] \Rightarrow$
(A) $x = 3, y = 9$ (B) $x = 1, y = 9$
(C) $x = 0, y = 9$ (D) $x = 3, y = 4$

96. $\frac{d}{dx}(\sin^2 x) =$
(A) $2 \sin x$ (B) $\sin 2x$
(C) $\cos 2x$ (D) $2 \cos x$

97. $\frac{d}{dx}(x^5 + \cos 2x) =$
(A) $5x^4 + \sin 2x$ (B) $5x^4 + \cos 2x$
(C) $5x^4 - 2 \sin 2x$ (D) $x^5 + 2 \sin 2x$

98. $\frac{d}{dx}(\sec^{-1} x) =$
(A) $\frac{1}{\sqrt{1-x^2}}$ (B) $\frac{1}{x\sqrt{x^2-1}}$
(C) $\frac{1}{1+x^2}$ (D) $-\frac{1}{x\sqrt{x^2-1}}$

99. $\frac{d}{dx}(a^x) =$
(A) $a^x \log a$ (B) $a^x \log x$
(C) a^x (D) $\log a$

100. $\frac{d}{dx}\log(\cos x) =$
(A) $\tan x$ (B) $-\tan x$
(C) $\cot x$ (D) $-\cot x$

Section–B (Non-Objective Type Questions)

■ ***Question Nos. 1 to 30 are Short Answer Type. Answer any 15 questions. Each question carries 2 marks.*** **15 × 2 = 30**

1. Find the distance between the planes $x - 2y + 2z = 6$ and $3x - 6y + 6z = 2$.

2. Find the equation of the plane whose intercepts on the axes of x, y, z are respectively 2, 3 and –4.

3. Find the values of p so that the lines $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z+17}{p}$ and $\frac{x+4}{2} = \frac{y+9}{2} = \frac{z-1}{2}$ are mutually perpendicular.

4. Find the mean for the following probability distribution :

x_i	0	1	2	3
p_i	1/8	3/8	3/8	1/8

5. If $\vec{a} = \vec{i} - \vec{j} + \vec{k}$ and $\vec{b} = 2\vec{i} + \vec{j} + 3\vec{k}$ then find the value of $|\vec{a} + \vec{b}|$.

6. Find the direction consines of the vector $3\vec{i} - 4\vec{j} + 12\vec{k}$.

7. If $x \cos y = \sin(x + y)$ find $\frac{dy}{dx}$.

8. Differentiate $\tan^{-1}\frac{2x}{1-x^2}$ with respect to $\sin^{-1}\frac{2x}{1+x^2}$.

9. If $x = \sqrt{1+t^2}$, $y = \sqrt{1-t^2}$ then find $\frac{dy}{dx}$.

10. Find *fog* and *gof* if $f(x) = 8x^3$ and $g(x) = x^{1/3}$.

11. Find the angle between the vectors $5\vec{i} + 3\vec{j} + 4\vec{k}$ and $6\vec{i} - 8\vec{j} - \vec{k}$.

12. Maximize $Z = 20x + 3y$ subject to $3x + 2y \le 210$, $x \ge 0$, $y \ge 0$.

13. Solve : $x^2\frac{dy}{dx} = 2xy$

14. Evaluate the determinant $\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^3 & b^3 & c^3 \end{vmatrix}$

15. If $A = \begin{bmatrix} 2 & -2 & -4 \\ -1 & 3 & 4 \\ 1 & -2 & -3 \end{bmatrix}$, show that $A^2 = A$.

16. Find the value of $\int_0^{\lambda/2} x \cos x\, dx$

17. Integrate $\int \sin^3 x\, dx$

18. Integrate $\int \frac{dx}{\sqrt{x+1} + \sqrt{x+2}}$

19. Integrate $\int \cos^3 x . \sin x\, dx$

20. Integrate $\int \frac{x^2 - 1}{x^2 + 4} dx$

21. Solve : $\frac{dy}{dx} = e^{x+y}$

22. Prove that $4(\cot^{-1} 3 + \cot^{-1} 2) = \pi$

23. Prove that $\tan^{-1} x + \tan^{-1} y = \tan^{-1}\frac{x+y}{1-xy}$

24. Find $\frac{dy}{dx}$ if $y = \sqrt{\sin x^2}$

25. If $y = \sin(xy)$ then find $\frac{dy}{dx}$

26. Integrate : $\int (x+2)^2 dx$

27. Evaluate $P(A \cup B)$ if $2P(A) = P(B) = \frac{5}{13}$ and $P(A/B) = \frac{2}{5}$.

28 If $y = x^{\sin x}$, find $\frac{dy}{dx}$

29. Find the value of $\int_0^{\lambda/2} \frac{dx}{1 + \sqrt{\tan x}}$

30. Find the value of $\int_0^a \sqrt{a^2 - x^2}\, dx$

■ ***Question Nos. 31 to 38 are Long Answer Types Questions. Answer any 4 questions. Each question carries 5 marks.*** **4 × 5 = 20**

31. Prove that $\sin^{-1}\frac{4}{5} + \sin^{-1}\frac{5}{13} + \sin^{-1}\frac{16}{65} = \frac{\pi}{2}$

32. Evaluate : $\int_0^{\pi/2} \log\cos x dx$

33. Solve : $(1+x^2)\frac{dy}{dx} + y = \tan^{-1} x$

34. Find $\frac{dy}{dx}$, when $(\sin y)^x = (\cos x)^y$

35. Evaluate the determinant $\begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix}$

36. Evaluate : $(\vec{i} - 3\vec{j} + 4\vec{k}) . \left[(2\vec{i} - \vec{j}) \times (\vec{j} + \vec{k})\right]$

37. Minimize $Z = 2x + y$
subject to $5x + 10y \le 50$, $x + y \ge 1$, $y \le 4$, $x \ge 0$, $y \ge 0$.

38. In four throws, with a pair of dice what is the probability of occurrence of doublets twice at least ?

ANSWER

SECTION–A

1.	(C)	**2.**	(A)	**3.**	(B)	**4.**	(B)	**5.**	(C)	**6.**	(B)
7.	(C)	**8.**	(B)	**9.**	(C)	**10.**	(C)	**11.**	(A)	**12.**	(C)
13.	(A)	**14.**	(B)	**15.**	(B)	**16.**	(B)	**17.**	(A)	**18.**	(A)
19.	(B)	**20.**	(*)	**21.**	(A)	**22.**	(B)	**23.**	(A)	**24.**	(A)
25.	(B)	**26.**	(D)	**27.**	(A)	**28.**	(C)	**29.**	(B)	**30.**	(A)
31.	(D)	**32.**	(B)	**33.**	(B)	**34.**	(C)	**35.**	(B)	**36.**	(B)
37.	(A)	**38.**	(C)	**39.**	(B)	**40.**	(A)	**41.**	(A)	**42.**	(B)
43.	(A)	**44.**	(B)	**45.**	(A)	**46.**	(D)	**47.**	(B)	**48.**	(C)
49.	(A)	**50.**	(A)	**51.**	(B)	**52.**	(A)	**53.**	(B)	**54.**	(C)
55.	(C)	**56.**	(B)	**57.**	(C)	**58.**	(B)	**59.**	(C)	**60.**	(A)
61.	(A)	**62.**	(C)	**63.**	(C)	**64.**	(B)	**65.**	(B)	**66.**	(B)
67.	(A)	**68.**	(A)	**69.**	(A)	**70.**	(A)	**71.**	(B)	**72.**	(B)
73.	(C)	**74.**	(B)	**75.**	(C)	**76.**	(C)	**77.**	(B)	**78.**	(A)
79.	(A)	**80.**	(B)	**81.**	(D)	**82.**	(B)	**83.**	(A)	**84.**	(C)
85.	(B)	**86.**	(B)	**87.**	(B)	**88.**	(C)	**89.**	(B)	**90.**	(A)
91.	(B)	**92.**	(C)	**93.**	(B)	**94.**	(C)	**95.**	(B)	**96.**	(B)
97.	(C)	**98.**	(B)	**99.**	(A)	**100.**	(B)				

SECTION–B

1. $P_1 = x - 2y + 2z - 6 = 0$

$\Rightarrow \quad 3x - 6y + 6z - 18 = 0$

$P_2 = 3x - 6y + 6z - 2 = 0$

$a = 3,\ b = -6,\ c = 6;\ \ d_1 = -18,\ d_2 = -2$

$$\text{Distance} = \left|\frac{d_2 - d_1}{\sqrt{a^2+b^2+c^2}}\right| = \left|\frac{-2+18}{\sqrt{9+36+36}}\right| = \left|\frac{16}{\sqrt{81}}\right|$$

$$= \left|\frac{16}{9}\right| = \frac{16}{9} \text{ Unit; Ans.}$$

2. Equation of the plane

$$\frac{x}{a}+\frac{x}{b}+\frac{z}{c}=1 \qquad [\text{here } a = 2,\ b = 3,\ c = -4]$$

$$\Rightarrow \quad \frac{x}{2}+\frac{y}{3}+\frac{z}{-4}=1$$

$$\Rightarrow \quad \frac{6x+4y+(-3z)}{12}=1$$

$\Rightarrow \quad 6x + 4y - 3z = 1 \times 12$

$\therefore \quad 6x + 4y - 3z = 12$; **Ans.**

3. **Hint :** 2020 (A) Q. No. 22.

4. Mean of probability distribution $= \Sigma p_i x_i$

$$= 0 \times \frac{1}{8} + 1 \times \frac{3}{8} + 2 \times \frac{3}{8} + 3 \times \frac{1}{8}$$

$$= 0 + \frac{3}{8} + \frac{6}{8} + \frac{3}{8}$$

$$= \frac{3+6+3}{8}$$

$$= \frac{12}{8} = \frac{3}{2} = 1.5 \text{ ; Ans.}$$

5. Given, $\vec{a} = \vec{i} - \vec{j} + \vec{k}$ and $\vec{b} = 2\vec{i} + \vec{j} + 3\vec{k}$

$\therefore \quad \vec{a} + \vec{b} = 3\vec{i} + 0\vec{j} + 4\vec{k}$

$\therefore \quad |\vec{a} + \vec{b}| = \sqrt{3^2 + 0^2 + 4^2}$

$= \sqrt{9+0+16} = \sqrt{25} = 5$; **Ans.**

6. **Hint :** See 2020 (A) Q. No. 3.

7. Given, $x \cos y = \sin (x + y)$

Diff. *w. r* to *x*,

$$x(-\sin y).\frac{dy}{dx} + \cos y \times 1 = \cos (x+y).\left(1+\frac{dy}{dx}\right)$$

$$\Rightarrow \quad -x \sin y \frac{dy}{dx} + \cos y = \cos(x+y) + \cos(x+y).\frac{dy}{dx}$$

$$\Rightarrow \quad \cos(x+y)\frac{dy}{dx} + x.\sin y \frac{dy}{dx} = \cos y - \cos(x+y)$$

$$\Rightarrow \quad \frac{dy}{dx}[\cos(x+y) + x \sin y] = \cos y - \cos(x+y)$$

$$\therefore \quad \frac{dy}{dx} = \frac{\cos y - \cos(x+y)}{\cos(x+y) + x \sin y} \text{ ; Ans.}$$

8. Let $y = \tan^{-1}\left(\frac{2x}{1-x^2}\right)$ and $z = \sin^{-1}\left(\frac{2x}{1+x^2}\right)$

Putting $x = \tan \theta$

$$y = \tan^{-1}\left(\frac{2\tan\theta}{1-\tan^2\theta}\right) = \tan^{-1}(\tan 2\theta) = 2\theta \qquad \ldots (1)$$

$$\text{and } z = \sin^{-1}\left(\frac{2\tan\theta}{1+\tan^2\theta}\right) \qquad \ldots (2)$$

$$= \sin^{-1}(\sin 2\theta) = 2\theta \quad \therefore \quad y = z$$

$$\Rightarrow \quad \frac{dy}{dz} = 1 \text{ ; Ans.}$$

9. $x = \sqrt{1+t^2}$

$$\frac{dx}{dt} = \frac{1}{2}.\frac{1}{\sqrt{1+t^2}}.2t \qquad \left[\because \ \frac{d}{dx}(x^n) = n.x^{n-1}\right]$$

$$\frac{dx}{dt} = \frac{t}{\sqrt{1+t^2}} \qquad \ldots (i)$$

$$y = \sqrt{1-t^2}$$

$$\frac{dy}{dt} = \frac{1}{2\sqrt{1-t^2}} \times (-2t)$$

$$\frac{dy}{dt} = \frac{-t}{\sqrt{1-t^2}} \qquad \ldots (ii)$$

From eq. (ii) ÷ (i),

$$\frac{\frac{dy}{dt}}{\frac{dx}{dt}} = \frac{\frac{-t}{\sqrt{1-t^2}}}{\frac{t}{\sqrt{1+t^2}}}$$

$$\Rightarrow \quad \frac{dy}{dx} = \frac{-\sqrt{1+t^2}}{\sqrt{1-t^2}} \text{ ; Ans.}$$

10. **Hint :** See 2020 (A) Q. No. 25.

11. Let $\vec{a} = 5\hat{i} + 3\hat{j} + 4\hat{k}$ and $\vec{b} = 6\hat{i} - 8\hat{j} - \hat{k}$

Let the angle between the vectors be θ.

$$\therefore \quad \cos\theta = \frac{\vec{a}\,\vec{b}}{|\vec{a}||\vec{b}|} \qquad \text{... (i)}$$

Now, $\vec{a}.\vec{b} = 5 \times 6 + 3 \times (-8) + 4 \times (-1)$

$= 30 - 24 - 4$

$= 30 - 28 = 2$

and $|\vec{a}| = \sqrt{5^2 + 3^2 + 4^2} = \sqrt{25 + 9 + 16}$

$= \sqrt{50}$

$|\vec{b}| = \sqrt{6^2 + (-8)^2 + (-1)^2}$

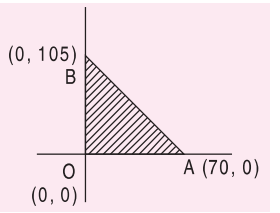
$= \sqrt{36 + 64 + 1} = \sqrt{101}$

From eq (i),

$$\cos\theta = \frac{2}{\sqrt{50} \times \sqrt{101}}$$

$$\therefore \quad \theta = \cos^{-1}\frac{2}{\sqrt{50} \times \sqrt{101}}\ ; \textbf{ Ans.}$$

12. Maximize $z = 20x + 3y$ subject to $3x + 2y \le 210$, $x \ge 0$, $y \ge 0$.



at (0, 10, 5), $z = 20.0 + 3.105 = 315$

$$\Rightarrow \quad \frac{x}{70} + \frac{y}{105} = 1 \qquad \text{... (1)}$$

at (70, 0), $z = 20.70 + 3.0 = 1400$

at (0, 0), $z = 0$

$\therefore$ Maximize $z = 1400$, at (70, 0).; **Ans.**

13. $x^2\frac{dy}{dx} = 2xy \Rightarrow \frac{dy}{dx} = 2.\frac{y}{x}$

$$\Rightarrow \quad \int \frac{dy}{y} = 2.\int \frac{dx}{x}$$

$\Rightarrow \log y = 2 \log x \Rightarrow y = c.x^2$; **Ans.**

14. Given determinant

$$= \begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^3 & b^3 & c^3 \end{vmatrix}$$

$$= \begin{vmatrix} 0 & 0 & 1 \\ a-c & b-c & c \\ a^3-c^3 & b^3-c^3 & c^3 \end{vmatrix}$$

[applying $C_1 \to (C_1 - C_3)$ and $C_2 \to (C_2 - C_3)$]

$$= (a-c)(b-c).\begin{vmatrix} 0 & 0 & 1 \\ 1 & 1 & c \\ a^2+ac+c^2 & b^2+bc+c^2 & c^3 \end{vmatrix}$$

[taking out $(a - c)$ and $(b - c)$ common from C_1 and C_2]

$$= (a-c)(b-c).1.\begin{vmatrix} 1 & 1 \\ a^2+ac+c^2 & b^2+bc+c^2 \end{vmatrix}$$

[expanded by R_1]

$= (a-c)(b-c).[(b^2+bc+c^2) - (a^2+ac+c^2)]$

$= (a-c)(b-c)[(b^2-a^2) + (bc-ac)]$

$= (a-c)(b-c)[(b^2-a^2) + (b-a)c]$

$= (a-c)(b-c)(b-a)(b+a+c)$

$= (a-b)(b-c)(c-a)(a+b+c)$; **Ans.**

15. L.H.S. $= A^2 = A.A$

$$= \begin{bmatrix} 2 & -2 & -4 \\ -1 & 3 & 4 \\ 1 & -2 & -3 \end{bmatrix}\begin{bmatrix} 2 & -2 & -4 \\ -1 & 3 & 4 \\ 1 & -2 & -3 \end{bmatrix}$$

$$= \begin{bmatrix} 4+2-4 & -4-6+8 & -8-8+12 \\ -2-3+4 & 2+9-8 & 4+12-12 \\ 2+2-3 & -2-6+6 & -4-8+9 \end{bmatrix}$$

$$= \begin{bmatrix} 2 & -2 & -4 \\ -1 & 3 & 4 \\ 1 & -2 & -3 \end{bmatrix} = A;\ \textbf{Proved}$$

16. $\int_0^{\pi/2} x \cos x\, dx$

$$\left[\because \quad \int f_1(x).f_2(x)dx = f_1(x)\int f_2(x)\,dx - \int f_1^1(x)\left\{\int f_2(x)\,dx\right\}dx + c\right]$$

$$= \left[x\int \cos dx - \int 1.\left\{\int \cos x\,dx\right\}dx\right]_0^{\pi/2} + c$$

$= \left[x\sin x - \int \sin x dx\right]_0^{\pi/2}$

$= \left[x\sin x + \cos x\right]_0^{\pi/2}$

$= \left(\frac{\pi}{2} + 0\right) - (0 + 1)$

$$\therefore \quad \int_0^{\pi/2} x\cos x\,dx = \frac{\pi}{2} - 1\ ; \textbf{ Ans.}$$

17. Let $I = \int \sin^3 x dx$

$$= \int \frac{3\sin x - \sin 3x}{4}dx$$

$$= \frac{1}{4}\left[-3\cos x - \frac{-\cos 3x}{3}\right] + C$$

$$= -\frac{3}{4}\cos x + \frac{1}{12}\cos 3x + C\ ; \textbf{ Ans.}$$

18. $\int \frac{1}{\sqrt{x+1}+\sqrt{x+2}}\,dx$

$= \int \frac{\sqrt{x+1}-\sqrt{x+2}}{(\sqrt{x+1}+\sqrt{x+2}).(\sqrt{x+1}-\sqrt{x+2})}dx$

$= \int \frac{\sqrt{x+1}-\sqrt{x+2}}{(x+1)-(x+2)}dx$

$= \int \frac{\sqrt{x+1}-\sqrt{x+2}}{x+1-x-2}\,dx$

$= -1\int \sqrt{x+1}-\sqrt{x+2}\,dx$

$= -1\left[\frac{(x+1)^{3/2}}{3/2}-\frac{(x+2)^{3/2}}{3/2}\right]+c$

$= \frac{-2}{3}[(x+1)^{3/2}-(x+2)^{3/2}]+c$; **Ans.**

19. Putting $\cos x = t$, $\sin dx = -dt$

$\therefore \quad \int \cos^3 x \sin x\,dx = -\int t^3 dt$

$= -\frac{t^4}{4}+C$

$= -\frac{1}{4}\cos^4 x + C$, **Ans.**

20. **Let,** $I = \int \frac{x^2-1}{x^2+4}dx$

$= \int \frac{x^2+4-4-1}{x^2+4}dx$

$= \int \left(\frac{x^2+4}{x^2+4}-\frac{5}{x^2+4}\right)dx$

$= \int \left(1-\frac{5}{x^2+4}\right)dx$

$= \int dx - \int \frac{5}{x^2+4}dx$

$= x-\frac{5}{2}\tan^{-1}\left(\frac{x}{2}\right)+C$; **Ans.**

21. $\frac{dy}{dx} = e^{x+y}$

$\Rightarrow \quad \frac{dy}{dx} = e^x.e^y \quad \Rightarrow \quad \int \frac{e}{e^y}dy = \int e^x dx$

$\Rightarrow \quad \int e^{-y}dy = \int e^x dx$

$\Rightarrow \quad -e^{-y} = e^x + C$

$\Rightarrow \quad e^{-y} = -e^x + C$

$\Rightarrow \quad -y = \int (-e^x + C)$

$\Rightarrow \quad y = -\int (C-e^x) = \int \left(\frac{1}{C-e^x}\right)$, **Ans.**

22. $4\,(\cot^{-1}3 + \cot^{-1}2) = \pi$

We know that $\cot^{-1}x + \cot^{-1}y = \cot^{-1}\left(\frac{xy-1}{y+x}\right)$

L.H.S. $= 4\ \cot^{-1}\left(\frac{3\times 2-1}{2+3}\right)$

$= 4\ \cot^{-1}\left(\frac{5}{5}\right)$

$= 4\ \cot^{-1}(1) = 4\times\frac{\pi}{4}$

$=$ R.H.S. **proved.**

23. Let $\tan^{-1}x = \alpha$ and $\tan^{-1}y = \beta$

$\therefore \quad x = \tan\ \alpha$ and $y = \tan\ \beta$

Now, $\tan\ (\alpha+\beta) = \frac{\tan\alpha+\tan\beta}{1-\tan\alpha\tan\beta} = \frac{x+y}{1-xy}$

or $\quad \alpha+\beta = \tan^{-1}\frac{x+y}{1-xy}$

$\therefore \quad \tan^{-1}x + \tan^{-1}y = \tan^{-1}\frac{x+y}{1-xy}$, **proved.**

24. $y = \sqrt{\sin x^2} \Rightarrow y = (\sin x^2)^{\frac{1}{2}}$

Diff. *w r* to *x*,

$\frac{dy}{dx} = \frac{1}{2}(\sin x^2)^{-\frac{1}{2}}.\cos x^2.2x$

$\frac{dy}{dx} = \frac{x.\cos(x^2)}{\sqrt{\sin x^2}}$, **Ans.**

25. $y = \sin xy$

Diff. *w r* to *x*,

$\frac{d}{dx}(y) = \frac{d}{dx}(\sin(xy))$

$= x\cos(xy)\,y^1 + y\cos(xy)$

$\Rightarrow \quad y^1 = x\cos(xy)\,y^1 + y\cos(xy)$

$\Rightarrow \quad y^1 = \frac{y\cos(xy)}{1-x\cos(xy)}$

$\therefore \quad \frac{dy}{dx} = \frac{y\cos(xy)}{1-x\cos(xy)}$; **Ans.**

26. $\int (x+2)^2 dx = \int (x^2+4x+4)\,dx$

$= \frac{x^{2+1}}{2+1}+4.\frac{x^{1+1}}{1+1}+4.\frac{x^{0+1}}{0+1}+C$

$= \frac{x^3}{3} + 4.\frac{x^2}{2} + 4.\frac{x^2}{1} + C$

$= \frac{1}{3}x^3 + 2x^2 + 4x + C$; **Ans.**

27. Hint : See 2020 (A) Q. No. 27

28. Let $y = x^{\sin x}$

Taking log on both sides,

$\log y = \log (x^{\sin x})$

$\Rightarrow \log y = \sin x \cdot \log x$

Diff. *w r* to *x*,

$\frac{1}{y}.\frac{dy}{dx} = \cos x.\log x + \sin x.\frac{1}{x}$

$\Rightarrow \frac{dy}{dx} = y\left[\cos x.\log x + \frac{\sin x}{x}\right]$

$= x^{\sin x}.\left[\cos x.\log x + \frac{\sin x}{x}\right]$, **Ans.**

29. $\int_0^{\pi/2} \frac{1}{1+\sqrt{\tan x}}dx = I$ ... (i)

$= \int_0^{\pi/2} \frac{1}{1+\sqrt{\tan(\pi/2 - x)}}dx$

$= \int_0^{\pi/2} \frac{1}{1+\sqrt{\cot x}}dx$

$= \int_0^{\pi/2} \frac{1}{1+\frac{1}{\sqrt{\tan x}}}dx$

$= \int_0^{\pi/2} \frac{\sqrt{\tan x}}{1+\sqrt{\tan x}}dx$

$\Rightarrow I + I = \int_0^{\pi/2} 1.dx$

$\Rightarrow [x]_0^{\pi/2} = 2I$

$\Rightarrow 2I = \frac{\pi}{2}$

$\therefore I = \frac{\pi}{4}$; **Ans.**

30. $\int_0^a \sqrt{a^2 - x^2}dx = \left(\frac{x}{2}\sqrt{a^2 - x^2} + \frac{a^2}{2}\sin^{-1}\frac{x}{a}\right)_0^a$

$= \left(\frac{a}{2}\sqrt{a^2 - a^2} + \frac{a^2}{2}\sin^{-1}\left(\frac{a}{a}\right)\right) - 0$

$= \left(0 + \frac{a^2}{2}.\sin^{-1}(1)\right)$

$= \frac{0^2}{2}.\frac{\pi}{2} = \frac{a^2\pi}{4}$; **Ans.**

31. Hint : See 2020 (A), Q. No. 28

32. Hint : See 2014 (A), Q. No. 46

33. Given diff. equation

$(1+x^2)\frac{dy}{dx} + y = \tan^{-1}x$

Or, $\frac{dy}{dx} + \frac{1}{1+x^2}.y = \frac{\tan^{-1}x}{1+x^2}$ ... (1)

This is linear differential equation in the form of $\frac{dy}{dx} + Py = Q$

Where $P = \frac{1}{1+x^2}$ and $Q = \frac{\tan^{-1}x}{1+x^2}$

Now I.F. $= e^{\int P\,dx} = e^{\int \frac{dx}{1+x^2}} = e^{\tan^{-1}x}$

$\therefore$ Solution of given differential equation

$y.e^{\tan^{-1}x} = \int e^{\tan^{-1}x}\frac{\tan^{-1}x}{1+x^2}dx + c$

$= \int te^t dt + c$ [Put $t = \tan^{-1}x$]

$= e^t(t-1) + c$

[by parts integrate]

$= e^{\tan^{-1}x}(\tan^{-1}x - 1) + c$

$\Rightarrow y = -1 + \tan^{-1}x + c\,e^{-\tan^{-1}x}$

This is required solution

34. $(\sin y)^x = (\cos x)^y$ [$\because \log m^n = n\log m$]

$\Rightarrow x\log\sin y = y\log\cos x$

Diff. w.r. to *u*,

$x\frac{d}{dx}\log\sin y + \log\sin y\frac{d}{dx}x$

$= y\frac{d}{dx}\log\cos x + \log\cos x\frac{dy}{dx}y$

$\Rightarrow \frac{x}{\sin y}\cos y\frac{dy}{dx} + \log\sin y = -y\frac{\sin x}{\cos x} + \log\cos x\frac{dy}{dx}$

$\Rightarrow \log\sin y + y\tan x = \log\cos x\frac{dy}{dx} - x\cot y\frac{dy}{dx}$

$\Rightarrow \frac{dy}{dx} = \frac{\log\sin y + y\tan x}{\log\cos x - x\cot y}$

$\therefore \frac{dy}{dx} = \frac{y\tan x + \log\sin y}{\log\cos x - x\cot y}$, **Ans.**

35. Hint : See 2019 (A) Q. No.—32

36. $\left(\vec{i} - 3\vec{j} + 4\vec{k}\right).\left[(2\vec{i} - \vec{j}) \times (\vec{j} + \vec{k})\right]$

$$= \begin{vmatrix} 1 & -3 & 4 \\ 2 & -1 & 0 \\ 0 & 1 & 1 \end{vmatrix}$$

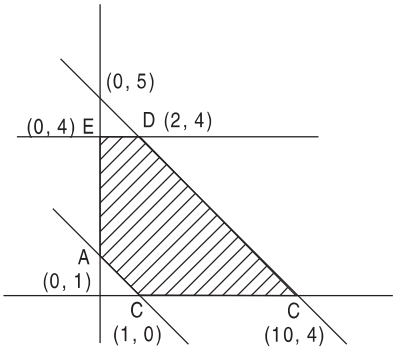
$= 1(-1) + 3(2) + 4(2)$

$= -1 + 6 + 8$

$= 13$; **Ans.**

37. $5x + 10y = 50$, $x + 1 = 1$ $y = 4$

$(10, 0), (0, 5)$ $(1, 0), (0, 1)$



$Z = 2x + 1$

$Z_A = 1$, $Z_B = 2$, $Z_C = 20$, $Z_D = 4 + 4 = 8$, $Z_E = 4$

$Z_{min} = 1$ at $(0, 1)$; **Ans.**

38. Here,

$n(S) = 36$

$n(E) = \{(1, 1), (2, 2), ... (6, 6)\} = 6$

$$P = \frac{1}{36} = \frac{1}{6}$$

$$a = \frac{5}{6}, x \geq 2$$

$P(x = 2) + P(x = 3) + P(x = 4)$

$$P(x = 2) = {}^4C_2\left(\frac{1}{6}\right)^2 \times \left(\frac{5}{6}\right)^2 = 6 \times \frac{1}{36} \times \frac{25}{36} = \frac{150}{1296}$$

$$P(x = 3) = {}^4C_3\left(\frac{1}{6}\right)^3 \times \left(\frac{5}{6}\right) = 4 \times \frac{1}{216} \times \frac{5}{36} = \frac{20}{1296}$$

$$P(x = 4) = {}^4C_4\left(\frac{1}{6}\right)^4 = \frac{1}{1296}$$

$$P_{(x=2+3+4)} = \frac{150}{1296} + \frac{20}{1296} + \frac{1}{1296}$$

$$= \frac{150 + 20 + 1}{1296}$$

$$= \frac{171}{1296} = \frac{19}{144}; \textbf{Ans.}$$

❑ ❑ ❑

ENGLISH (अंग्रेजी) – XII (100 Marks) – 2024 (A)

Time : 3 Hours 15 Minutes **Full Marks : 100**
Instructions to candidate : See previous Question

SECTION–A (OBJECTIVE TYPE)

■ **Question No. 1 to 100 have four options, out of which only one is correct. You have to mark, your selected option, on the OMR-Sheet. You have to attempt only 50 Questions.** **50×1=50**

1. Choose the correctly spelt word :
(A) Concent (B) Cunsent
(C) Consent (D) Counsent

2. They should not ..... upon the poor. (Choose the correct phrase)
(A) look up (B) look down
(C) look after (D) look on

3. There is ..... university here.
(Choose the correct option)
(A) a (B) an
(C) the (D) no article

4. Rajesh is still shouting, ... ?
(Choose the correct option)
(A) not he is (B) not is he
(C) wasn't he (D) isn't he

5. Choose the correct antonym of 'Trivial' :
(A) Rural (B) Important
(C) Loss (D) Artificial

6. This child is very ..... to me.
(Choose the correct option)
(A) deer (B) dear (C) dare (D) dearer

7. Ramesh is ..... and hearty.
(Choose the correct option)
(A) hale (B) hail (C) heal (D) head

8. Choose the correct sentence :
(A) Women were very seldom convict.
(B) His eyes had hardly close.
(C) Hardly had he settled into his seat when Radha charged in.
(D) Hardly nobody came.

9. He said that he ..... be there.
(Choose the correct option)
(A) would (B) need (C) can (D) want

10. I have not heard of you ..... last week.
(Choose the correct option)
(A) since (B) in (C) by (D) for

11. There are seven days in a :
(Choose the correct option)
(A) weak (B) weaker (C) week (D) seek

12. The police ..... the thief.
(Choose the correct option)
(A) arrest (B) arrested (C) arresting (D) has arrest

13. His progress satisfied me.
(Choose the correct passive voice)
(A) I was satisfying with his progress.
(B) I am satisfy with his progress.
(C) I was satisfied with his progress.
(D) I have to be satisfy with his progress.

14. The engagement party was cancelled as ..... people were against the marriage.
(Choose the correct option)
(A) some (B) the some
(C) little (D) the few

15. Ramesh has been absent ..... Friday.
(Choose the correct option)
(A) since (B) from
(C) for (D) by

16. Chicken and rice ..... my favourite dish.
(Choose the correct option)
(A) are (B) had
(C) is (D) have

17. Nadal won all the matches played in Paris.
(Choose the correct negative sentence)
(A) Nadal does not win all the matches played in Paris.
(B) Nadal did not lose a single match played in Paris.
(C) Nadal was not able to lose any match played in Paris.
(D) Nadal had lost any match not played in Paris.

18. He says to me, "You are my friend."
(Choose the correct indirect narration)
(A) He tells me that I am his friend.
(B) He telling me that I will be his friend.
(C) He told me I am friend of his.
(D) He will tell me that I will be his friend.

19. Give me something to eat ..... I shall die of hunger.
(Choose the correct option)
(A) else (B) can (C) for (D) but

20. All his ..... is stolen. (Choose the correct option)
(A) luggages (B) beds (C) luggage (D) furnitures

21. I bought ..... a shirt. (Choose the correct option)
(A) itself (B) himself (C) herself (D) myself

22. She is very dull. She cannot pass.
(Choose the best combination)
(A) she is too dull to pass
(B) To pass is she too dull
(C) Dull is she too to pass
(D) Too dull is to pass she

23. Praveen does not ..... with Mohan.
(Choose the correct option)
(A) agreed (B) agree
(C) to agree (D) agreeing

24. We met a lot of people ..... our holidays.
(Choose the correct option)
(A) on (B) at (C) by (D) during

25. He cannot put ..... with such insult.
(Choose the correct option)
(A) of (B) up (C) down (D) from

26. Neither of the two men ..... done this.
(Choose the correct option)
(A) have (B) has (C) may (D) should

27. Choose the correct spelling :
(A) Risemblence (B) Resiemblience
(C) Resemblance (D) Risimblence

28. He said to Rita, "Am I ill ?"
(Choose the correct indirect speech)
(A) He says that he is ill to Rita.
(B) He will say to Rita that he is ill.
(C) He asked Rita if he was ill.
(D) He said to Rita if he is ill.

29. Find out the ..... things. (Choose the correct option)
(A) discard (B) discarding
(C) will discard (D) discarded

30. Sri Lanka is ..... island. (Choose the correct option)
(A) a (B) an
(C) the (D) no article

31. We should think ..... this matter deeply.
(Choose the correct option)
(A) by (B) in (C) over (D) off

32. Choose the correct meaning of :
"To read between the lines"
(A) to understand the hidden meaning
(B) to learn quickly
(C) to laugh at
(D) to have good night

33. Choose the odd one out :
(A) School (B) University
(C) Office (D) College

34. ..... shall I fear but the ones who hurt me? (Choose the correct option)
(A) Whose (B) Whom (C) Who (D) Which

35. Choose the correct synonym of 'Forbid' :
(A) Allow (B) Prohibit
(C) Accomplish (D) Hold

36. The antonym of 'Duplicate' is :
(A) Copy (B) Original
(C) Clone (D) Photo

37. Choose the correct sentence :
(A) I did my work quick.
(B) I did my work every quick.
(C) I did my work quickly.
(D) I do my working quick.

38. I didn't ..... where he was going. (Choose the correct option)
(A) know (B) knew
(C) knowing (D) will know

39. If you invite me, I ..... certainly come. (Choose the correct answer)
(A) could (B) would
(C) might (D) would have

40. Choose the mis-spelt word :
(A) Campaign (B) Controversy
(C) Secretry (D) Decision

41. Choose the mis-spelt word :
(A) Harmaeni (B) Harmony
(C) Harmany (D) Harmeny

42. Choose the correct one word substitution of "Ceremony of crowning a king".
(A) Coquette (B) Demagogue
(C) Coronation (D) Deprecate

43. Do what you want to do, ... don't disturb me. (Choose the correct option)
(A) though (B) that (C) but (D) so

44. It was not a ..... act at all. (Choose the correct option)
(A) pardon (B) pardoning
(C) pardoned (D) pardonable

45. Choose the odd one out :
(A) Pen (B) Marker (C) Paper (D) Pencil

46. You never have bread and butter for breakfast, ... ? (Choose the correct option)
(A) have you (B) do you
(C) don't they (D) do they

47. Choose the correct meaning of : "Out of question".
(A) Undesirable (B) Impossible
(C) Unpleasant (D) Irresistible

48. Their idea of a holiday ..... at a resort. (Choose the correct option)
(A) is relaxed (B) is to relaxing
(C) is to relax (D) is relaxing

49. They decided ..... the white car. (Choose the correct option)
(A) about (B) on (C) in (D) of

50. My cycle did not ..... brakes. (Choose the correct option)
(A) has (B) have (C) had (D) did has

51. It is time for the bell to be rung. (Choose the correct active voice)
(A) It will be time to ring the bell.
(B) Time will be when she bell rings.
(C) It is time to ring the bell.
(D) Rings the bell in time.

52. He blamed ..... for the ugly situation. (Choose the correct option)
(A) himself (B) yourself
(C) themselves (D) itself

53. We ..... be quiet in the library. (Choose the correct option)
(A) mustn't (B) doesn't have to
(C) doesn't (D) must

54. I would have done a better job ..... he did. (Choose the correct option)
(A) than (B) then (C) that (D) there

55. Akbar was ..... noblest king. (Choose the correct option)
(A) a (B) an
(C) the (D) no article

56. Moti always ..... chappatis in his dinner. (Choose the correct answer)
(A) eat (B) eats (C) eating (D) eaten

57. Choose the correct sentence :
(A) He prevented me from going there
(B) He prevented me to go there
(C) He prevents me at going there
(D) He preventing me through going there

58. He ..... not be there. (Choose the correct option)
(A) is (B) shall (C) need (D) must

59. ..... the grass. (Choose the correct option)
(A) Keep off (B) Keep on
(C) Keep up (D) Keep away

60. ..... chair is required. (Choose the correct option)
(A) More (B) Much
(C) Many (D) An extra

❑ **Instruction :** *Questions from 61 to 100 are based on the prescribed texts.*

61. 'Our ancestors, therefore, set a limit to our ..... ?
(A) land (B) indulgences
(C) towns (D) grains

62. "I pledge my loyalty to my country, irrespective of religion or language ....." From whose piece is this quotation taken ?
(A) Zakir Hussain (B) Pearl S. Buck
(C) Mahatma Gandhi (D) Anton P. Chekhov

63. Nanukaka went to visit the ..... Minister.
(A) Finance (B) Welfare (C) Railway (D) Home

64. Leep, the dog, was bought for ..... rubles.
(A) 115 (B) 65 (C) 85 (D) 75

65. Pearl S. Buck was interested in meeting the :
(A) leaders (B) saint
(C) peasants (D) Americans

66. At first Benjy kept ..... hens.
(A) 10 or a dozen (B) 20
(C) 30 (D) 40

67. The ..... would not be satisfied until justice rolled down like water.
(A) Americans (B) Negroes
(C) Europeans (D) Indians

68. Bertrand Russell belonged to :
(A) Ireland (B) Iceland
(C) Britain (D) Germany

69. ..... stops and hinders our progress.
(A) Education (B) Poverty
(C) Class (D) Politics

70. ..... was twelve years old and still at primary school.
(A) Seibei (B) Seibei's friend
(C) Seibei's sister (D) Seibei's cousin

71. Donne compares his journey of life to that of the :
(A) Stars (B) Sun (C) Planets (D) Moon

72. 'Thou watchest the last oozings hours by hours.' It is from :
(A) An Epitaph (B) The Soldier
(C) Ode to Autumn (D) Song of Myself

73. "Travellers in their last distress" is from :
(A) Now the Leaves are Falling Fast
(B) An Epitaph
(C) Ode to Autumn
(D) The Soldier

74. The Soldier is a/an :
(A) sonnet (B) ballad (C) epic (D) lyric

75. Autumn is a season of :
(A) fruitfulness (B) no fire
(C) no rain (D) no leaves

76. "And when I crumble, who will remember"—is from :
(A) Ode to Autumn (B) An Epitaph
(C) Song of Myself (D) The Soldier

77. In 'Fire-Hymn', Daruwalla talks about a :
(A) burning clothes (B) burning house
(C) burning forest (D) burning ghat

78. "And his footprints are not found in any file of Scotland Yard." It is from :
(A) The Soldier (B) Fire-Hymn
(C) Ode to Autumn
(D) Macavity : The Mystery Cat

79. The grandmother's house fell ..... after her death.
(A) crazy (B) noisy (C) silent (D) chaotic

80. 'He drank enough, And lifted his head, dreamily, as one who has drunken'—is from :
(A) Snake
(B) My Grandmother's House
(C) The Soldier
(D) An Epitaph

81. The Anglo-Saxons invaded ..... in AD 449.
(A) Britain (B) Thailand
(C) America (D) Japan

82. Wycliff and Langland are writers of the ..... period.
(A) Old English (B) Middle English
(C) Modern English (D) Post-modern English

83. Macavity is said to be mysterious because :
(A) the Scotland Yard is baffled by him
(B) he has a hidden paw
(C) no one understands his ways
(D) he has hidden powers

84. Attic civilization belongs to :
(A) India (B) Greece (C) Rome (D) China

85. "The past is not dead and static, it is alive and ....."
(A) pledge (B) ethnic
(C) dynamic (D) presumptuous

86. "Nanukaka opened his silver snuffbox and took a ....."
(A) coat (B) kurta (C) pinch (D) pitch

87. Martin Luther King, Jr. wanted the Negroes to continue working with :
(A) hatred (B) jealousy (C) love (D) faith

88. "The last of the great prehistoric inventions was the art of ....."
(A) fighting (B) cooking (C) writing (D) hunting

89. "The editorial policy of a daily paper is controlled by ..... chief factors."
(A) four (B) two (C) three (D) five

90. Pearl S. Buck ate her food ..... in an Indian village.
(A) with ladle (B) with her hands
(C) with fork and spoon (D) with chop sticks

91. "That thou lov'st me, as thou say'st,' is from :
(A) Snake (B) An Epitaph
(C) Song of Myself
(D) Sweetst Love, I Do Not Goe

92. "In a series of memorable pictures, John Keats, exhibits the principle of ..... in nature."
(A) scarcity (B) beauty
(C) maturity (D) immaturity

93. The praises and images of ..... run throughout the poem "The Soldier".
(A) India (B) England (C) France (D) America

94. 'How often I think of going there, to peer through blind eyes of windows". It is from :
(A) My Grandmother's House
(B) An Epitaph
(C) Song of Myself
(D) Snake

95. Who wrote '..... for every atom belonging to me as good belongs to you'?
(A) Rupert Brooke (B) Walt Whitman
(C) John Donne (D) Water de la Mare

96. 'Hoping to cease not till death.'—is from :
(A) The Fire-Hymn
(B) The Soldier
(C) Song of Myself
(D) My Grandmother's House

97. The ..... English period is generally considered to be from AD 1150–1500.
(A) Old (B) Middle
(C) Modern (D) Post-modern

98. Latin and ..... were the two major influences on Old English.
(A) Greek (B) French
(C) Scandinavian (D) Indian

99. The Anglo–Indian community in India use ..... as their mother-tongue.
(A) Urdu (B) Parsi
(C) English (D) Hindi

100. Who wrote 'She Stoops to Conquer'?
(A) G. B. Shaw (B) T. S. Eliot
(C) Salman Rushdie (D) Oliver Goldsmith

SECTION–B (DESCRIPTIVE TYPE)

1. Write an essay on any *one* of the following in about 150-200 words : 1×8=8
(a) Value of Education
(b) Chandrayaan 3
(c) An Indian Festival
(d) Wonders of Science
(e) Noise Pollution

2. Explain any *one* of the following : 1×4=4
(a) 'A certain degree of physical harmony and comfort is necessary, but above a certain level it becomes a hindrance instead of help.'
(b) 'Fancy a lad spending his time playing around like that with gourds!...'
(c) 'In non-technocratic societies, except for remarkable accidents, birth is always attended.'
(d) My life has been too crowded with travels and many people for me to put it all within the covers of one book, ..."

3. Explain any *one* of the following : 1×4=4
(a) 'He hath no desire, nor sense,
Nor halfe so short a way;
Then feare not mee,'
(b) Cold, impossible, ahead
Lists the mountain's lovely head.
(c) 'You may meet him a by-street, you may see him in the square—
But when a crime's discovered, then macavity's not there.'
(d) 'And yet those voices :
If you were not afraid, you would kill him !'

4. Write a letter to your friend, congratulating him for his success in the Secondary Examination.

Or,

Write an application to your Headmistress asking for sick leave as you are suffering from typhoid.

5. Answer any *five* of the following in about 40-50 words: 5×2=10
(a) What does Pearl S. Buck mean by saying 'Religion is ever present in Indian life'?
(b) What did the doctor advise Benjy's parents to ensure his mental growth ?
(c) What do you mean by the term 'free press'?
(d) How are the children of the joint family in Bangladesh looked after ?

(e) Is the speaker in 'The Soldier' afraid of death?
(f) Why did the speaker like the snake?
(g) How are autumn and summer related to spring?
(h) Name three areas of English language in which rapid changes have been noticed in the last few decades.
(i) What has made English 'The most gloriously, empire language?
(j) What did the 18th century grammarians share with the Age?

6. Answer any *three* of the following in about 100-120 words: 3×5=15

(a) Write the summary of any *one* of the following poems:
(i) Sweetest Love, I Do not Goe
(ii) The Soldier
(iii) Now the Leaves are Falling Fast

(b) Write the summary of any *one* of the following prose-pieces:
(i) A Child is Born
(ii) Ideas That Have Helped Mankind
(iii) I Have a Dream

(c) Write a note on the Indian English.

OR,

Write a note on English as a world language.

OR,

Write a note on Modern English.

(d) Match the names of the poems given in List-A with their poets in List-B.

List-A	List-B
(i) The Soldier	(a) John Keats
(ii) To Autumn	(b) Rupert Brooke
(iii) Snake	(c) K. N. Daruwala
(iv) My Grandmother's House	(d) D. H. Lawrence
(v) Fire-Hymn	(e) Kamala Das

(e) Translate any *five* into English :
(i) वे लोग एक स्कूल में पढ़ाते हैं।
(ii) मेरी घड़ी में एक बजा है।
(iii) मेरे पास एक सुंदर कलम है।
(iv) लोग महात्मा गाँधी का आदर करते हैं।
(v) बिहार की भूमि उपजाऊ है।
(vi) आपको शिक्षकों का आदर करना चाहिए।
(vii) वह पढ़ाई में मरी मदद करती है।
(viii) क्या कल तुम सुनीता के यहाँ जाओगी?

(f) Match the names of the prose pieces in List-A with their authors in List-B.

List-A	List-B
(i) Bharat is My Home	(a) Dorothy L. Sayers
(ii) A Pinch of Snuff	(b) Dr. Zakir Hussain
(iii) How Free is the Press	(c) H.E. Bates
(iv) The Artist	(d) Manohar Malgaonkar
(v) The Earth	(e) Shiga Naova

7. Read the passage and answer the questions that follow: 4×1=4

Anita was enthusiastic about protecting the environment. She decided to initiate a campaign to raise awareness about the importance of recycling. Anita started by giving presentations at her school, educating her classmates about the need for a clean environment. She also created posters with catchy slogans and placed them around the community. The campaign gained momentum, and more people joined Anita's cause. Soon, Anita's efforts were recognized by local authroities and they implemented recycling programmes in the community. Anita felt proud of her contribution towards a greener and cleaner world.

Questions :
(a) What cause was Anita enthusiastic about ?
(b) Where did Anita start her campaign ?
(c) How did Anita raise awareness about recycling ?
(d) What impact did Anita's campaign have on the community ?

OR,

Write a precis of the following passage, and give a suitable title:

Humans first appeared on earth a million and a half years ago. He was a little more than an animal then. Still, early humans had some advantages over animals. He had a large brain, an erect body with fast-moving hands. He invented a language to communicate with his colleagues. The ability to speak was of the highest value because it allowed them to share ideas and plans together. Speech enabled the transmission of ideas from generation to generation. These special advantages put humans far ahead of all other living creatures.

ANSWER

SECTION – A

1.	(C)	**2.**	(B)	**3.**	(A)	**4.**	(D)	**5.**	(B)
6.	(B)	**7.**	(A)	**8.**	(C)	**9.**	(A)	**10.**	(A)
11.	(C)	**12.**	(B)	**13.**	(C)	**14.**	(A)	**15.**	(A)
16.	(C)	**17.**	(B)	**18.**	(A)	**19.**	(A)	**20.**	(C)
21.	(D)	**22.**	(A)	**23.**	(B)	**24.**	(D)	**25.**	(B)
26.	(B)	**27.**	(C)	**28.**	(C)	**29.**	(D)	**30.**	(B)
31.	(C)	**32.**	(A)	**33.**	(C)	**34.**	(B,C)	**35.**	(B)
36.	(B)	**37.**	(C)	**38.**	(A)	**39.**	(B)	**40.**	(C)
41.	(A,C,D)	**42.**	(C)	**43.**	(C)	**44.**	(D)	**45.**	(C)
46.	(A)	**47.**	(B)	**48.**	(C)	**49.**	(B)	**50.**	(B)
51.	(C)	**52.**	(A)	**53.**	(D)	**54.**	(A)	**55.**	(C)
56.	(B)	**57.**	(A)	**58.**	(C)	**59.**	(A)	**60.**	(D)
61.	(B)	**62.**	(A)	**63.**	(B)	**64.**	(C)	**65.**	(C)
66.	(A)	**67.**	(B)	**68.**	(C)	**69.**	(B)	**70.**	(A)
71.	(B)	**72.**	(C)	**73.**	(A)	**74.**	(A)	**75.**	(A)
76.	(B)	**77.**	(D)	**78.**	(D)	**79.**	(C)	**80.**	(A)
81.	(A)	**82.**	(B)	**83.**	(A)	**84.**	(B)	**85.**	(C)
86.	(C)	**87.**	(D)	**88.**	(C)	**89.**	(B)	**90.**	(B)
91.	(D)	**92.**	(B)	**93.**	(B)	**94.**	(A)	**95.**	(B)
96.	(C)	**97.**	(B)	**98.**	(C)	**99.**	(C)	**100.**	(D)

SECTION – B

1. (a) Value of Education

Education holds immense value in shaping individuals and societies. It serves as a cornerstone for personal growth and societal progress. Firstly, education empowers individuals with knowledge and skills, opening doors to various opportunities. It enhances critical thinking, a problem-solving and communication skills, essential for navigating the complexities of life.

Moreover, education fosters social development by promoting values such as tolerance, respect and cooperation. It plays a pivotal role in creating informed and responsible citizens who contribute positively to their communities. Education is a catalyst for social mobility, breaking the chains of poverty and inequality.

On an economic level, a well-educated populace drives innovation and economic prosperity. It equips individuals with the expertise required for a rapidly evolving job market, enhancing their employability and contributing to overall economic growth.

Furthermore, education promotes cultural understanding and global cooperation. It bridges gaps between different cultures, fostering a sense of unity and shared humanity. In a world interconnected by technology, education becomes a tool for building bridges, rather than walls.

In conclusion, the value of education extends for beyond individual achievements. It is the key to personal fulfillment, societal advancement, economic prosperity and global harmony. Investing in education is an investment in a brighter and more equitable future for individuals and the world at large.

(b) Chandrayaan-3

Chandrayaan-3, India's ambitious lunar exploration mission, marks significant step in the country's space exploration endeavors. Building upon the success of its predecessors, Chandrayaan-1 and Chandrayaan-2, this mission aims to further explore the mysteries of the Moon.

Chandrayaan-3 focuses on achieving a successful soft landing on the lunar surface, demonstrating India's growing prowess in space technology. It is designed to carry advanced instruments, including a lander and a rover, to conduct scientific experiments and enhance our understanding of the Moons geology.

The mission holds scientific importance as it aims to analyze the lunar surface, study the Moons mineral composition and gather valuable data that can contribute to our understanding of the Moons history and evolution. Chasndrayaan-3's success would also strengthen India's position in the global space community.

Additionally, the mission has technological significance, showcasing India's capabilities in space exploration and engineering. It highlights the country's commitment to pushing the boundaries of space science and fostering innovation in space technology.

Chandrayaan-3 exemplifies the spirit of exploration and scientific curiosity, contributing not only to India's space achievements but also to the global quest for knowledge beyond Earth. As the mission unfolds, it holds the promise of unraveling more secrets of the Moon and adding to humanity's broader understanding of the cosmos.

(c) Hint : See 2009, Q. No. 8 (c).

(d) Wonder of Science

The wonders of science are evident in every aspect of our daily lives transforming the world and shaping the way we perceive and interact with it. From advancements in medicine that enhance our well-being to technological innovations that connect the global community, science has been a driving force of progress.

One marvel of science is medical breakthroughs, revolutionizing health care and saving countless lives. Vaccines, antibiotics, and diagnostic tools have become indispensable in the fight against diseases. Science has provided solutions to once-incurable ailments, offering hope and improved quality of life.

Technological wonders, from smartphones to artificial intelligence, have reshaped the way we communicate, work and access information. The internet, a pinnacle of scientific innovation, has connected people worldwide, fostering collaboration and sharing knowledge at an unprecedented scale.

Environmental science has become crucial in addressing pressing issues like climate change and pollution. Scientists work tirelessly to develop sustainable solutions, harnessing renewable energy sources and creating technologies to mitigate the impact of human activities on the planet.

Space exploration, another marvel of science, expands our understanding of the universe. Scientific discoveries beyond Earth provide insights into the origins of our solar system and the potential for life beyond our planet.

In essence, the wonders of science permeate every facet of our existence, offering solutions to challenges and unlocking the mysteries of the universe. The continuous pursuit of knowledge through scientific inquiry not only enhances our lives but also propels humanity into a future shaped by innovation and discovery.

(e) Hint : See 2022 (A) Q. No. 1 (c).

2. (a) These lines have been taken from our most reading lesson in prose section 'Indian Civilization and Culture' which has been beautifully written in a well decorated manner about Indian living-hood.

In these lines, the author has told about human physical harmony and comfort. He tells that proper use of hands and feet can keep our health better if we use machinery or other sources of help more than proper it becomes hindrance for our physical and mental habits.

(b) This extract has been taken from our most interesting lesson in prose section 'The Artist' which has been written by H.E. Bates. In the lesson the author describes the habit of a boy named Seibei who has an unusual habit on Gourds. Since the boy has a mind of an artist so he has such an interest rather than study.

In the lesson Seibei's father is so irritated for such interest and he tells his son's activities to one of his friends who has come to attend him. He tells that all the time Seibei is engrossed on Gourds rather than playing or study.

(c) This extract has been taken from our most remarkable lesson in prose section 'A Child is Born', who has been interestedly written by Germaine Greer. This lesson deals about child-birth system in all the country. She has expressed views on it.

She tells that the women living in society which is not developed well with technology their child-births are looked after by all the members of whole family rather than expensive hospitals. In some rare cases there happen the accidents in which they have to go through the sparkling hospitals.

(d) This line has been taken from the lesson 'India Through A Travellers' Eyes' written by Pearl S. Buck. It is about her visit to India a traveller and the impressions she gathered about it. According to Pearl S. Buck, her life is full of travels. When she visited to India, she met several kinds of people. Her life is full of so many people that it is not possible to put them within the covers of one book. It means she met a large number of people in India and listened to them. She knew their future plan.

3. (a) This stanza has been taken from our most remembered lesson in poetry section 'Sweetest Love I do not goe' which has been written by John Donne in a new kind of lyrical and satirical verse. In this poem the poet moans like a lover to his beloved and expressing his love for her.

He says that he loves his beloved so much and he does not have any other desire or sense rather than his beloved. His compares his love with sun and he weights his love more than sun and tells he has no fear of anything in his life.

(b) Hint : See 2021 A, Q. No. 3 (b).

(c) The present stanza has been taken from our most interesting poem 'Macavity : The Mystery Cat' which has been written by Thomas Stearns Eliot in so decorative style. He has given a full account of his pet cat named 'Macavity' and expressed his activities in his poem.

The poet tells that he has a mind of human; extra ordinary thinking like any animals. His action is such strange that no one can claim that these crimes have been done by Macavity because if the crime is discovered no one could see him right on the spot. He can be seen in any other places but not right on the spot.

(d) This extract has been taken from the poem 'Snake' written by D. H. Lawrence. Here, in this poem, the poet is narrating an ordinary experience of finding a snake drinking water in his backyard. When the poet saw a snake who came to drink water, he was fascinated by it. He did not want to kill him.

Nature in him prevented him from killing it. But, his inner vokes, representing common belief provoking him says that he became afraid of the snake otherwise he would have killed it.

4. Dear Shantnu

Examination Hall
05 January, 2024

I hope this letter finds you well. I wanted to extend my heatfelt congratulations on your outstanding success in the secondary examination! Your hard work and dedication have truly paid off and I couldn't be happier for you. This achievement is a testament to your intelligence and perseverance.

I know the journey wasn't easy, but your determination and commitment have shone through. You success not only reflects your academic prowess but also your resilience in the face of challenges. I have no doubt that you will continue to excel in your future endeavors.

Once again, congratulations on this well-deserved achievement. I look forward to witnessing your continued success and celebrating many more milestones together.
Best wishes,

Address :

Your friend
Anand

OR,

To,
The Headmistress
HPD Jain School, Ara

Subject : Prayer for sick leave
Through : The class teacher

Ma'am,

I am Vinay Kumar studying in class X. I am writing to inform you that unfortunately, I have been diagnosed with typhoid fever and the doctor has advised me to take a period of rest for recovery.

Due to my health condition. I am unable to attend classes and actively participate in school activities. Therefore, I kindly request your permission to grant me sick leave starting from 06.02.2024 to 12.02.2024. I have attached to the medical certificate along with this application for your reference.

I shall ever be obliged to you for this kind act.

Your faithful
Vinay Kumar
Class – X 'A'
Roll – 02

Date : 05.02.2024

5. **(a)** The author wanted to express her idea about the role of the religion in Indian life. She cited the example of this fact by narrating whatever she experienced in one Indian family. While she was sitting in her host's room, one gentleman came in and without speaking to them moved to the far end of the room. There he knelt his head bowed and remained in that way for about a quarter of an hour. Her hostess explained that he was her husband's eldest brother and was offering prayer. She meant to say that religion was present in every walk of the life of an Indian. It had both the best and the worst aspects. But she did not criticize it.

(b) The doctor had advised them that Benjy needed interest that would strenthen his mind. It would be good if they gave him something to do, some occupation which helps his development.

(c) We usually mean freedom of the press in a very technical and restricted sense namely freedom from direction or censorship by the government. In this respect the British press is under ordinary conditions, singularly free.

(d) In Bangladesh, children under the age of five or six are looked after by the whole family. All the children of the joint family are looked after together. They are taken to the pond for a bath perhaps by one daughter-in-law, and six bathes them all. Then they all came in and sit down to eat.

(e) No, the speaker is not afraid of death. He would be given a corner of the foreign field.

(f) He liked the snake because it had come like a guest. It had drunk water quietly, and departed peacefully after drinking to its satisfaction.

(g) **Hint :** See 2021 A, Q. No. 5(b).

(h) English is a younger language in comparison to any other language. But there have been seen many rapid developments in English Language this is the reason that English has become a world language. Main three changes are as following :

(i) English Grammar
(ii) Spelling
(iii) Pronunciation

Removing all difficulties from English some codes for uses of proper words and cases, Greet Vowel Shift for spelling and pronunciation were made on time being many changes were put in it. It was made standard language to be understood and easy to be expressed our all types of feelings and emotions and this language development with a great speed.

(i) There are many reasons which have made English the most gloriously as rapid improvements were made into it. The rules and codes of Grammar, Spelling and Pronunciation were made. The main reason for English to be the most gloriously language was that many vocabularies were borrowed from many European Languages such as Latin, Spanish, Italian and French.

(j) The 18th century grammarians shared the spirit of the Age to establish order in English language. They saw a chaotic (confused) period of expansion and experiment of English language.

6. **(a)** **(i)** **Hint :** See 2011, Q. No. 13 (d).
(ii) **Hint :** See 2009, Q. No. 14 (c).
(iii) **Hint :** See 2013, Q. No. 12 (d).

(b) **(i)** **Hint :** See 2009, Q. No. 17 (b).
(ii) **Hint :** See 2013, Q. No. 15 (b).
(iii) **Hint :** See 2009, Q. No. 17 (d).

(c) **Hint :** See 2011, Q. No. 19.

OR,

Hint : See 2010, Q. No. 20.

OR,

Hint : See 2010, Q. No. 19.

(d) (i)—(b), (ii)—(a), (iii)—(d), (iv)—(e), (v)—(c).

(e) **(i)** They teach in a school.
(ii) It is 1'O clock by my watch.
(iii) I have a beautiful pen.
(iv) People respect Mahatma Gandhi.
(v) The land of Bihar is fertile.
(vi) You should respect teachers.
(vii) She helps me at study.
(viii) Will you go to Sunita tomorrow?

(f) (i)—(b), (ii)—(d), (iii)—(a), (iv)—(e), (v)—(c).

7. **(a)** Anita was enthusiastic about protecting the environment.

(b) Anita started her campaign at school.

(c) Anita raise awareness about recycling by giving presentations, educating her classmates and creating posters with catchy slogans.

(d) Anita's campaign were recognized by the community and they implemented recycling programmes in the community.

Or,

Title : The importance of Language

The invention of language provided humans the ability to speak which is the highest value to allow them to share ideas and planes and enabled the transmission of ideas from generation to generation.

[Total words : 90; Precised words : 30]

HINDI (हिन्दी) – XII (100 अंक) – 2024 (A)

समय : 3 घंटा 15 मिनट] [पूर्णांक : 100

परीक्षार्थी के लिए निर्देश : पूर्ववत्

खण्ड – अ (वस्तुनिष्ठ प्रश्न)

■ *प्रश्न संख्या 1 से 100 तक वस्तुनिष्ठ प्रश्न के साथ चार विकल्प दिए गए हैं, जिनमें से कोई एक सही है। इन 100 प्रश्नों में से किन्हीं 50 प्रश्नों के अपने द्वारा चुने गए सही विकल्प को OMR उत्तर-पत्रक पर चिह्नित करें।* *(50 × 1 = 50)*

1. 'छप्पय' क्या है ?
(A) अलंकार (B) रस
(C) छंद (D) संधि

2. चिंतामणि किस काल के कवि थे ?
(A) आदिकाल (B) भक्तिकाल
(C) रीतिकाल (D) आधुनिक काल

3. निम्नलिखित में कौन कवि छायावादी है ?
(A) भूषण (B) जयशंकर
(C) विनोद कुमार शुक्ल (D) नाभादास

4. 'कामायनी' महाकाव्य में कामायनी कौन है ?
(A) मनु (B) श्रद्धा
(C) इड़ा (D) रूपा

5. सुभद्रा कुमारी चौहान के पति का नाम क्या था ?
(A) ठाकुर लक्ष्मण सिंह (B) ठाकुर राम सिंह
(C) ठाकुर कृष्ण सिंह (D) ठाकुर राजा सिंह

6. 'राख से लीपा हुआ चौका'—यह पंक्ति किस शीर्षक कविता की है ?
(A) पुत्र-वियोग (B) अधिनायक
(C) उषा (D) हार-जीत

7. 'कामायनी : एक पुनर्विवार' शीर्षक रचना किसकी है ?
(A) विनोद कुमार शुक्ल (B) गाजनन माधव 'मुक्तिबोध'
(C) अशोक वाजपेयी (D) सुमित्रानंदन पंत

8. 'कौमुदी' नामक कविता केन्द्र की स्थापना किसने की ?
(A) अशोक वाजेपयी (B) रघुवीर सहाय
(C) अज्ञेय (D) रामधारी सिंह 'दिनकर'

9. विनोद कुमार शुक्ल की किस रचना पर मणिकौल ने फिल्म बनाई थी ?
(A) अतिरिक्त नहीं (B) सब कुछ होना बचा रहेगा
(C) महाविद्यालय (D) नौकर की कमीज

10. ''समय के पास समय' शीर्षक रचना किसकी है ?
(A) रघुवीर सहाय (B) अशोक वाजपेयी
(C) अज्ञेय (D) मुक्तिबोध

11. ''सर्प शब्द का पर्यायवाची शब्द क्या है ?
(A) पयोद (B) केहरि
(C) सुरंग (D) उरग

12. 'ब्रह्मा' शब्द का पर्यायवाची शब्द क्या है ?
(A) जगदीश (B) रत्नाकार
(C) चतुरानन (D) दशानन

13. 'चंद्र' शब्द का पर्यायवाची शब्द क्या है ?
(A) अंशुमाली (B) तमस
(C) शार्दूल (D) हिमांशु

14. 'जिसके चार पद है'—के लिए एक शब्द है
(A) चौमासा (B) चतुरानन
(C) चतुष्पद (D) चौराहा

15. 'जिसे भय नहीं है'—के लिए एक शब्द है :
(A) निर्दयी (B) निर्भय
(C) निर्भर (D) निर्मित

16. 'दो बार जन्म लेनेवाला'—के लिए एक शब्द है
(A) अंडज (B) पंकज
(C) जलज (D) द्विज

17. 'गिरा हुआ'—के लिए एक शब्द है
(A) पारस (B) पयोधि
(C) पावन (D) पतित

18. 'दिन दूना रात चौगुना'—मुहावरे का अर्थ है
(A) खूब उन्नति (B) खूब अवनति
(C) पतन (D) दिशाहीन

19. 'पगड़ी रखना'—मुहावरे का अर्थ है
(A) गर्मी होना (B) सिर खुजलाना
(C) इज्जत बचाना (D) इज्जत उतारना

20. 'नाच नचाना'—मुहावरे का अर्थ है
(A) मान करना (B) तंग करना
(C) नृत्य करना (D) शिष्ट होना

21. लिंग' शब्द किस भाषा का शब्द है ?
(A) तुर्की (B) फारसी
(C) संस्कृत (D) अरबी

22. 'राख' शब्द है :
(A) पुलिंग (B) स्त्रीलिंग
(C) उभयलिंग (D) इनमें से कोई नहीं

23. 'मोती' शब्द क्या है ?
(A) पुलिंग (B) स्त्रीलिंग
(C) उभयलिंग (D) इनमें से कोई नहीं

24. निम्नलिखित में कौन वर्ण अघोष है ?
(A) ज (B) ग
(C) ड (D) थ

25. निम्नलिखित में कौन वर्ण अंत:स्थ व्यंजन का उदाहरण है ?
(A) य (B) क
(C) च (D) ट

26. हिन्दी में ऊष्म व्यंजनों की संख्या कितनी है ?
(A) दो (B) तीन
(C) चार (D) पाँच

27. 'फ' का उच्चारण क्या है ?
(A) तालु (B) मूर्द्धा
(C) दंत (D) ओष्ठ

28. 'वह आदमी है ।' इस वाक्य में 'भला' किस विशेषण का उदाहरण है ?
(A) संख्यावाचक (B) परिणामवाचक
(C) संकेतवाचक (D) गुणवाचक

29. 'ए' वर्ण किस स्वर का उदाहरण है ?
(A) ह्रस्व (B) दीर्घ
(C) प्लुत (D) लघु

30. 'देवेश' शब्द का संधि-विच्छेद है
(A) देवता + ईश (B) दैव + ईश
(C) देव + ईश (D) देवे + श

31. 'सौ अनाज एक सुजान' नामक उपन्यास के उपन्यासकार कौन है ?
(A) जयप्रकाश नारायण (B) जगदीशचन्द्र माथुर
(C) बालकृष्ण भट्ट (D) मोहन राकेश

32. शिक्षा प्राप्ति के लिए अमेरिका कौन गये थे?
(A) बालकृष्ण भट्ट (B) चन्द्रधर शर्मा गुलेरी
(C) जयप्रकाश नारायण (D) रामधारी सिंह 'दिनकर'

33. 'अर्धनारीश्वर' कल्पित रूप है :
(A) राधा और कृष्ण का (B) शंकर और पार्वती का
(C) सीता और राम का (D) विष्णु और लक्ष्मी का

34. मालती के बच्चे का नाम क्या है ?
(A) टिटी (B) सिटी
(C) किटी (D) चिटी

35. भगत सिंह का जन्म कब हुआ था ?
(A) सन् 1907 में (B) सन् 1911 में
(C) सन् 1914 में (D) सन् 1915 में

36. 'तीनकठिया' प्रथा का संबंध किससे है ?
(A) हींग (B) कपास
(C) नील (D) रंग

37. 'सिपाही का माँ' शीर्षक पाठ का साहित्यिक विधा क्या है ?
(A) लेख (B) कहानी
(C) एकांकी (D) निबंध

38. 'जनयुग' पत्रिका के संपादक कौन थे ?
(A) गणेश शंकर विद्यार्थी (B) अज्ञेय
(C) बालकृष्ण भट्ट (D) नामवर सिंह

39. 'सदियों का संताप' शीर्षक कृति किसकी है ?
(A) ओमप्रकाश वाल्मीकि (B) नामवर सिंह
(C) मलयज (D) उदय प्रकाश

40. ओमप्रकाश वाल्मीकि का जन्म कहाँ हुआ था ?
(A) बरला, मुजफ्फरनगर (B) महुई, आजमगढ़
(C) सीता, अनूपपुर (D) निहालपुर, इलाहाबाद

41. 'अगम' शब्द का विलोम क्या होगा ?
(A) आगम (B) गम
(C) सरगम (D) सुगम

42. 'एकेश्वरवाद' शब्द का विलोम क्या होगा ?
(A) ईश्वरवाद (B) बहुदेवीवाद
(C) बहुदेववाद (D) बहुतदेवाद

43. 'उग्र' शब्द का विलोम क्या होगा ?
(A) अधः (B) सौम्य
(C) तारा (D) उदार

44. निम्नलिखित में कौन शब्द विसर्ग संधि का उदाहरण है?
(A) दुष्कर (B) अहंकार
(C) पंचम (D) जगदीश

45. 'जगत् + आनंद' - पदों की संधि है :
(A) जगनंद (B) जगतआनंद
(C) जगतानंद (D) जगदानंद

46. निम्नलिखित में कौन शब्द यण् स्वरसंधि का उदाहरण है ?
(A) यद्यपि (B) देवर्षि
(C) विद्यार्थी (D) चयन

47. 'सज्जन' शब्द का संधि-विच्छेद है :
(A) सम् + जन (B) सत् + जन
(C) सज् + जन (D) सद् + जन

48. 'रमेश' शब्द का संधि-विच्छेद क्या है ?
(A) रम + श (B) रमन + ईश
(C) रमा + ईश (D) रम + इश

49. निम्नलिखित में कौन शुद्ध शब्द है?
(A) परीक्षण (B) पीचास
(C) प्रान (D) भुधर

50. 'वीणापाणि' शब्द में कौन समास है ?
(A) नञ् (B) द्विगु
(C) अव्ययीभाव (D) बहुव्रीहि

51. 'तूती बोलना' - मुहावरे का अर्थ है :
(A) तोता जैसा बोलन (B) प्रभाव खोना
(C) अप्रभावित करना (D) प्रभाव जमाना

52. 'गीता गयी होगी'-किस काल का उदाहरण है ?
(A) वर्तमान काल (B) पूर्ण वर्तमान काल
(C) भूतकाल (D) भविष्यत काल

53. 'रीति' शब्द का बहुवचन रूप क्या है ?
(A) रीतियाँ (B) रितिओ
(C) रितियाएँ (D) रितें

54. 'चंदन ने उसका व्यापार हथिया लिया'-यह वाक्य किस क्रिया का उदाहरण है ?
(A) पूर्वकालिक क्रिया (B) प्रेरणार्थक क्रिया
(C) नामबोधक क्रिया (D) पुनरुक्त क्रिया

55. 'भारत का राष्ट्रपति कौन है ?' इस वाक्य में 'कौन' किस सर्वनाम का उदाहरण है ?
(A) पुरुषवाचक (B) निजवाचक
(C) प्रश्नवाचक (D) संबंधवाचक

56. 'मैं घड़ा भरता हूँ।'-वाक्य में कौन क्रिया है ?
(A) सकर्मक (B) अकर्मक
(C) द्विकर्मक (D) संयुक्त

57. 'वह कलम से लिखता है'-किस कारक का उदाहरण है ?
(A) कर्ता (B) कर्म
(C) करण (D) अपादान

58. 'निम्नलिखित में कौन शब्द अशुद्ध है ?
(A) वनवास (B) रसायन
(C) मरण (D) वीना

59. (-) कोष्ठक में अंकित विराम चिह्न है :
(A) प्रश्नवाचक (B) पूर्णविराम
(C) योजक (D) अल्पविराम

60. 'मंडली' शब्द में कौन संज्ञा है ?
(A) जातिवाचक (B) गुणवाचक
(C) समूहवाचक (D) द्रव्यवाचक

61. 'जूठन' शीर्षक आत्मकथा के लेखक के बड़े भाई का नाम क्या था ?
(A) सुखवीर (B) मनमीत
(C) गजोधर (D) कालीराम

62. निम्नलिखित में कौन रचना मलयज की है ?
(A) छायावाद (B) वट पीपल
(C) हुंकार (D) संवाद और एकालाप

63. 'तिरिछ' शीर्षक कहानी के कहानीकार के अनुसार दशहरे के दिन किस पक्षी को जरूर देखना चाहिए ?
(A) मैना (B) तीतर
(C) नीलकंठ (D) कबूतर

64. लीडबेटर किसमें 'विश्व शिक्षक' का रूप देखते थे ?
(A) बालकृष्ण भट्ट में (B) जे॰ कृष्णमूर्ति में
(C) उदय प्रकाश में (D) ओमप्रकाश वाल्मीकि में

65. 'पॉल गोमरा का स्कूटर' किसकी रचना है ?
(A) उदय प्रकाश (B) मलयज
(C) अज्ञेय (D) जे॰ कृष्णमूर्ति

66. जे॰ कृष्णमूर्ति का पूरा नाम क्या था ?
(A) जान कृष्णमूर्ति (B) जिद्दू कृष्णमूर्ति
(C) जेसर कृष्णमूर्ति (D) जार्ज कृष्णमूर्ति

67. जायसी किस भाषा के कवि थे ?
(A) ब्रजभाषा (B) अवधी
(C) कन्नौजी (D) बघेली

68. निम्नलिखित में कौन कवि सगुण भक्तिधारा के हैं ?
(A) जायसी (B) कबीरदास
(C) सूरदास (D) कुतुबन

69. किस कवि का मूल नाम 'रामबोला' था ?
(A) तुलसीदास का (B) नाभादास का
(C) सूरदास का (D) कबीरदास का

70. तुलसीदास का स्थाई निवास-स्थान कहाँ था ?
(A) अयोध्या में (B) काशी में
(C) सीतापुर में (D) रामपुर में

71. 'हरिशंकर' शब्द में कौन समास है ?
(A) द्विगु (B) कर्मधारय
(C) द्वन्द्व (D) अव्ययीभाव

72. 'चरणकमल' शब्द में कौन समास है ?
(A) कर्मधारय (B) तत्पुरुष
(C) अव्ययीभाव (D) द्वन्द्व

73. 'रसभरा' शब्द में कौन समास है ?
(A) कर्म तत्पुरुष (B) करण तत्पुरुष
(C) संप्रदान तत्पुरुष (D) अपादान तत्पुरुष

74. 'निम्नलिखित में कौन शब्द द्विगु समास का उदाहरण है ?
(A) पंचपात्र (B) नीलकलम
(C) देशभक्ति (D) प्रेससिक्त

75. किसी भाषा के मूल शब्द को क्या कहते हैं ?
(A) तत्सम (B) तद्भव
(C) देशज (D) विदेशी

76. 'सौ' शब्द का तत्सम रूप क्या है ?
(A) कोटि (B) लक्ष
(C) पद्म (D) शत

77. निम्नलिखित में कौन शब्द विदेशी शब्द है ?
(A) क्षीर (B) फूल
(C) अश्व (D) कैंची

78. 'जलज' शब्द किस शब्द का उदाहरण है ?
(A) रूढ़ (B) देशज
(C) योगरूढ़ (D) विदेशी

79. 'अधिकार' शब्द में उपसर्ग कौन है ?
(A) अति (B) आ
(C) अधि (D) अनु

80. 'अव' उपसर्ग से बना हुआ शब्द कौन है ?
(A) आगमन (B) अध्यक्ष
(C) अनुज (D) अवज्ञा

81. 'कवि ने कहा' शीर्षक रचना किसकी है ?
(A) मुक्तिबोध (B) ज्ञानेंद्रपति
(C) सुभद्रा कुमारी चौहान (D) शमशेर बहादुर सिंह

82. किस चौराहे पर लोगों की भीड़ लगी हुई थी ? 'रस्सी का टुकड़ा' शीर्षक कहानी के अनुसार लिखें।
(A) नीरदलैण्ड (B) आर्केदिया
(C) गोदरविल (D) केरासम्स

83. चेख्यकोव किससे माफी माँगने गया था ?
(A) पत्नी से (B) पिता से
(C) ब्रिजालोव से (D) ऐनलियो से

84. फ्रेंक्का का आया कौन थी ?
(A) कारमेन (B) फर्डिनांड
(C) ऐमिली (D) बनाशो

85. 'देखते नहीं यह रेशम से कढ़ा हुआ सालू''-यह पंक्ति किस शीर्षक कहानी की है ?
(A) जूठन (B) तिरिछ
(C) उसने कहा था (D) रोज

86. 'बिहार में हिन्दी की वर्तमान स्थिति' विषय पर लेख के लिए किसने सर्वोच्च पुरस्कार प्राप्त किया ?
(A) बालकृष्ण भट्ट (B) ओमप्रकाश बाल्मीकि
(C) रामधारी सिंह 'दिनकर' (D) जयप्रकाश नारायण

87. 'आपस में धाँगड़' किस भाषा में बात करते थे ?
(A) मिश्रित बुंदेली (B) ब्रजबुली
(C) मिश्रित ओराँव (D) मणिपुरी

88. 'जानवर और जानवर' शीर्षक रचना किसकी है ?
(A) उदय प्रकाश (B) मोहन राकेश
(C) अज्ञेय (D) बालकृष्ण भट्ट

89. 'सिपाही की माँ' शीर्षक एकांकी की मुन्नी की अवस्था क्या थी ?
(A) 10 वर्ष (B) 12 वर्ष
(C) 13 वर्ष (D) 14 वर्ष

90. 'रत्नाकर त्रिपाठी किस कवि के पिता थे ?
(A) भूषण (B) तुलसीदास
(C) नाभादास (D) सूरदास

91. 'सुवास' शब्द में उपसर्ग कौन है ?
(A) नि (B) सम्
(C) सु (D) वि

92. 'लघुत्व' शब्द में प्रत्यय कौन है ?
(A) अ (B) त्व
(C) लघु (D) क्तवा

93. 'वीरता' शब्द में प्रत्यय कौन है ?
(A) वीर (B) वि
(C) ता (D) अ

94. 'रक्तिमा' शब्द में प्रत्यय कौन है ?
(A) इमा (B) ईमा
(C) आ (D) रक्त

95. 'पर्वत' शब्द का विशेषण क्या है ?
(A) परबत (B) पार्वती
(C) पर्वतीय (D) पवित्र

96. 'प्रथम' शब्द का विशेषण क्या है ?
(A) प्राथमिक (B) प्रयास
(C) प्रार्थना (D) पृथक

97. 'निज' शब्द का विशेषण क्या है ?
(A) नजर (B) निजी
(C) निजाम (D) निर्जीव

98. 'दरिंदों ने केवल मासूमों को लूटा ही नहीं, बल्कि उनकी हत्या भी कर दी'-किस वाक्य का उदाहरण है ?

(A) सरल वाक्य (B) मिश्र वाक्य
(C) संयुक्त वाक्य (D) आज्ञावाचक वाक्य

99. निम्नलिखित में शुद्ध वाक्य कौन है ?

(A) मैंने एक वर्ष तक उनकी प्रतीक्षा देखी।
(B) यह काम आप पर निर्भर करता है।
(C) पशुओं का झुंड चारों ओर पानी की खोज में घूम रहा था।
(D) मेरे लिए ठंडी बर्फ और गर्म आग लाओ।

100. 'वहाँ अकेल बैठा हुआ आदमी अपराधी है'-इस वाक्य में कौन पदबंध है ?

(A) संज्ञा पदबंध (B) सर्वनाम पदबंध
(C) विशेषण पदबंध (D) क्रिया पदबंध

खण्ड - ब (विषयनिष्ठ प्रश्न)

1. निम्नलिखित में से किसी एक विषय पर निबंध लिखें : 1×8=8

(i) राष्ट्र-निर्माण और नारी (ii) नशा उन्मूलन
(iii) बेरोजगारी (iv) छात्र और अनुशासन
(v) स्वच्छ भारत अभियान (vi) साहित्य और समाज

2. निम्नलिखित में से किन्हीं दो अवतरणों की सप्रसंग व्याख्या करें : 2×4=8

(i) ''नर और मादा पशुओं में भी थे और पक्षियों में भी। किंतु पशुओं और पक्षियों ने अपनी मादाओं पर आर्थिक परवशता नहीं लादी। लेकिन, मनुष्य की मादा पर यह पराधीनता आप से आप लद गई।''

(ii) ''जो कुछ मवाद या धुआँ जमा रहता है, वह बातचीत के जरिए भाप बनकर बाहर निकल पड़ता है।''

(iii) ''दीन, सब अँगहीन, छीन, मलीन, अघी अघाइ।
नाम लै भरै उदर एक प्रभु-दासी-दासा कहाइ॥''

(iv) ''तड़प रहे हैं विकल प्राण ये
मुझको पल भर शांति नहीं है
वह खोया धन पा सकूँगी
इसमें कुछ भी भ्रांति नहीं है।''

3. अपने महाविद्यालय के प्रधानाचार्य के पास एक आवेदन-पत्र लिखें, जिसमें खेल का सामान उपलब्ध कराने का अनुरोध किया गया हो। 1×5=5

अथवा

अपने विद्यालय में मनाए गए 'बिहार दिवस' का वर्णन करते हुए मित्र के पास एक पत्र लिखें।

4. निम्नलिखित प्रश्नों में से किन्हीं पाँच के उत्तर दें : 5×2=10

(i) जब तक मनुष्य बोलता नहीं, तब तक उसके व्यक्तित्व का कौन-सा पक्ष प्रकट नहीं होता है ?
(ii) 'उसने कहा था' शीर्षक कहानी किस प्रकार की कहानी है ?
(iii) दलविहीन लोकतंत्र और साम्यवाद में कैसा संबंध है ?
(iv) बुद्ध ने आनंद से क्या कहा ? 'अर्धनारीश्वर' शीर्षक निबंध के अनुसार लिखें।
(v) लेखक और मालती के संबंध का परिचय 'रोज' शीर्षक कहानी के आधार पर दें।
(vi) भगत सिंह के अनुसार विद्यार्थियों को राजनीति में भाग क्यों लेना चाहिए ?
(vii) तुलसी, सीता से कैसी सहायता माँगते हैं ?
(viii) 'कबीर कानि राखी नहीं' से क्या तात्पर्य है ?
(ix) शिवाजी की तुलना भूषण ने मृगराज से क्यों की है
(x) कवयित्री का 'खिलौना' क्या है ?

5. निम्नलिखित में से किन्हीं तीन प्रश्नों के उत्तर दें : 3×5=15

(i) भूषण के प्रथम कवित्त का भावार्थ लिखें।
(ii) 'तुमुल कोलाहल कलह में' शीर्षक कविता का भावार्था लिखें।
(iii) सुभद्रा कुमारी चौहान की रचना 'पुत्र वियोग' का सारांश लिखें।
(iv) लहना सिंह का परिचय अपने शब्दों में दें।
(v) विद्यालय में लेख के साथ कैसी घटनाएँ घटती हैं? 'जूठन' शीर्षक आत्मकथा के आधार पर लिखें।
(vi) 'सिपाही की माँ' शीर्षक एकांकी का सारांश लिखें।

6. निम्नलिखित अवतरणों में से किसी एक का संक्षेपण कीजिए। 1× 4 = 4

(i) भारत के लिए लोक अदालत कोई अपरिचित नाम नहीं है। यहाँ पंचों के माध्यम से विवाद के निपटारे की व्यवस्था अत्यंत प्राचीन है। यह हमारी संस्कृति की पहचान है, जिसे विश्व के समृद्ध राष्ट्र भी हमारी गौरव-निधि मानते हैं। यहाँ पहले जब न्याय पंचायतें नहीं थीं तो गाँव के चौपाल पर विवादों का निपटारा होता था। धीरे-धीरे देश में अदालती-प्रथा की शुरुआत हुई। नि:संदेह अदालती प्रथा ने देश में विधिवत् विधि शासन व्यवस्था की स्थापना की, किन्तु यह औपचारिकताओं में इतनी जकड़ गयी कि लोग वर्षों तक न्याय के लिए तरसने लगे और न्यायालयों के प्रति आम आदमी की आस्था डगमगाने लगी।

(ii) किसी भी राष्ट्र या जाति में संजीवनी शक्ति भरने वाला साहित्य ही है। साहित्य की महत्ता को पूरे विश्व ने मिलकर स्वीकारा है। साहित्य समाज का दर्पण होता है। एक सभ्य समाज की कल्पना साहित्य के बिना नहीं की जा सकती, क्योंकि समाज को राह दिखाने वाला, उसका मार्गदर्शक साहित्य ही है। अनेक विद्वानों ने यह स्वीकार किया है कि साहित्य के बिना मानव का जीवन अधूरा है। इसलिए साहित्य का अध्ययन सबके लिए आवश्यक है। जिस प्रकार भोजन हमारी शारीरिक जरूरतों की पूर्ति करता है ठीक उसी प्रकार साहित्य हमारी मानसिक आवश्यकताओं की पूर्ति करता है।

उत्तरमाला (ANSWER)

खण्ड - अ

1. (C)	2. (C)	3. (B)	4. (B)	5. (A)	6. (C)
7. (B)	8. (B)	9. (D)	10. (B)	11. (D)	12. (C)
13. (D)	14. (C)	15. (B)	16. (D)	17. (D)	18. (A)
19. (C)	20. (B)	21. (C)	22. (B)	23. (A)	24. (D)
25. (A)	26. (C)	27. (D)	28. (D)	29. (B)	30. (C)
31. (C)	32. (C)	33. (B)	34. (A)	35. (A)	36. (C)
37. (C)	38. (D)	39. (A)	40. (A)	41. (D)	42. (C)
43. (B)	44. (A)	45. (D)	46. (A)	47. (B)	48. (C)
49. (A)	50. (D)	51. (D)	52. (C)	53. (A)	54. (C)
55. (C)	56. (A)	57. (C)	58. (D)	59. (C)	60. (C)
61. (A)	62. (D)	63. (C)	64. (B)	65. (A)	66. (B)
67. (B)	68. (C)	69. (A)	70. (B)	71. (C)	72. (A)
73. (B)	74. (A)	75. (A)	76. (D)	77. (D)	78. (C)
79. (C)	80. (D)	81. (B)	82. (C)	83. (C)	84. (A)
85. (C)	86. (D)	87. (C)	88. (B)	89. (D)	90. (A)
91. (C)	92. (B)	93. (C)	94. (A)	95. (C)	96. (A)
97. (B)	98. (C)	99. (C)	100. (A)		

खण्ड - ब

1. (i) राष्ट्र-निर्माण और नारी

राष्ट्र निर्माण और नारी के बीच गहरा संबंध है। नारी समाज का मूल आधार होती है और उसके योगदान के बिना किसी भी समाज का विकास संभव नहीं है। राष्ट्र निर्माण में भी नारी का महत्वपूर्ण योगदान होता है। नारी के शिक्षित, सक्षम और स्वतंत्र होने पर ही एक समृद्ध राष्ट्र की स्थापना हो सकती है। नारी की सक्षमता को बढ़ाने के लिए समाज में उसके समर्थन, शिक्षा और सामाजिक समानता की दिशा में कदम उठाने की जरूरत है।

नारी के उत्थान से समाज में समृद्धि और विकास आता है। उसके समान अधिकार, योग्यता के आधार पर काम करने की स्वतंत्रता और समाज में उसकी भूमिका को महत्व देने से ही राष्ट्र निर्माण में सफलता मिलती है। इसलिए नारी के सशक्तिकरण और समाज में उसके योगदान को महत्त्वपूर्ण माना गया है।

समाज में नारी के समर्थन और समानता के माध्यम से ही एक मजबूत और सशक्त राष्ट्र का निर्माण हो सकता है। इसलिए, नारी को सामाजिक, आर्थिक और राजनीतिक समर्थन प्रदान करना अत्यंत आवश्यक है।

(ii) संकेत : 2018 (A) के प्रश्न-1 का उत्तर देखें।

(iii) संकेत : 2011 (A) के प्रश्न-3 (ग) का उत्तर देखें।

(iv) संकेत : 2017 (A) के प्रश्न-1 (v) का उत्तर देखें।

(v) संकेत : 2020 (A) के प्रश्न-1 (iv) का उत्तर देखें।

(vi) साहित्य और समाज

साहित्य समाज की आत्मा और विचारधारा का प्रतिबिंब होता है, जो समाज के विभिन्न पहलुओं को प्रकट करता है। साहित्य और समाज एक-दूसरे को प्रभावित करते हैं। किसी भी राष्ट्र या जाति में संजीवनी शक्ति भरने वाला साहित्य ही है। साहित्य की महत्ता को पूरे विश्व ने स्वीकार किया है। साहित्य समाज का दर्पण होता है। एक सभ्य समाज की कल्पना साहित्य के बिना नहीं की जा सकती, क्योंकि समाज को राह दिखाने वाला, उसका मार्गदर्शक साहित्य ही है। अनेक विद्वानों ने यह स्वीकार किया है कि साहित्य के बिना मानव का जीवन अधूरा है। इसलिए साहित्य का अध्ययन सबके लिए आवश्यक है। जिस प्रकार भोजन हमारी शारीरिक जरूरतों की पूर्ति करता है ठीक उसी प्रकार साहित्य हमारी मानसिक आवश्यकताओं की पूर्ति करता है। साहित्य के माध्यम से समाज के विभिन्न वर्गों और समुदायों के बीच संबंधों को समझने में मदद मिलती है। इसके माध्यम से सामाजिक असमानता, अन्याय और अधिकारों के उल्लंघन को उजागर किया जा सकता है, जो समाज के सुधार में महत्त्वपूर्ण भूमिका निभाता है।

2. (i) प्रस्तुति पंक्तियाँ रामधारी सिंह दिनकर रचित निबंध 'अर्द्धनारीश्वर' पाठ से ली गई है।

इन पंक्तियों के माध्यम से कवि ने कहा है कि नारी पर मनुष्य की पराधीनता अपने आप लद गई है। इस पराधीनता ने नर और नारी से वह सहज दृष्टि छीन ली जिसमें नर अपनी भाषा को और मादा अपने नर को देखती है। कवि के कहने का तात्पर्य यह है कि मनुष्य, स्त्री को अपने से कमजोर समझता है इसलिए उसने सभी आर्थिक पहलुओं को खुद ही अपनाया।

(ii) प्रस्तुत पंक्तियाँ हमारी पाठ्य-पुस्तक दिगंत, भाग-2 के 'बातचीत' शीर्षक निबंध से उद्धृत की गयी है। मनुष्य के मन में अनेक तरह के भाव उठते रहते हैं। कभी हर्ष और विषाद के तो कभी करुणा और दवा के। इसी क्रम में मन में पीड़ा या शोकादि भाव भी उठते हैं जिसे निबंधकार ने प्रतीकात्मक रूप से अभिव्यक्त किया है, इसी प्रसंग के क्रम में ये पंक्तियाँ लिखी गयी हैं।

उपरोक्त पंक्तियों में मवाद और धुआँ दो ऐसे शब्दों का प्रयोग हुआ है जिसके माध्यम से निबंधकार ने मनुष्य के भीतर छिपी हुई घनीभूत पीड़ा और शोकादि बातों की ओर हमारा ध्यान आकृष्ट किया है। बातचीत एक ऐसा सरल, सुगम और सहज तरीका है जिसके द्वारा मनुष्य अपने भाव प्रकट कर अपने आपको हल्का और पीड़ा रहित महसूस करता है। मन की व्यथा और शोक बातचीत के क्रम में भाग की तरह अन्दर से बाहर निकल जाते हैं। इस क्रिया के द्वारा मनुष्य का मन हल्का और स्वच्छ यानि निर्मल हो जाता है। अपनी पीड़ा और शोकादि बातों से मुक्त होकर वह चित में आनंद का अनुभव करता है। उपरोक्त पंक्तियों से यह स्पष्ट हो जाता है कि बातचीत से मन की ग्रंथियाँ फूटती-टूटती है जिससे मन हल्का और निर्मल होकर आनंद को प्राप्त करता है। इस आनंद को कोई छोड़ना नहीं चाहता।

इसके द्वारा ही परमानंद की भी प्राप्ति संभव है। अत: बातचीत का मानव जीवन में अत्यधिक महत्व है।

(iii) प्रस्तुत पंक्तियाँ महाकवि तुलसीदास के 'विनय पत्रिका' से ली गयी है। इन पंक्तियों के माध्यम से कवि अपनी बात माता जानकी के माध्यम से अपने प्रभु! श्रीरामचन्द्र जी तक पहुँचाना चाहते हैं। कवि अपनी बात पहुँचाने के क्रम में परिचय देता है कि हे प्रभु। मैं बड़ा दीन हीन हूँ, निर्बल हूँ, परन्तु आपका दास हूँ। आपका कीर्तन-भजन करता हूँ। आपका ही नाम ले-ले कर अपना पेट भरता हूँ। हे प्रभु कृपा करके मेरी दशा पर विचार कीजिए क्योंकि मैं आपका ही भक्त आपकी शरण में हूँ। इन पंक्तियों के माध्यम से कवि ईश्वर की प्रतिष्ठा करता है कि जीवन जगत में जो कुछ हो रहा है सबका कारण मात्र यह ईश्वर श्रीराम हैं। कोई यदि निर्बल भी है, हीन भी है तो ईश्वर उसका दोष दूर करते हैं। अत: प्रभु को याद करना चाहिए। कवि की भाषा अवधी है। कवि ने बड़े मिठास के साथ शब्दों का संयोजन किया है।

(iv) प्रस्तुत सारगर्भित पंक्तियाँ 'पुत्र वियोग' शीर्षक कविता से उद्धृत है। यह संवेदनशील कविता सुभद्रा कुमारी चौहान द्वारा लिखी गई है। कवितांश में पुत्र-विच्छेद से उपजे विषाद का मार्मिक चित्रण है। कवयित्री के भग्न हृदय के शांकाकुल उद्‌गार मानवीय संवेदना को झकझोर देते हैं।

कवयित्री के प्राण तड़प रहे हैं, उसकी व्याकुलता वर्णनातीत है। अशान्त मन बेचैन है। खोए हुए धन की तरह अपना बेटा अब अपने पास नहीं रहा। इसमें तनिक भी संदेह नहीं रह गया है।

कवयित्री अपने बेटे को खोकर व्यथित है, उसके मन की शान्ति अपहृत हो गई है। वह अमूल्य धरोहर अब उसके पास नहीं है। भविष्य में वह उसे पुन: प्राप्त नहीं कर सकेगी।

3. सेवा में,

प्रधानाचार्य, महोदय,
+2 विद्यालय, पटना

विषय : खेल का सामान उपलब्ध कराने के संबंध में।

महाशय,

सविनय निवेदन है कि अगले ही मास अपने विद्यालय-बोर्ड की खेल-कूद प्रतियोगिता आयोजित होने जा रही है। इस बार अधिक वर्षा के कारण हमारे क्रीड़ा-स्थल की हालत खराब हो गई है। किसी भी खेल की समुचित तैयारी नहीं हो पाई है। मैदान में कई स्थानों पर गड्ढे हो गए हैं। क्रिकेट की पिच क्षतिग्रस्त हो गई है। बैड-मिण्टन और दौड़ का रेखांकन मिट गया है।

आपसे आग्रह है कि खेल के मैदान में उचित व्यवस्था कराएँ। मैदान के गड्ढे भरवाकर उसे समतल कराने की कृपा करें। क्रिकेट के पिच पर तो काफी परिश्रम की आवश्यकता है। इस वर्ष अभी तक खेल का नया सामान खरीदा नहीं गया है। इसलिए दस दिन से अभ्यास बन्द है। पिछले वर्ष भी अभ्यास की कमी के कारण हमारी टीमें परास्त हो गई थीं। आपसे आग्रह है कि शीघ्र ही खेल के सामान और मैदान की समुचित व्यवस्था कराएँ ताकि हम बेहतर खेल का प्रदर्शन कर सकें।

धन्यवाद सहित।

दिनांक: 07-02-2024

आपका आज्ञाकारी शिष्य
मोहन
खेल सचिव
कक्षा बारहवीं-सी
अनक्रमांक .....।

अथवा,

प्रिय मित्र, परीक्षा भवन
अशोक 07-02-2024

आशा ही नहीं, पूर्ण विश्वास है कि आप और घर के अन्य सभी सदस्य सकुशल एवं सानंद होंगे। इस पत्र के माध्यम से मैं आपको अपने विद्यालय में मनाए गए 'बिहार दिवस' के बारे में वर्णन करना चाहता हूँ। बिहार दिवस 22 मार्च को हमारे विद्यालय में एक कार्यक्रम आयोजित किया गया। इस कार्यक्रम के मुख्य अतिथि हमारे जिला पदाधिकारी थे। दीप जलाकर उन्होंने कार्यक्रम की शुरुआत की। विद्यालय के कई विद्यार्थियों ने भाषण, नृत्य, गीत आदि प्रदर्शित किया। यह सब देखकर वह बहुत प्रसन्न हुए और पूरे विद्यालय परिवार को शुभकामनाएँ दी। विशेष अगले पत्र में।

पता :

आपका मित्र
पंकज

4. **(i)** जब तक मनुष्य बोलता नहीं तब तक उसका गुण-दोष प्रकट नहीं होता है।

(ii) 'उसने कहा था' शीर्षक कहानी चन्द्रधर शर्मा गुलेरी की अमर रचना है। शुद्ध प्रेम की आध्यात्मिक अनुभूति और उसकी स्वाभाविक उत्सर्गमय अभिव्यक्ति इस कहानी का कथ्य है।

(iii) जेपी के अनुसार दलविहीन लोकतंत्र मार्क्सवाद और लेनिनवाद के मूल उद्देश्यों में से है। मार्क्सवाद के अनुसार समाज जैसे-जैसे साम्यवाद की ओर बढ़ता जाएगा, वैसे-वैसे राज्य-स्टेट का क्षय होता जाएगा और अंत में एक स्टेटलेस सोसाइटी (राज्यविहीन समाज) कायम होगी। वह समाज अवश्य ही लोकतांत्रिक होगा, बल्कि उसी समाज में लोकतंत्र का सच्चा स्वरूप प्रकट होगा और वह लोकतंत्र निश्चय ही दलविहीन होगा।

(iv) बुद्ध निवृतिमार्गी थे। उन्होंने घर-बार, राज-पाट, पत्नी-पुत्र को छोड़कर मुक्तिप्राप्ति हेतु संन्यास धारण कर लिया था। उनके अनुसार गृहस्थ जीवन मुक्ति-मार्ग में बाधक होता है। अनिच्छा से उन्होंने नारियों को भिक्षुणी बनने की अनुमति दी थी। एक दिन बुद्ध ने थोड़ा पश्चाताप के साथ आयुष्मान आनंद से कहा कि ''आनन्द! मैंने जो धर्म चलाया था, वह पाँच सहस्त्र वर्ष तक चलनेवाला था किन्तु अब वह केवल पाँच सौ वर्ष ही चलेगा, क्योंकि नारियों को मैंने भिक्षुणी होने का अधिकार दे दिया है।''

(v) मालती और लेखक के बीच भाई-बहन का संबंध है। यद्यपि मालती लेखक के दूर के रिश्ते की बहन है। तथापि इकट्ठे खेलने, इकट्ठे लड़ने और पिटने और पढ़ने के कारण दोनों का परस्पर संबंध सखा का ही रहा। उनके व्यवहार में सदा सख्य की स्वेच्छा और स्वच्छन्दता रही, वह भ्रातृत्व के, या बड़े छोटेपन के बन्धनों में कभी नहीं घिरा। तभी तो मालती की यंत्रवत् जिन्दगी जो बिलकुल अनैच्छिक, अनुभूतिवहीन और नीरस जिन्दगी को देखकर उसे ऐसा लग रहा था कि मालती पर वक्त की जो छाया घिरी हुई है, वह अज्ञात रहकर भी मानो उन्हें वश में कर रही है। लेखक भी वैसा ही नीरस निर्जीव-सा हो रहा है जैसे मालती।

(vi) **संकेत :** 2012 (A) के प्रश्न-4 (ख) का उत्तर देखें।

(vii) **संकेत :** 2020 (A) के प्रश्न-4 (vi) का उत्तर देखें।

(viii) कबीरदास महान क्रांतिकारी कवि थे। उन्होंने सदैव पाखंड का विरोध किया। भारतीय षड्दर्शन और वर्णाश्रम की ओर तनिक भी ध्यान नहीं दिया। वर्णाश्रम व्यवस्था का पोषक धर्म था-षड्दर्शन। भारत के प्रसिद्ध छः दर्शन हिन्दुओं के लिए अनिवार्य थे। इनकी ओर ध्यान आकृष्ट करते हुए कबीर ने षड्दर्शन की बुराइयों की तीखी आलोचना की और उनके विचारों की ओर तनिक भी ध्यान नहीं दिया यानी कानों से सुनकर ग्रहण नहीं किया बल्कि उसके पाखंड की धज्जी-धज्जी उड़ा दी। कबीर ने जनमानस को भी षड्दर्शन द्वारा पोषित वर्णाश्रम की बुराइयों की ओर सबका ध्यान आकृष्ट किया और उसके विचारों को मानने का प्रबल विरोध किया।

(ix) **संकेत :** 2021 (A) के प्रश्न-4 (vi) का उत्तर देखें।

(x) कवयित्री का खिलौना उसका बेटा है। बच्चों को खिलौना प्रिय होता है, वह उनकी सर्वोत्तम प्रिय वस्तु होती है। उसी प्रकार कवयित्री के लिए उसका बेटा उसके जीवन का सर्वोत्तम उपहार है। इसलिए वह कवयित्री का खिलौना है।

5. **(i)** **संकेत :** 2016 (A) के प्रश्न-8 (क) अथवा का उत्तर देखें।

(ii) **संकेत :** 2012 (A) के प्रश्न-5 (ख) का उत्तर देखें।

(iii) **संकेत :** 2014 (A) के प्रश्न-1 (ख) का उत्तर देखें।

(iv) **संकेत :** 2018 (A) के प्रश्न-15 (i) का उत्तर देखें।

(v) **'जूठन'** शीर्षक आत्मकथा में कथाकार ओमप्रकाश बाल्मीकि ने विद्यालय काल की कुछ मार्मिक घटनाओं का जिक्र किया है। विद्यालय में शिक्षकों, हेडमास्टर, विद्यार्थियों का व्यवहार अत्यंत निन्दनीय था। विद्यालय का हेडमास्टर, ओमप्रकाश (लेखक) को झाड़ू बनाकर पूरे स्कूल की सफाई करने का आदेश देता है। हेडमास्टर कहता भी है, ''तेरा तो यह खानदारी काम है जो फटाफाट लग जा काम पे।'' लेखक को हेडमास्टर का आदेश मानना पड़ा। स्कूल के लंबे-चौड़े मैदान को साफ करना पड़ा। धूल से चेहरा पट गया था। मुँह के भीतर धूल घुस गयी थी। स्कूल के बाकी छात्र अपने क्लास में पढ़ रहे थे।

दूसरे दिन की घटना और चिर स्मरणीय एवं मर्मस्पर्शी है। स्कूल जाते ही हेडमास्टर फिर झाड़ू देता है। कक्षा में बैठने की लालसा उस दिन भी पूरी नहीं हुई। फिर झाड़ू लगाने का आदेश देता है। तीसरे दिन लेखक चुपचाप कक्षा में जाकर बैठ जाता है। थोड़ी देर बाद हेडमास्टर की दहाड़ सुनाई देती है। हेडमास्टर लपककर लेखक की गर्दन दबोच लेता है; कक्षा से बाहर खींच कर लेखक को बरामदे में ला पटका, चीख कर बोला, ''जा लगा पूरे मैदान में झाड़ू। लेखक फिर झाड़ू लगाने का कार्य शुरू करती है।'' आँखों से आँसू बहने लगते हैं। क्लास के लड़के छिप-छिपकर तमाशा देखते हैं। इसी बीच लेखक के पिता अचानक स्कूल के पास से गुजरते हैं। पुत्र ओमप्रकाश को झाड़ू लगाते देखकर ठिठक जाते हैं। ओमप्रकाश के पिता प्यार से उसे मुन्शीजी पुकारते रहे हैं। मुंशीजी को रोता देख पिता रोने का कारण पूछते हैं। पिता को मालूम होता है कि मुंशीजी तीन दिनों से लगातार रोज झाड़ू लगा रहे हैं। कक्षा में पढ़ने का मौका नहीं मिलता। पिताजी बौखलाकर हाथ से झाड़ू छीन लेते हैं और चीखने लगते हैं, ''कौन-सा मास्टर है जो मेरे लड़के से झाड़ू लगवाता है?'' पिताजी की आवाज संपूर्ण स्कूल में गूँज उठती है तभी शिक्षक एवं हेडमास्टर बाहर आ जाते हैं और वे लेखक के पिता को धमकाते हैं। पिता के साहस को लेखक अभी भी भूल नहीं पाया है।

(vi) **संकेत :** 2018 (A) के प्रश्न-15 (iii) का उत्तर देखें।

6. **(i)** **शीर्षक : लोक अदालत :** भारत में प्राचीन काल से ही विवादों का निपटारा पंचों और चौपालों द्वारा होता रहा है। हाल में अदालती-प्रथा के आने पर विधिवत् शासन व्यवस्था स्थापित हुई, किन्तु औपचारिकताओं के कारण न्याय में वर्षों लगने लगे जिससे आम आदमी की आस्था डगमगाने लगी।

[कुल शब्द संख्या-104
संक्षेपित शब्द संख्या-42]

(ii) **शीर्षक : साहित्य का महत्त्व :** साहित्य समाज का दर्पण होता है। एक सभ्य समाज का मार्गदर्शक साहित्य ही हैं। यह हमारी मानसिक आवश्यकताओं की पूर्ति करता है और राष्ट्र या जाति में संजीवनी शक्ति भरता है।

[कुल शब्द संख्या-97
संक्षेपित शब्द संख्या-31]

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