बिहार विद्यालय परीक्षा समिति (उच्च माध्यमिक), पटना द्वारा आयोजित नये परीक्षा पैटर्न पर आधारित
Based on Bihar School Examination Board (Higher Secondary), Patna

11.12.2023 को INTERNET पर जारी प्रश्न-पत्र एवं उनके हल के साथ

2024

TARGET

CLASS XII

MODEL PAPER

SCIENCE (English Medium) WITH ANSWER

Physics, Chemistry, Mathematics, Biology
English-100, हिन्दी -100

आशीष पब्लिकेशन

WITH OMR ANSWER SHEET

50% Objective &
50% Subjective Pattern

प्रकाशक :

आशीष पब्लिकेशन

खजांची रोड, पटना - 800 004

Mobile : 8987230259

E-mail : ashishpublicationpatna@gmail.com

website: www.ashishpublication.com

टाइपसेटर :

सीन ग्राफिक्स, पटना

विशेष : पुस्तक को मुद्रित करते समय सामग्री के संबंध में यथासंभव सावधानी बरती गई है । फिर भी, यदि कुछ त्रुटियाँ रह गई हो, तो इसके लिए प्रकाशक उत्तरदायी नहीं है ।

CONTENT

11.12.2023 को INTERNET पर जारी MODEL PAPER

MODEL PAPER 1 – 5

❑ ❑ ❑

बिहार विद्यालय परीक्षा समिति (उच्च माध्यमिक), पटना पर आधारित

ओ॰एम॰आर॰ उत्तर पत्रक /(OMR ANSWER SHEET)

❑ नीले/काले पेन से लिखें तथा उचित गोले को नीले/काले पेन से पूरा भरें। (Write and darken the appropriate circles with Blue/black pen)

1. परीक्षार्थी का नाम (EXAMINEE'S NAME) .....
2. रौल कोड (ROLL CODE) .....
3. रौल नम्बर (ROLL NUMBER) .....
4. विषय कोड (SUBJECT CODE) .....
5. पाली (SITTING) .....
6. पंजीयन क्रमांक (REGISTRATION NUMBER) .....
7. विषय का पूरा नाम (FULL NAME OF THE SUBJECT) .....
8. परीक्षा की तिथि (DATE OF EXAMINATION) .....

9. जिस सेट कोड का प्रश्न पत्र आपको मिला है, उस सेट-कोड के गोलक को नीले/काले पेन से नीचे पूरा भरे (प्रगाढ़ करें) तथा दिए गए बॉक्स में सेट कोड लिखें, अन्यथा आपके इस विषय के उत्तर की जाँच नहीं की जाएगी तथा आपको शून्य अंक (Zero Marks) दिया जा सकता है :

सही सेट कोड को नीचे बॉक्स में लिखें। जैसे A, B, C, D, E, F, G, H, I, J ☐	नीचे दस सेट में से अपने प्रश्न-पत्र के सही सेट कोड के गोलक को नीले/काले पेन से भरें :				
	SET-A ◯	SET-B ◯	SET-C ◯	SET-D ◯	SET-E ◯
	SET-F ◯	SET-G ◯	SET-H ◯	SET-I ◯	SET-J ◯

10. प्रश्न पत्र क्रमांक लिखें / Write Question Booklet Serial Number ☐☐☐–☐☐☐☐–☐☐☐

11. परीक्षा केंद्र का नाम लिखें / Write Name of Examination Centre .....

परीक्षार्थी का पूर्ण हस्ताक्षर (Full Signature of the Examinee)	वीक्षक का पूर्ण नाम एवं हस्ताक्षर (Invigilator's Full Name and Signature)	केन्द्राधीक्षक की मुहर (Facsimile Stamp of the Centre Superntendent)

वस्तुनिष्ठ प्रश्नों के उत्तर देने के लिए सही गोले को नीले/काले पेन से पूरा भरें।
(For answerning objective questions, darken the appropriate circle with blue/Black pen)

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

PHYSICS

INTERNET MODEL PAPER – 1

Time : 3 Hours + 15 Minutes] [**Total Marks :** 70

INSTRUCTIONS TO THE CANDIDATES :

1. Candidates are required to give their answers in their own words as far as practicable.
2. Figure in the right hand margin indicate full marks.
3. While answering the questions, candidate should adhere to the word limit as far as practicable.
4. 15 Minutes of extra time has been allotted for the candidates to read the questions carefully.
5. This question paper is divided into two sections—**SECTION – A** and **SECTION – B**.
6. In **SECTION – A** there are **70 Objective Type Question**, out of which only 35 objective questions be answered. Darken the circle with blue/black ball pen against the correct option on OMR Sheet provided to you. Do not use Whitener/Liquid/ Blade/Nail on OMR paper; otherwise the result will be invalid.
7. In **SECTION – B**, there are **20 Short Answer Type Question** (each carrying 2 marks), out of which any 10 questions are be answered.Apart from this, there are **6 Long Answer Type Question** (Each Carrying 5 marks), out of which 3 questions are to be answered.
8. Use of any electronic device is prohibited.

SECTION – A : Objective Type Questions

Directions : *There are 70 Objective Type Questions, out of which only 35 objectives questions to be answered. For each question, mark the correct option on the **OMR** answer sheet.* **35 × 1 = 35**

1. Electric dipole moment is a vector quantity, whose direction is :
(A) North to South (B) South to North
(C) From positive to negative charge
(D) From negative to positive charge

2. Unit of electric field intensity is
(A) newton/coulomb (B) joule-coulomb
(C) joule/coulomb (D) newton-coulomb

3. No. of electrons in one coulomb charge is :
(A) 6.25×10^{17} (B) 6.25×10^{18}
(C) 6.25×10^{19} (D) 1.6×10^{19}

4. The permittivity (K) of any electric insulator medium can be :
(A) –3 (B) 0 (C) 0.7 (D) 6.0

5. An electric field can deflect :
(A) X-rays (B) neutrons
(C) α–particles (D) γ–particles

6. A point charge 'q' is placed in electric field of magnitude E. The force experienced by charge will be :
(A) qE (B) $\frac{q}{E}$ (C) $\frac{E}{q}$ (D) q^2E^2

7. A charge $+q$ is placed at the centre point of a cube of side L. The electric flux coming out from one plane cube of cube is :
(A) $\frac{q}{\epsilon_0}$ (B) $\frac{q}{6\epsilon_0}$ (C) $\frac{6qL^2}{\epsilon_0}$ (D) $\frac{q}{6L^2\epsilon_0}$

8. The capacity of a spherical conductor is 1.0μF. It's radius will be :
(A) 1.11 metre (B) 10 meter
(C) 9 km (D) 1.11 cm

9. The capacity of any condenser does not depend upon :
(A) Shapes of plates (B) Size of plates
(C) Charge on plates (D) Distance between plates

10. Three condensers of equal capacity C are connected first in parallel and then in series. The ratio of equivalent capacity in both conditions is :
(A) 9 : 1 (B) 6 : 1 (C) 3 : 1 (D) 1: 9

11. Volt metre^{-1} is unit of :
(A) electric flux (B) electric potential
(C) electric field (D) electric capacity

12. S.I. unit of specific resistance is :
(A) ohm^{-1} metre^{-1} (B) ohm^{-1} metre
(C) ohm metre^{-1} (D) ohm metre

13. At absolute zero temperature any crystal of Silicon behaves like :
(A) Conductor (B) Perfect insulator
(C) Semi conductor (D) Super Conductor

14. Which one of the following expresses resistance :
(A) $e.\left(\frac{l}{A}\right)$ (B) $\frac{e.A}{l}$ (C) $\frac{l}{e.A}$ (D) $\frac{lA}{e}$

15. When temperature increases, then resistance of any conductor :
(A) increases (B) decreases
(C) remains constant (D) depends on conductor

16. Power of electrical circuit is :
(A) V.R (B) V^2R (C) $\frac{V^2}{R}$ (D) $V^2R.I$

17. 1 ev is equivalent to :
(A) 1.6×10^{-19} volt (B) 1.6×10^{-19} volt metre^{-1}
(C) 1.6×10^{-19} Joul (D) 1.6×10^{-19} KWh

18. The algebraic sum of all current meeting at a point in electrical circuit is :
(A) infinite (B) positive (C) zero (D) negative

19. Moving charge produces :
(A) only electric field
(B) only magnetic field
(C) Both electric and magnetic field
(D) neither electric nor magnetic field

20. Unit of $\sqrt{\left(\frac{\mu_0}{\epsilon_0}\right)}$ is :
(A) $\frac{\text{newton}}{\text{coulomb}}$ (B) ohm (C) henary (D) farad

21. Two parallel electron beams moving in same direction :
(A) will repel each other
(B) will neither attract nor repel
(C) will attract each other
(D) None of these

22. Which one of the following statement is true ?
(A) $\vec{\tau} = \vec{M} . \vec{B}$ (B) $\vec{\tau} = \vec{M} \times \vec{B}$
(C) $\vec{M} = \vec{\tau} \times \vec{B}$ (D) $\vec{\tau} = \frac{\vec{M}}{\vec{B}}$

23. Vertical component of earth's magnetic field is zero at :
(A) magnetic poles (B) geographical poles
(C) every places (D) magnetic equater

24. The most suitable element for making electromagnet is :
(A) Soft iron (B) Steel (C) Copper (D) Nickel

25. The value of permeability of paramagnetic substances :
(A) 1 (B) More than 1
(C) Less than 1 (D) Very large

26. At neutral points :
(A) $B > B_H$ (B) $B < B_H$ (C) $B = B_H$ (D) $B = O$
(Where B = Intensity of magnetic field of magnet, B_H = Horizontal Components of earth's Magnetic field)

27. Lenz's law is based on conservation of which physical quantity?
(A) Energy (B) Charge
(C) Momentum (D) Mass

28. Unit of induction is :
(A) ohm second (B) $\frac{\text{ohm}}{\text{second}}$
(C) $\frac{\text{second}}{\text{ohm}}$ (D) $\frac{1}{\text{ohm second}}$

29. Dimension $\frac{L}{R}$ is equal to dimension of which of the following ?
(A) LC (B) $\frac{1}{\sqrt{\frac{L}{C}}}$ (C) $\sqrt{LC}$ (D) $\frac{1}{LC}$

30. If the peak value of any alternating current is $I_0 = 5\sqrt{2}$, then the root mean square value of alternating current (I_{rms}) will be :
(A) 5 A (B) 10 A (C) 25 A (D) 50 A

31. In an alternating current circuit, a resistance of 8 ohm and an inductance of reactance 6 ohm are connected in series. Impedence of circuit will be :
(A) 2 ohm (B) 10 ohm
(C) 14 ohm (D) $14\sqrt{2}$ ohm

32. The work-principle of both hot wire ammeter and hot wire voltmeter is based on which effect of the current ?
(A) magnetic effect (B) Chemical effect
(C) heating effect (D) electro-magnetic effect

33. The power factor of purely inductive circuit is :
(A) zero (B) 0.1
(C) 1 (D) infinite

34. Which is not possible in any transformer ?
(A) eddy current (B) direct current
(C) alternative current (D) induced current

35. The impedance of L.R circuit is :
(A) $R^2 + W^2L^2$ (B) $\sqrt{R+WL}$
(C) R + WL (D) $\sqrt{R^2+W^2L^2}$

36. Which of the following waves is not electromagnetic ?
(A) alpha rays (B) gamma rays
(C) infrared rays (D) X-rays

37. Waves of maximum frequency is :
(A) ultraviolet waves
(B) gamma waves
(C) visible light waves
(D) radio waves

38. The direction of transmission of electromagnetic waves is:
(A) parallel to $\vec{B}$ (B) parallel to $\vec{E}$
(C) parallel to $\vec{B} \times \vec{E}$ (D) parallel to $\vec{E} \times \vec{B}$

39. Dimension of $\frac{1}{2}\epsilon_0 E^2$ (Where ϵ_0 = permittivity of vaccum and E = electric field) is :
(A) $[MLT^{-1}]$ (B) $[ML^2T^{-2}]$
(C) $[ML^{-1}T^{-2}]$ (D) $[ML^2T^{-1}]$

40. For total internal reflection, if the value of critical angle from any medium to vaccum is 30°, then the speed of light in the medium is :
(A) 3×10^8 m/s (B) 1.5×10^8 m/s
(C) 6×10^8 m/s (D) 4.5×10^8 m/s

41. Two lens of +3D and -2D power are combined to form an equivalent lens. What is the focal length of equivalent lens ?
(A) 3 metre (B) 5 metre
(C) 1 metre (D) 2 metre

42. The final image of astronomical telescope is :
(A) real and erect (B) real and inverted
(C) virtual and invertal (D) virtual and erect

43. Two light waves of equal amplitude and equal wavelength are superimposed. The amplitude of resultant wave is maximum, when phase-difference between them is :

(A) zero (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{2}$ (D) π

44. Which phenomenon supports the transverse nature of light waves ?

(A) diffraction (B) refraction
(C) polarisation (D) interference

45. In polarized light, the angle between plane of vibration and polarization plane is :

(A) 0° (B) 45° (C) 90° (D) 180°

46. In photo-electric emission phenomenon, on increasing the intensity of incident light, the photo electric current :

(A) increases (B) decreases
(C) remains constant
(D) first increases then remains constant

47. Which of the following has minimum stopping potential ?

(A) X-rays (B) red light
(C) blue light (D) yellow light

48. Wave length of matter waves is :

(A) $\lambda = \frac{h}{p}$ (B) $\lambda = \frac{p}{h}$

(C) $\lambda = h \times p$ (D) $\lambda = \frac{h^2}{p^2}$

49. The angular momentum of electron in stationary energy-level off hydrogen atom is :

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

50. Lyman series in hydrogen spectrum lies in :

(A) Infrared region (B) visible light region
(C) ultraviolet region (D) x-rays region

51. How many times charge of alpha-particle is that of charge of proton ?

(A) four times (B) two times
(C) three times (D) equal

52. Energy equivalent to 1 amu is :

(A) 190 MeV (B) 139 MeV
(C) 913 MeV (D) 931 MeV

53. Source of radiant energy of the sun is :

(A) nuclear fission (B) Photo electric effect
(C) Cyclotron (D) Nuclear fusion

54. p–type semiconductor is electricity :

(A) positive charged (B) neutral
(C) negative charged (D) None of these

55. The barrier-potential of germanium diode is approximately:

(A) 0.1 volt (B) 0.3 volt (C) 0.5 volt (D) 0.7 volt

56. The value of amplitude modulation index is :

(A) always zero (B) between 1 and ∞
(C) between 1 and 0 (D) always infinity (∞)

57. If charge on sphere is 10μc, then electric flux on its surface is :

(A) $36\pi \times 10^4$ Nm^2/c (B) $36\pi \times 10^{-4}$ Nm^2/c
(C) $36\pi \times 10^6$ Nm^2/c (D) $36\pi \times 10^{-6}$ Nm^2/c

58. Unit of the product of self-inductance L and angular frequency ω is :

(A) ohm (B) volt
(C) ampere (D) farad

59. The magnifying power of a magnifying lens of power 12D will be :

(A) 4 (B) 1200 (C) 3 (D) 25

60. Brewster's Law is :

(A) $\mu = \tan i\,p$ (B) $\mu = \cos i\,p$
(C) $\mu = \sin i\,p$ (D) $\mu = \tan^2 i\,p$

61. If the length of a potentiometer wire is increased, the balance will be obtained at :

(A) smaller length (B) large length
(C) same length (D) nowhere on wire

62. The Boolean algebra for a NAND gate is :

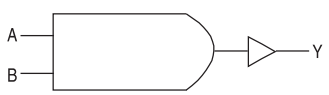
(A) A + B = Y (B) $\overline{A+B} = Y$

(C) $\overline{A.B} = Y$ (D) A.B = Y

63. A plane wavefront is a part of a :

(A) spherical wavefront (B) Cylindrical wavefront
(C) both (A) and (B) (D) None of these

64. The output of the following logic gate is :



(A) $Y = \overline{A+B}$ (B) $Y = \overline{A} + \overline{B}$

(C) Y = A.B (D) $Y = \overline{A}.\overline{B}$

65. If velocity of light in air and water is $3 \times 10^8 ms^{-1}$ and $2 \times 10^8 ms^{-1}$ respectively, then what should be its critical angle ?

(A) $\sin^{-1}\left(\frac{3}{2}\right)$ (B) $\tan^{-1}\left(\frac{3}{2}\right)$

(C) $\tan^{-1}\left(\frac{2}{3}\right)$ (D) $\sin^{-1}\left(\frac{2}{3}\right)$

66. Which lens is used to remove astigmatism ?

(A) Concave lens (B) Convex lens
(C) Cylindrical lens (D) None of these

67. Which colour has maximum refractive index for glass ?

(A) Yellow (B) Red
(C) Violet (D) Blue

68. The width of interference fringe is :

(A) proportional to wavelength
(B) inversely proportional to wavelength
(C) proportional to square of wavelength
(D) inversely proportional to square of wavelength

69. If electric field and drift velocity are E and V_d respectively then conductivity will be :

(A) $\frac{E}{v_d}$ (B) $\frac{v_d}{E}$ (C) E.V_d (D) $E^2.\ V_d$

70. In L.C.R circuit, energy loss takes place in :

(A) resistance (B) inductor
(C) capacitance (D) all of these

SECTION – B : Non-Objective Type Questions

SHORT ANSWER TYPE QUESTIONS

Directions : *Questions Nos. 1 to 20 are of short answer type. Each question carries 2 marks. Answer any ten question on your copy.* 10 × 2 = 20

1. **The surface charge density of any uniformly charged spherical conductor is 80.0μc/km^2. Find the charge on the sphere.**
2. **What is unit of potential-gradient ? Write the relationship between potential gradient and intensity of electric field.**
3. **A charge of 1.6×10^{-7}c is uniformely distributed on the surface of a spherical conductor of radius 12cm. What will be electric field of any point outside the sphere ?**
4. **What is Lorentz force ?**
5. **Name the energy losses in a transformer.**
6. **Write down maximum and minimum values of magnifying power of a simple microscope.**
7. **What is shunt ? Write its two uses.**
8. **Establish the relationship between mean value and peak value of alternating current.**
9. **What are reactance and impedance in alternating circuit ?**
10. **Write down two properties of electromagnetic waves.**
11. **Differentiate between primary and secondary rainbow.**
12. **Describe the two shortcomings of Bohr model of atom.**
13. **Write truth table and Boolean expression of OR and AND gate.**
14. **The decay constant of a radioactive substance is 5.2×10^{-3} per year. What is its half-life ?**
15. **Find an expression for the energy of a charged conductor.**
16. **What is the relationship between size of a nucleus and its mass number ?**
17. **Why the aperature of objective of compound microscope is small ?**
18. **What is Malus law of polarization ?**
19. **Define threshold frequency and work function.**
20. **Find the expression for work done in deflecting a dipole in an uniform electric field.**

LONG ANSWER TYPE QUESTIONS

Directions : *Questions Nos. 21 to 26 are Long Answer Type Questions. Answer any 3 out of them.* 3 × 5 = 15

21. **State and prove Gauss's theorem. Calculate the electric field at a point near a charged metallic conductor.**
22. **State Bio-Savart law. Applying it find an expression for magnetic field at a point on the axis of a circular coil carrying electric current.**
23. **Describe the principle, construction and working of a transformer.**
24. **What is dispersive power ? Find the necessary conditions for obtaining deviation without dispersion by two thin prism.**
25. **Explain with the help of labelled diagram the working of a transistor as an oscillator.**
26. **State laws of photo electric effect. How is it explained by Einstein ?**

ANSWER WITH EXPLANATIONS

SECTION – A

OMR ANSWER-SHEET

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

ANSWER

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

SECTION – B

1. Given,
Diameter of the sphere, d = 2.4 m
Radius of the sphere, d = 1.2 m

$$\sigma = 80.0\mu \frac{C}{m^2}$$

Surface charge density = 80×10^{-6} C/km^2
We know,
The total charge of the sphere, Q = charge density Surface area

$$= \sigma \times 4\pi^2$$

By substituting the values, we get

$$= 80 \times 10^{-6} \times 4 \times 3.14 \times (1.12)^2$$
$$= 1.447 \times 10^{-3} \text{ C Ans.}$$

2. The unit of potential gradient, also known as electric field strength or electric field gradient, is volts per meter (V/m). It represents the change in electric potential (voltage) per unit distance.
The relationship between potential gradient (E) and the intensity of the electric field (I) is given by : $E = -dV/dr$
Where :
- E is the electric field strength (potential gradient) in V/m.
- dV is the change in electric potential (voltage) in volts (V).
- dr is the change in distance in meters (m).

The negative sign in the equation indicates that the electric field points in the direction of the steepest decrease in electric potential. In other words, it shows that the electric field points from higher potential to lower potential.
The electric field intensity (E) measures the force experienced by a unit positive charge at a given point in an electric field, while the potential gradient indicates how quickly the electric potential changes with distance. A stronger electric field results in a larger potential gradient.

3. Here, $q = 1.6 \times 10^{-7}$C.
Radius of the sphere; R = 12 cm = 0.12 m
Just outside the sphere, the charge may be assumed to be concentrated at its center. Therefore, the electric field is just outside the sphere

$$= \frac{1}{4\pi\epsilon_0} \times \frac{q}{R^2} = 9\times10^9 \times \frac{1.6\times10^{-7}}{(0.12)^2} = 10^5 \text{NC}^{-1} \text{ Ans.}$$

4. Lorentz force, named after the Dutch physicist Hendrik Lorentz, is a fundamental concept in electromagnetism that describes the force experienced by a charged particle when it moves through an electric field (E) and a magnetic field (B). The Lorentz force (F_L) acting on a charged particle (q) is given by the equation :

$$F_L = q(E + v \times B)$$

Where :
- F_L is the Lorentz force.
- q is the charge of the particle.
- E is the electric field.
- v is the velocity of the particle.
- B is the magnetic field.

The force depends on the charge, velocity, and the direction of motion of the particle relative to the fields. It plays a crucial role in understanding the behavior of charged particles in electromagnetic phenomena, such as in the operation of electric motors, generators, and particle accelerators.

5. Energy losses in a transformer primarily occur due to two factors :
Iron or Core Losses (Hysteresis and Eddy Current Losses) : These losses occur in the transformer's iron core due to two main factors:
- Hysteresis Losses
- Eddy Current Losses

These losses are collectively known as "iron losses" and can be minimized by using materials with low hysteresis and eddy current losses in the transformer core.
Efforts are made in transformer design to reduce these losses as much as possible to improve the transformer's overall efficiency.

6. The minimum magnifying power of a simple microscope is 8 and the maximum magnifying power of a simple microscope is 10.

7. A "shunt" refers to a low-resistance pathway or branch in an electrical circuit that is used to divert or bypass some of the current around a specific component or portion of the circuit. Shunts are designed to allow a controlled fraction of the total current to flow through them, while the majority of the current continues along the main path. Shunts are often made of materials with low resistance, such as copper or other conductive metals.

8. In an alternating current (AC) circuit, the relationship between the mean (average) value (I_{avg}) and the peak value (I_{peak}) of the current can be established as follows :
For a sinusoidal AC current waveform (which is the most common type of AC waveform), the mean value of the current over one complete cycle is related to the peak value by the following relationship :

$$I_{avg} = \frac{I_{peak}}{\sqrt{2}}$$

Where :
- I_{avg} is the mean (average) value of the current
- I_{peak} is the peak value of the current.

This relationship holds true for sinusoidal AC currents because the mean value of a sinusoidal waveform over one complete cycle is $\frac{1}{\sqrt{2}}$ (approximately 0.707) times its peak value.
It's important to note that for other non-sinusoidal waveforms, the relationship between mean and peak values may be different. However, for many practical applications, sinusoidal AC currents are commonly used, and this relationship is applicable.

9. In alternating current (AC) circuits, reactance and impedance are two important electrical properties that describe how components and circuits resist the flow of AC current.

Reactance :

- Reactance is a measure of how a component or circuit resists the flow of AC current due to the component's capacitance or inductance.
- There are two types of reactance :
- **Inductive Reactance (XL) :** Inductive reactance is associated with inductors (coils) and is proportional to the frequency of the AC signal. It is calculated as $X_L = 2\pi f L$, where f is the frequency of the AC signal, and L is the inductance of the coil.
- **Capacitive Reactance (XC) :** Capacitive reactance is associated with capacitors and is inversely proportional to the frequency of the AC signal. It is calculated as $X_c = \frac{1}{2\pi fC}$, where f is the frequency of the AC signal, and C is the capacitance of the capacitor.
- Reactance is measured in ohms (Ω).

Impedance :

- Impedance is a comprehensive measure of how a component or circuit resists the flow of AC current, taking into account both resistive (real) and reactive (imaginary) components.
- Impedance is represented as a complex quantity and is calculated as Z = R+ jX, where R is the resistance of the component or circuit and X is the reactance.
- Impedance accounts for the phase difference between current and voltage in AC circuits.
- Impedance is also measured in ohms (Ω).

10. Two properties of electromagnetic waves are :

(i) Electromagnetic waves travel at the speed of light : Electromagnetic waves, including visible light, radio waves, microwaves and X-rays all propagate through space at the speed of light (c), which is approximately 3×10^8 meters per second (m/s) in a vacuum.This constant speed is one of the fundamental properties of electromagnetic waves and is not affected by the frequency or wavelength of the wave.

(ii) Electromagnetic waves exhibit wave–particle duality : Electromagnetic waves display both wave-like and particle-like behavior. They can be described as continuous oscillating electric and magnetic fields, but they also consist of discrete packets of energy called "photons." This duality is a fundamental concept in quantum physics and is described by the theory of quantum electrodynamics (QED), which explains the behavior of electromagnetic waves at the quantum level.

11. Differentiate between primary and secondary rainbow : In one ray their is only one reflection which from the primary rainbow. In which the violet colour is on the inner edge and red colour is on the outer edge. But in the other way, there are two internal reflections which forms the secondary rainbow. In which the red colour is on the inner edge and violet colour is on the outer edge.

12. Two shortcoming of Bohr model of Atom :

(i) Bohr's model was valid only for a single electron atom.

(ii) It did not explain the chemical nature of atom.

13. Truth table of OR gate :

Input		Output
A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

Boolean expression of OR gate : Y = A + B

AND Gate:

Input		Ouput
A	B	Y = A · B
0	0	0
0	1	0
1	0	0
1	1	1

Boolean expression of AND gate : Y = A · B

14. Given, $\lambda = 5.2 \times 10^{-3}$ per year

According to the formula

$$T = \frac{0.6931}{\lambda} = \frac{0.6931}{5.2\times10^{-3}}$$

$$= \frac{6931\times10\times10\times10\times10}{52\times10000}$$

$$= 133.88462 = 133.3 \text{ year}$$ **Ans.**

15. The energy U of a charged conductor can be expressed using the formula :

$$U = \frac{1}{2}\frac{Q^2}{C}$$

Where :

- U is the energy of the charged conductor.
- Q is the charge on the conductor.
- C is the capacitance of the conductor.

This formula represents the electrostatic potential energy stored in a charged conductor. It shows that the energy is directly proportional to the square of the charge on the conductor (Q^2) and inversely proportional to the capacitance (C). Capacitance is a measure of the conductor's ability to store charge, and the energy is stored in the form of electric potential energy within the conductor's electric field.

16. Nuclear Size Increases with Mass Number : In general, as the mass number (A) of a nucleus increases, its size or radius also increases. This is because nuclei with more protons and neutrons tend to have a larger spatial extent to accommodate the increased number of nucleons (protons and neutrons).

17. The aperture of the objective lens in a compound microscope is kept small primarily to enhance image quality and focus at high magnifications. Smaller

apertures increase the depth of field, allowing more of the sample to be in focus at once, which is crucial in microscopy. They also reduce optical aberrations like spherical and chromatic aberrations, leading to clearer, more accurate images. Additionally, smaller apertures help in achieving an optimal numerical aperture, balancing resolution and diffraction limits. This balance is essential for resolving fine details in specimens. Moreover, manufacturing large-aperture lenses with the necessary precision for microscopy is technically challenging and expensive. A smaller aperture also allows for better control of light and contrast, important for observing certain types of samples. Therefore, these practical, technical, and optical considerations dictate the use of smaller apertures in high-magnification objectives of compound microscopes.

18. Malus' Law describes the behavior of light intensity when it passes through a polarizer. Discovered by Etienne-Louis Malus in 1808, this law is fundamental in the study of polarization, an optical phenomenon where light waves oscillate in specific directions. Malus' Law states that the intensity of polarized light after passing through a polarizing filter is directly proportional to the square of the cosine of the angle between the light's initial polarization direction and the axis of the polarizer. Mathematically, it's expressed as $I = I_0 \cos^2\theta$, where I is the transmitted light intensity, I_0 is the initial intensity, and θ is the angle between the polarization directions. This law is crucial in applications involving polarized light, like in photography to reduce glare, in LCD screens, and in analyzing stresses in transparent materials.

19. **Work function :** It is the minimum energy required to eject an electron from the metal surface. It is denoted by ϕ_0.

Threshold frequency—The minimum frequency associated with metal in the incident radiation below this then no electrons ejected from the metal surface. It is denoted by v_0.

$$\boxed{\phi_0 = hv_0}$$

20. To find the eñpression for the work done in deflecting a dipole in a uniform electric field, we consider a dipole with charges +q and –q separated by a distance d, creating a dipole moment $p = qd$, where d is a vector pointing from the negative to the positive charge. The dipole is placed in a uniform electric field E.

The potential energy U of a dipole in an electric field is given by :

$$U = -p \cdot E$$

This can also be written as :

$$U = -pE \cos\theta$$

where θ is the angle between the dipole moment p and the electric field E, $p = |p|$ is the magnitude of the dipole moment, and $E = |E|$ is the magnitude of the electric field.

The work done W in deflecting the dipole from an initial angle θ_1 to a final angle θ_2 is equal to the change in potential energy :

$$W = U_{final} - U_{initial}$$
$$W = pE\cos\theta_2 - (-pE\cos\theta_1)$$
$$W = pE(\cos\theta_1 - \cos\theta_2)$$

This is the expression for the work done in rotating a dipole from one angle to another in a uniform electric field. The work done depends on the initial and final orientation of the dipole with respect to the field, the strength of the electric field, and the magnitude of the dipole moment.

21. Gauss's Law, also known as Gauss's theorem, is a fundamental law in electromagnetism. It states that the electric flux through a closed surface is directly proportional to the enclosed electric charge. Mathematically, it is expressed as:

$$\oint S E.dA = Q_{enc}/E_0$$

Where

- $\oint S$ denotes the surface integral over a closed surface S.
- E is the electric field.
- dA is the differential area vector on the surface, pointing outward.
- ϕ_{enc} is the total charge enclosed within the surface.
- E_0 is the permittivity of free space.

Proof of Gauss's Law :

Gauss's Law can be derived from Coulomb's Law, which states that the electric force F between two point charges is proportional to the product of their charges and inversely proportional to the square of the distance between them :

$$F = k_e \frac{q_1 q_2}{r^2}\hat{r}$$

Where k_e is Coulomb's constant. The electric field E created by a point charge q at a distance r is then :

$$E = k_e \frac{q}{r^2}\hat{r}$$

Now, consider a spherical surface of radius r centered around a point charge q. The electric field at every point on the surface is radially outward and has a magnitude of $k_e q/r^2$.

The flux through a small area $E.dA = EdA\cos\theta$. For a spherical surface, $\theta = 0$ and $dA = r^2\, d\Omega$ (where $d\Omega$ is the solid angle), so the flux through the entire surface is :

$$\oint E.dA = \oint_s K_e \frac{q}{r^2} r^2\, d\Omega = q k_e \oint_s d\Omega$$

Since the integral of the solid angle over a sphere is 4π, we have :

$$\oint_s E.dA = 4\pi k_e q$$

Since $k_e = \dfrac{1}{4\pi\varepsilon_0}$, we get

$$\oint_s E.dA = \frac{q}{\varepsilon_0}$$

This is Gauss's Law for a point charge. For any charge distribution, by applying the superposition principle, the law remains valid.

Electric Field Near a Charged Metallic Conductor : To find the electric field near a charged metallic conductor, apply Gauss's Law. For a conductor, charges reside on its surface. If we consider a Gaussian surface just outside the

conductor's surface, the electric field is perpendicular to the surface and its magnitude is uniform over the Gaussian surface.

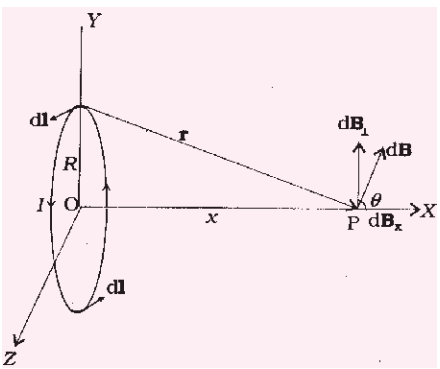
Let σ be the surface charge density on the conductor and A the area of the Gaussian surface (which matches a part of the conductor's surface). Then, the enclosed charge $Q_{enc} = \sigma A$. Applying Gauss's Law :

$$\oint_S E \cdot dA = EA = \frac{\sigma A}{\varepsilon_0}$$

Solving for E : $\quad E = \dfrac{\sigma}{\varepsilon_0}$

This is the magnitude of the electric field just outside the surface of a charged metallic conductor.

22. Consider a circular loop carrying a steady current I. The loop is placed in the *y-z* plane with its centre at the origin *O* and has a radius *R*. The *x*-axis is the axis of the loop. We wish to calculate the magnetic field at the point P on this axis. Let *x* be the distance of P from the centre O of the loop.



Consider a conducting element *dl* of the loop. This is shown in Figure. The magnitude *dB* of the magnetic field due to *dl* is given by the Biot-Savart law.

$$dB = \frac{\mu_0}{4\pi}\frac{I|dl| \times r}{r^3} \qquad \text{(i)}$$

Now, $r^2 = x^2 + R^2$. Further, any element of the loop will be perpendicular to the displacement vector from the element to the axial point. For example, the element *dl* in Figure is in the *y-z* plane whereas the displacement vector *r* from *dl* to the axial point *P* is in the *x-y* plane. Hence $|dl \times r| = rdl$. Thus,

$$dB = \frac{\mu_0}{4\pi}\frac{Idl}{(x^2 + R^2)} \qquad \text{(ii)}$$

The direction of *dB* is shown in figure. It is perpendicular to the plane formed by *dl* and *r*. It has an *x*-component dB_x and a component perpendicular to *x*-axis, $dB_\perp$. When the components perpendicular to the *x*-axis are summed over, they cancel out and we obtain a null result. For example, the $dB_\perp$ component due to *dl* is cancelled by the contribution due to the diametrically opposite *dl* element, shown in figure. Thus, only the *x*-component survives. The net contribution along *x*-direction can be obtained by integrating $dB_x = dB\cos\theta$ over the loop. For figure,

$$\cos\theta = \frac{R}{(x^2 + R^2)^{1/2}} \qquad \text{(iii)}$$

From Eqs. (ii) and (iii),

$$dB_x = \frac{\mu_0 Idl}{4\pi}\frac{R}{(x^2 + R^2)^{3/2}}$$

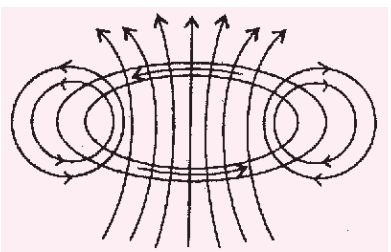
The summation of elements *dl* over the loop yields 2πR, circumference of the loop. Thus, the magnetic field at P due to entire circular loop is

$$B = B_x\hat{i} = \frac{\mu_0 IR^2}{2(x^2 + R^2)^{3/2}}\hat{i} \qquad \text{(iv)}$$

As a special case of the above result, we may obtain the field at the centre of the loop. Here $x = 0$, and we obtain,

$$B_0 = \frac{\mu_0 I}{2R}\hat{i} \qquad \text{(v)}$$

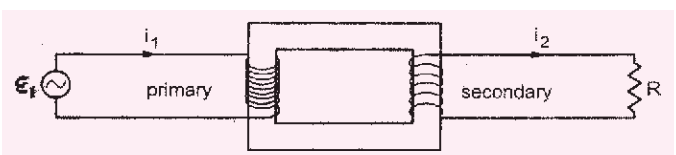
The magnetic field lines due to a circular wire from closed loops and are shown in figure. The direction of the magnetic field is given by (another) stated below :



23. Transformer is broadly used electrical device and it is used for many purposes. It is necessary to change an alternating voltage from one to another of greater or smaller value. It is based on principal of mutual induction.

Construction : It consist of two coil wounded on soft iron core. Which is made up by thick sheet of a material having very small loss of energy.

The coil in which supply an electrical emf is called primary coil (*P*) & the coil by which obtained emf is called secondary coil (*S*). These, two coils & core is made insulated from each other.



Types of Transformer : Transformers are following two types :

(a) Step-up : If no. of turns in secondary coil is more than that of primary coil transformer is called step-up.

(b) Step down : If no. of turns in secondary coil is less than that of primary coil is step-down.

Working : When the primary coil of the transformer is connected to an emf. Then there is an induced emf in that of coil Due to this magnetic flux through the core passes by secondary coil since direction of alternating emf changes continuously. Hence, there will be change in flux through the secondary coil hence an induced emf produced in secondary coil.

$$\boxed{\frac{V_S}{V_P} = \frac{N_S}{N_P} = r}$$

where V_S = emf in secondary coil
V_P = emf in primary coil.
N_S = No. of terms in secondary coil.
N_P = No. of terms in primary coil.
$\therefore$ r = Transformer ratio.

24. Dispersive Power : Dispersive power is a measure of the degree to which a material (like glass in a prism) can separate or disperse different wavelengths of light, primarily due to the variation in refractive index with wavelength. In simpler terms, it is a property that quantifies how much a material spreads out different colors of light. The greater the dispersive power the more the material can separate light into its constituent colors.

Mathematically, dispersive power ω of a material is given by the formula :

$$\omega = \mu\text{yellow}^{-1}/\mu\text{red} - \mu\text{violet}$$

where μ yellow, μred and μ violet are the refractive indices for yellow, red and violet light respectively.

Deviation Without Dispersion Using Two Thin Prisms : To obtain deviation without dispersion using two prisms, certain conditions must be met. These conditions involve the orientation and the refractive indices of the two prisms :

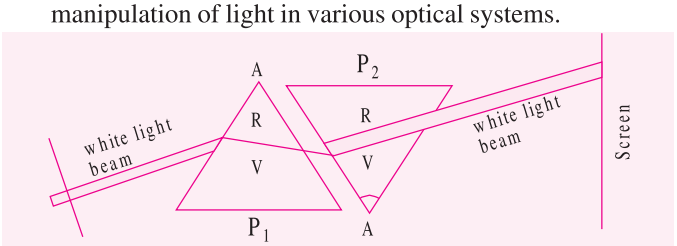
(i) Prism Orientation : The prisms should be arranged such that their refracting angles are oppositely oriented. This means if one prism bends light to the right, the other should bend it to the left.

(ii) Refractive Indices and Angles : The prisms must have different refractive indices, and their angles must be chosen carefully. The product of the refractive index and the angle of the prism must be equal for both prisms for the colors at the two ends of the spectrum (typically red and violet).

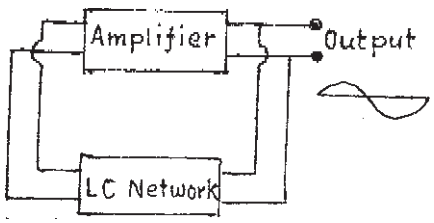
(iii) Equal but Opposite Deviation : The angular deviation caused by the first prism is neutralized by the second prism but only for a specific wavelength of light (usually chosen to be yellow, the middle of the visible spectrum).

When these conditions are satisfied the two prisms together will cause a net deviation of light without causing any dispersion. This means that while the light beam is deviated from its original path, it does not spread out into its component colors. This technique is often used in optical instruments where deviation is needed without the accompanying dispersion, like in certain types of telescopes and binoculars.

In practical applications, achieving perfect deviation without dispersion is challenging due to the material properties and the precision required in aligning the prisms. However, this concept is fundamental in understanding the manipulation of light in various optical systems.



25. The function of an oscillator circuit is to produce an alternating voltage of desired frequency when only DC, battery are available. Figure shows a schematic representation of an oscillator circuit. The basic parts in this circuit are (a) an amplifier (b) LC Network.



Oscillator action : Batteries is biased the transistor and no external input signal is fed to the amplifying section. A part of the output signal is fed back to its input section after going through the LC Network. This signal is amplified by the transistor and a part is again fed back to its input section. Thus it is a self subtaining device. The component with the proper frequency V_0 gets resonantly amplified and the output acts as a source of alternating voltage of that frequency. The frequency can be varied by varying L or C.

26. Phenomena of Photo electric emission—When light of Suitable frequency illuminates a metal surface, electrons are emitted from the metal surface. These Photo (light) generates electrons are called photo electrons.

Explanation—When an electron attempts to come out of a metal the metal surface acquires a positive charge and pulls the electron back to the metal. The free electron is thus held inside the metal surface by the attractive force of the ions. A certain amount of energy (as form of light) is required by an electron to escape from the metal surface. This energy is called work function is denoted by ϕ_0.

Law of photoelectric effect are following :

(i) For a given material there is a certain minimum frequency of radiation known as the threshold frequency such that if the incident radiation has a frequency below this threshold, no photo electric emission ever take place.

(ii) For the incident frequency *r greater* than the threshold frequency v_0, the photoelectric current is directly proportional to the intensity of radiation.

(iii) The maximum kinetic energy of the photoelectrons is directly proportional to only the frequency of incident radiation.

Einstein Photo electric equation—Einstein developed this theory and applied it to photon electric emission. According to him, light has photon in form of "Energy pocket is called photon".

Energy of photon; $E = h\upsilon$

Where, h = Plank's constance when photon falls on electron with Energy (hv), it causes an electron to be ejected out of the metal instantaneously. The electron must first over come the work function ϕ_0 (inner force) and leave the surface barrier with some velocity (Kinetic energy)

Thus $E = hv = \phi_0 + \frac{1}{2}mv_{max}^2$

or $K_{max} = \frac{1}{2}mv_{max}^2 - hv - \phi_0$

or $[K_{max} = hv - hv_0]$

Where v_0 = Thresholds frequency

❑ ❑ ❑

CHEMISTRY

INTERNET MODEL PAPER – 1

Time : 3 Hours + 15 Minutes] [**Total Marks** : 70

INSTRUCTIONS TO THE CANDIDATES :

1. Candidates are required to give their answers in their own words as far as practicable.
2. Figure in the right hand margin indicate full marks.
3. While answering the questions, candidate should adhere to the word limit as far as practicable.
4. 15 Minutes of extra time has been allotted for the candidates to read the questions carefully.
5. This question paper is divided into two sections—**SECTION – A** and **SECTION – B**.
6. In **SECTION – A** there are **70 Objective Type Question**, out of which only 35 objective questions be answered. Darken the circle with blue/black ball pen against the correct option on OMR Sheet provided to you. Do not use Whitener/Liquid/Blade/ Nail on OMR paper; otherwise the result will be invalid.
7. In **SECTION – B**, there are **20 Short Answer Type Question** (each carrying 2 marks), out of which any 10 questions are be answered.
   Apart from this, there are **6 Long Answer Type Question** (Each Carrying 5 marks), out of which 3 questions are to be answered.
8. Use of any electronic device is prohibited.

SECTION – A : Objective Type Questions

Directions : *There are 70 Objective Type Questions, out of which only 35 objectives questions to be answered. For each question, mark the correct option on the* ***OMR*** *answer sheet.* 35 × 1 = 35

1. In NaCl crystal, one Na+ is surrounded by how many Chlorine ions ?
(A) 3 (B) 8 (C) 4 (D) 6

2. The geometry of match box is :
(A) Cubic (B) Monoclinic
(C) Orthorhombic (D) Tetragonal

3. The number of octahedral voids in close packing of *N* sphere is :
(A) $\frac{N}{2}$ (B) 2N (C) N (D) 4N

4. Which of the following types of defects causes a decrease in density of a crystal ?
(A) Frenkel (B) Schottky
(C) Interstitial (D) F-centre

5. Which of the following forms an ideal solution ?
(A) C_2H_5OH and water (B) HNO_3 and water
(C) $CHCl_3$ and CH_3COCH_3 (D) C_6H_6 and $C_6H_5CH_3$

6. The normality of 0.1 M H_3PO_4 solution is :
(A) 0.5 N (B) 0.1 N
(C) 0.2 N (D) 0.3 N

7. The colligative properties of dilute solution depends upon :
(A) the nature of the solute
(B) the nature of the solvent
(C) the number of particles of solute
(D) the number of particles of solvent

8. At 25°C, the osmotic pressure of which of the following would be maximum ?
(A) $CaCl_2$ (B) KCl (C) glucose (D) Urea

9. On passing one faraday of electricity through a dilute solution of an acid, the volume of hydrogen obtained at S.T.P. is :
(A) 22400 ml (B) 1120 ml
(C) 2240 ml (D) 11200 ml

10. On increasing dilution, the molar conductance of an electrolytic solution :
(A) increases (B) decreases
(C) remains constant (D) None of these

11. The standard oxidation potential of an electrode is +0.763 *V*. Its standard reduction potential is :
(A) 2 × 0.763 V (B) $\frac{0.763}{2}$ V
(C) – 0.763 V (D) None of these

12. λ_∞ NaCl is equal to :
(A) λNa^+ (B) λCl^+
(C) $\lambda Na^+ + \lambda Cl^+$ (D) $\frac{\lambda Na^+}{\lambda Cl^-}$

13. Which of the following is a secondary cell ?
(A) Le clanche cell (B) Lead storage battery
(C) Concentration cell (D) All of these

14. The rate constant of a reaction depends upon :
(A) temperature (B) mass
(C) weight (D) time

15. The unit of rate constant of a first order reaction is :
(A) mol.litre^{-1} (B) time^{-1}
(C) L mol sec^{-1} (D) mol^{-1} L^{-1} sec^{-1}

16. If the initial concentration of the reactant is doubled, time for half reaction is also doubled, the order of reaction is :
(A) zero (B) first (C) second (D) third

17. Which of the following is correct for a reaction of first order ?
(A) $t\frac{1}{2}\alpha a$ (B) $t\frac{1}{2}\alpha\frac{1}{a}$ (C) $t\frac{1}{2}\alpha a^{\circ}$ (D) $t\frac{1}{2}\alpha a^{2}$

18. Adsorption is the phenomenon in which a substance :
(A) accumulates at the surface of the other substance
(B) goes into the body of the other substance
(C) remains close to the other substance
(D) oxidizes or reduces the other substance

19. A catalyst is a substance which :
(A) increases the equilibrium concentration of the product
(B) changes the equilibrium constant of the reaction
(C) shortens the time to reach equilibrium
(D) supplies energy to the reaction

20. The stability of Lyophobic colloids is due to :
(A) Hydration of particles
(B) Charge on particles
(C) Big size of particles
(D) Small size of particles

21. Gold number is associated with :
(A) Lyophilic colloid (B) Lyophobic colloid
(C) Emulsions (D) Gels

22. Sulphide ores are generally concentrated by :
(A) Froth floatation process
(B) roasting
(C) Gravity separation process
(D) reduction with carbon

23. Which of the following metals is extracted by complex formation method ?
(A) Zn (B) Ag (C) Hg (D) Cu

24. Zone refining method is used to obtain :
(A) very high temperature (B) ultra pure metals
(C) ultra pure oxides (D) ultra pure Al

25. During the extraction of iron, slag produced is :
(A) CO (B) $FeSiO_3$ (C) $MgSiO_3$ (D) $CaSiO_3$

26. Which of the following oxides of nitrogen is paramagnetic ?
(A) N_2O (B) NO_2 (C) N_2O_5 (D) N_2O_3

27. The oxidation states of phosphorus is :
(A) –3 to +5 (B) –3 to 0 (C) 0 to +5 (D) –4 to +2

28. Which of the following oxides is the most acidic ?
(A) P_2O_5 (B) N_2O_5 (C) Sb_2O_5 (D) As_2O_5

29. Formic acid reacts with conc. H_2SO_4 to form :
(A) CO (B) CO_2 (C) SO_2 (D) SO_3

30. Sulphur molecule is
(A) diatomic (B) tetraatomic
(C) triatomic (D) octaatomic

31. The electronic configuration of Cu (z = 29) is :
(A) [Ar] $3d^9\ 4s^2$ (B) [Ar] $3d^{10}\ 4s^1$
(C) [Ar] $3d^8\ 4s^2\ 4p^1$ (D) [Ar] $3d^{10}\ 4s^2$

32. The general electronic configuration of lanthanide elements :
(A) $(n-2)f^{1-14}\ (n-1)\ s^2p^6d^{0,1}ns^2$
(B) $(n-2)f^{0-14}\ (n-1)\ d^{0,\ 1}ns^2$
(C) $(n-2)f^{0-14}\ (n-1)\ d^{\ 10}ns^2$
(D) $(n-2)d^{0,\ 1}\ (n-1)\ f^{0\text{-}14}\ ns^1$

33. Which of the following is not an actinide ?
(A) Curium (B) Californium
(C) Uranium (D) Terbium

34. Which of the following is diamagnetic ?
(A) Cr^{3+} (B) V^{2+} (C) Sc^{3+} (D) Ti^{3+}

35. The number of unpaired electrons in Fe^{2+} (z = 26) is :
(A) 4 (B) 5 (C) 6 (D) 3

36. The oxidation number of Fe in $K_3[Fe(CN)_6]$ is :
(A) 6 (B) 4 (C) 3 (D) 2

37. All ligands are :
(A) Lewis acids (B) Lewis bases
(C) Neutral (D) None of these

38. The structure of $[Ni(CN)_4]^{2-}$ is :
(A) Linear (B) Tetrahedral
(C) Square planar (D) Octahedral

39. Vitamin B-12 contains
(A) Cobalt (B) Magnesium
(C) Iron (D) Nickel

40. Which of the following has zero dipole moment ?
(A) CH_3Cl (B) $CHCl_3$ (C) CHI_3 (D) CCl_4

41. Which of the following is a gemdihalide ?
(A) CH_3CHBr_2 (B) $CH_2Br\text{–}CH_2Br$
(C) $CH_3\text{–}CHBrCH_2Br$ (D) $CH_3CHBrCH_2CH_2Br$

42. From which of the following, chloroform is formed ?
(A) Methanol (B) Methanal
(C) Propan-1-ol (D) Propan-2-ol

43. Alkyl halides are used for the preparation of which of the following ?
(A) Alkane (B) Alkene
(C) Alcohol (D) All of these

44. Which of the following represents secondary alcohol ?
(A) $-CH_2OH$ (B) $>CHOH$
(C) $\geqslant C-OH$ (D) $>\underset{OH}{C}-\underset{OH}{C}<$

45. Grain alcohol is the common name of which of the following ?
(A) Amyl alcohol (B) Ethyl alcohol
(C) Methanol (D) None of these

46. Which of the following forms alkane on reaction with Grignard reagent?
(A) CH_3CH_2OH (B) CH_3CHO
(C) CH_3COCH_3 (D) HCHO

47. The reaction $RCOCl + H_2 \xrightarrow{Pd/BaSO_4} RCHO + HCl$ is called :
(A) Cannizzaro's reaction (B) Rosenmund's reaction
(C) Haloform reaction (D) Clemmensen's reaction

48. An aldehyde on oxidation gives :
(A) an alcohol (B) an acetone
(C) an ether (D) an acid

49. Which of the following doesn't give cannizzaro's reaction ?
(A) Trimethyl acetaldehyde (B) Acetaldehyde
(C) Bengaldehyde (D) Formaldehyde

50. Urotropine is formed by the reaction of ammonia with which of the following ?
(A) Acetaldehyde (B) Formaldehyde
(C) Acetone (D) Phenol

51. Which of the following formula represents an ester ?
(A) RCOOH (B) RCOOR (C) RCOR (D) ROR

52. Formic acid and Formaldehyde can be distinguished by which of the following ?
(A) Benedict's solution (B) Tollen's reagent
(C) Fehling's solution (D) $NaHCO_3$

53. Which of the following is the strongest acid ?
(A) CH_3COOH (B) $ClCH_2COOH$
(C) $Cl_2CHCOOH$ (D) $Cl_3C.COOH$

54. Which of the following is a strong reducing agent ?
(A) Ethanoic acid (B) Benzoic acid
(C) Methanoic acid (D) Chloroacetic acid

55. By which of the following carboxylic acids can be directly recuced into alcohol ?
(A) $LiAlH_4$ (B) $Na^+C_2H_5OH$
(C) $NaBH_4$ (D) H_2

56. Which of the following is a secondary amine ?
(A) $R - NH_2$ (B) $R - \underset{\displaystyle R}{\underset{|}{N}} - R$
(C) $R_4\overset{+}{N}\overset{-}{X}$ (D) R – NH – R

57. The molecular formula of methylisocyanate is
(A) CH_3NCO (B) CH_3CNO
(C) CH_3NCS (D) CH_3CN

58. Which of the following gives primary amine on hydrolysis ?
(A) Nitroparaffin (B) Alkylcyanide
(C) Amide (D) Alkyl isocyanide

59. The hybridization of nitrogen in amines is
(A) sp (B) sp^2 (C) sp^3 (D) dsp^2

60. Sucrose on hydrolysis gives :
(A) Only glucose (B) Glucose and Glactose
(C) Glucose and Fructose (D) Glucose and Lactose

61. Ascorbic acid is :
(A) a vitamin (B) an enzyme
(C) a protein (D) an amino acid

62. Which of the following is responsible for the heredity character of cell?
(A) RNA (B) DNA
(C) Protein (D) Harmones

63. Soaps are :
(A) Carbohydrates (B) Ethers
(C) Salts of fatty acids (D) None of these

64. Which of the following is a natural polymer ?
(A) Protein (B) Polythene
(C) Buna-S (D) Bakelite

65. An example of copolymer is :
(A) Nylon-6
(B) Nylon-6, 6
(C) Poly methyl methyl acrylate (PMMA)
(D) Polythene

66. A product of condensation polymer is :
(A) Polythene (B) PVC
(C) Teflon (D) Nylon-6, 6

67. Which of the following is used as an antipyretic ?
(A) Paracetamol (B) Chloroquine
(C) Chloramphenicol (D) LSD

68. An antibiotic used for the treatment of typhoid is :
(A) Pencillin (B) Chloramphenicol
(C) Tetramycin (D) Sulphadiazine

69. The poisonous gas evolved in Bhopal tragedy is :
(A) N_2 (B) CH_3NCO (C) CH_3CN (D) CO_2

70. Gammexane is :
(A) Chlorobenzene (B) DDT
(C) Benzene hexachloride (D) None of these

SECTION – B : Non-Objective Type Questions

SHORT ANSWER TYPE QUESTIONS

Directions : *Questions Nos. 1 to 20 are of short answer type. Each question carries 2 marks. Answer any ten question on your copy.* $10 \times 2 = 20$

1. What are metallic solids ? Give two examples.
2. What are Frankel defects ? Explain with examples.
3. What are isotonic solutions ?
4. What are colligative properties of a solution ? Give examples.

5. Define conductance and molar conductance.
6. Write Faraday's first law of electrolysis.
7. What are enzyme catalysts ?
8. What are surfactants ?
9. Write names and formulae of two ores of copper.
10. Differentiate between ores and minerals.
11. Electron affinity of chlorine is greater than that of Fluorine. Why ?
12. Halogen elements are strong oxidizing agents. Why ?
13. What do you understand by interhalogens ? Give two examples.
14. Discuss the structure of XeF_2.
15. What are f-block elements ? Why are they called so ?
16. Cu(I) is diamagnetic where as Cu(II) is paramagnetic. Explain.
17. Write IUPAC names of the following
    (i) $[CO(NH_3)_5Cl]Cl_2$ (ii) $K_3[Cr(C_2O_4)_3]$
18. What are different constituents of tincture iodine?
19. What are elastomer ? Give one example of natural elastomer.
20. Define carbohydrates

LONG ANSWER TYPE QUESTIONS

Directions : *Questions Nos. 21 to 26 are Long Answer Type Questions. Answer any 3 questions out of them.* 3 × 5 = 15

21. Write structural formula of following compounds
    (A) 2–Aminoethanol
    (B) Tertiary butylamine
    (C) N–Ethyl ethanamine
    (D) N, N Dimethyl methanamine
    (E) N–Ethylcyclopentanamine
22. Write short notes on the following.
    (A) HVZ reaction
    (B) Hoffmann Bromamide reaction
23. What happens when
    (i) Formaldehyde reacts with ammonia ?
    (ii) Calcium formate is heated with calcium acetate ?
24. How would you bring about the following conversions ?
    (i) Acetylene to ethyl alcohol
    (ii) Ethyl alcohol to diethyl ether
25. Write formula of the following as per IUPAC system.
    (i) Hexaamineplatinum (IV) chloride
    (ii) Tetrabromidocuprate (II) ion
    (iii) Sodium dicynidoaurate (I)
    (iv) Potassium tetrahyrxozincate (II)
    (v) Potassium dicyanoargentate (I)
26. (i) What do you mean by first order reaction ? Give two examples.
    (ii) Obtain an expression for rate constant of a first order reaction.

ANSWER WITH EXPLANATIONS

SECTION – A

OMR ANSWER-SHEET

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

ANSWER

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

SECTION – B

1. **Metallic Solids :** Metallic solids are composed of metal atoms arranged in a regular pattern. They exhibit characteristics like high electrical and thermal conductivity, malleability, and ductility. Examples include iron (Fe) and copper (Cu).
2. **Frenkel defect**—This defect arises when some of the ions of the lattice occupy interstitial sites leaving lattice sites vacant. This defect is generally found in ionic crystals where anion is much larger in size than the cation, e.g. AgBr, ZnS. etc. Due to this defect density does not change, electrical conductivity increases to a small extent and there is no chance in overall chemical composition of the crystal.

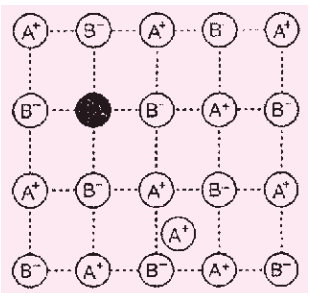


Fig. (b) : Frenkel defect

3. **Isotonic Solutions :** Isotonic solutions have the same osmotic pressure or concentration of solutes as another solution, typically a biological fluid. These solutions are important in medical applications to avoid cell damage.
4. **Colligative Properties :** These properties depend on the number of solute particles in a solution, not their identity. Examples include boiling point elevation and freezing point depression.
5. **Conductance and Molar Conductance** : Conductance measures how easily electricity flows through a solution, while molar conductance is conductance normalized to the concentration of the electrolyte and the cell constant.
6. **Faraday First Law**—The quantity of the substance released from each electrode during the electrolysis is directly proportional to the quantity of electric current passed through the electrolyte.
   If through an electrolyte I ampere electric current is passing in t second and due to it if m gm substance is deposited then;
   $$m \propto It \Rightarrow m = ZIt .$$
   where; Z is a constant called electro chemical equivalent.
   Here, if I = 1 amp.
   t = 1 sec.
   then $m = z$
7. **Enzyme Catalysts**—Enzymes are complex nitrogenous organic compounds which are produced by living plants and animals. They are actually protein molecules of high molecular mass and form colloidal solutions in water. The enzymes are also referred to as **Bio-Chemical Catalysts** as they also occur in the bodies of animals and plants and such a phenomenon is known as Bio-Chemical Catalysis.
8. **Surfactants :** Surfactants are compounds that lower the surface tension between two liquids or between a liquid and a solid. They are used in detergents, emulsifiers, foaming agents, and dispersants.
9. **Ores of Copper :** Two common ores of copper are Chalcopyrite ($CuFeS_2$) and Cuprite (Cu_2O).
10.

Sl. No.	Mineral	Ore
1.	Naturally occurring substances of metals present in the earth's crust are called minerals.	Minerals which can be used to obtain the metal profitably are called ores.
2.	All minerals are not ores.	All ores are essentially minerals too
3.	e.g., bauxite ($Al_2O_3 \cdot xH_2O$) and clay ($Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O$)	e.g.bauxite ($Al_2O_3 \cdot xH_2O$)

11. Chlorine has greater electron affinity than fluorine because the smaller size of fluorine leads to higher electron-electron repulsion, making it less eager to accept an additional electron.
12. Halogens are strong oxidizing agents due to their high electronegativity and small size, which makes them efficient in gaining electrons and oxidizing other substances.
13. **Interhalogens :** Interhalogens are compounds formed between different halogen atoms. They are typically more reactive than pure halogens. Examples include CIF and IBr.
14. **Structure of XeF_2 :** XeF_2 (Xenon Difluoride) has a linear structure with sp^3d hybridization. The Xenon atom has three lone pairs and two bond pairs, forming a linear geometry.
15. **f-block Elements :** f-block elements are those in which the outermost electrons enter the f-orbital. They are called so because the differentiating electron enters the f-orbital. These elements include lanthanides and actinides.
16. Cu(l) is diamagnetic because it has a completely filled d^{10} configuration with no unpaired electrons. Cu(ll), however, has a d^9 configuration with one unpaired electron, making it paramagnetic.
17. **IUPAC Names of Coordination Compounds:**
   (i) $[CO(NH_3)_5CI]CI_2$: Pentaamminechloridocobalt (III) chloride
   (ii) $K_3[Cr(C_2O_4)_3]$: Potassium trioxalatochromate (III).
18. **Constituents of Tincture Iodine :** Tincture iodine is a solution containing iodine and potassium iodide in ethanol or alcohol. It is used as a disinfectant and antiseptic.
19. **Elastomers :** Elastomers are polymers that exhibit elastic properties, meaning they return to their original shape after being stretched. Natural rubber is an example of a natural elastomer.
20. **Carbohydrates :** Carbohydrates are organic compounds composed of carbon, hydrogen, and oxygen, typically with a hydrogen : oxygen atom ratio of 2 :1 (as in water). They are essential biomolecules that provide energy and serve as structural components in living organisms.
21. **(A) 2-Aminoethanol :** $CH_3CH(OH)NH_2$
   This structure represents an ethanol molecule where the hydrogen atom on the second carbon is replaced by an amino group (NH_2).
   (B) Tertiary butylamine : $(CH_3)_3CNH_2$,
   This structure has a central nitrogen atom with three methyl groups attached, making it a tertiary amine.

(C) N-Ethyl ethanamine : $CH_3CH_2NHCH_2CH_3$
In this structure, an ethyl group is attached to the nitrogen of ethanamine.

(D) N, N Dimethyl methanamine : $H_3C–N–CH_3$
This compound *is a* methanamine molecule with two methyl groups attached to the nitrogen atom.

(E) N-Ethylcyclopentanamine : $C_5H_9NHCH_2CH_3$
Here, an ethyl group is bonded to the nitrogen of a cyclopentanamine molecule.

22. (A) HVZ Reaction (Hell-Volhard-Zelinsky Reaction)

The Hell-Volhard-Zelinsky (HVZ) reaction is a classic organic reaction involving the halogenation of carboxylic acids at the alpha position. This reaction is particularly unique as it specifically targets the alpha carbon, which is the carbon adjacent to the carbonyl group of the carboxylic acid. The HVZ reaction typically employs a halogen (like bromine or chlorine) and a catalyst, usually phosphorus tribromide (PBr_3) for bromination or phosphorus trichloride (PCI_3) for chlorination.

where the alpha hydrogen is abstracted, forming an enol. The enol then reacts with the halogen to introduce the halogen atom at the alpha position, followed by hydrolysis to regenerate the carboxylic acid group but now with the halogen substituted at the alpha carbon.

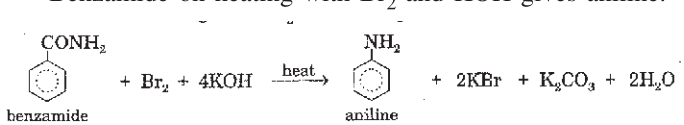
This reaction is significant in organic chemistry as it provides a method for the functionalization of carboxylic acids, a common building block in many organic compounds. The HVZ reaction is widely used in the synthesis of alpha-halo carboxylic acids, which are valuable intermediates in the preparation of various other compounds, including amino acids, lactones, and Pharmaceuticals.

(B) Hoffmann–Bromamide Reaction

This reaction is used for converting an amide to amine containing one carbon less than the parent amide. When an amide is heated with bromine and an alkali, a primary amine containing one carbon less than the amide is obtained. This reaction is known as the **Hoffmann's-Bromamide reaction,** or as Hoffmann's degradation of amides. For example, acetamide on heating with Br_2 + KOH gives methylamine.

$$\underset{\text{acetamide}}{CH_3CONH_2} + Br_2 + 4KOH \xrightarrow{\text{heat}} \underset{\substack{\text{methanamine}\\(\text{methylamine})}}{CH_3NH_2} + 2KBr + K_2CO_3 + 2H_2O$$

Benzamide on heating with Br_2 and KOH gives aniline.



This reaction is very useful for converting a higher homologue to the next lower one.

23. The reaction between formaldehyde (CH_2O) and ammonia (NH_3) is a classic example of organic chemistry, resulting in the formation of hexamethylenetetramine, also known as urotropine or hexamine. This reaction occurs under acidic conditions and is a kind of condensation reaction where multiple molecules combine, losing small molecules like water.

The process begins with the nucleophilic attack of ammonia on the carbonyl carbon of formaldehyde. Ammonia, being a good nucleophile due to its lone pair of electrons, easily attacks the electrophilic carbon atom of the formaldehyde. This step is followed by a series of condensation reactions involving multiple formaldehyde and ammonia molecules, leading to the formation of hexamethylenetetramine. During this process, six molecules of formaldehyde and four molecules of ammonia combine, with the release of six molecules of water.

Hexamethylenetetramine is a versatile compound used in various applications, such as in the production of synthetic resins, as a urinary antiseptic, and in the preparation of other chemical compounds. Its formation from formaldehyde and ammonia is an important reaction in industrial chemistry, illustrating the principles of nucleophilic addition and condensation in organic synthesis.

When calcium format ($Ca(HCOO)_2$ is heated with calcium acetate $Ca(CH_3COO)_2$, it undergoes a chemical reaction leading to the formation of acetone (CH_3COCH_3) and calcium carbonate ($CaCO_3$). This reaction is an example of the ketonic decarboxylation of calcium salts of carboxylic acids.

The process involves the heating of a mixture of calcium formate and calcium acetate, which facilitates the decarboxylation (removal of a carboxyl group as carbon dioxide) of the carboxylic acid salts. In this reaction, the acetate ion (CH_3COO^-) loses a carboxyl group, forming acetone, a simple ketone, while the formate ion ($HCOO^-$) decomposes to produce carbon dioxide and water. Simultaneously, calcium carbonate is formed as a by product.

Influence of heat and provides a method for synthesizing simple ketones like acetone, which is an important solvent and industrial chemical. The formation of calcium carbonate as a byproduct also exemplifies the type of reactions that involve inorganic components in organic synthesis.

24. (i) Conversion of Acetylene to Ethyl Alcohol

The conversion of acetylene (ethyne, C_2H_2) to ethyl alcohol (ethanol, C_2H_50H) involves several steps, primarily hydration. Acetylene is a hydrocarbon with a triple bond between two carbon atoms, and its conversion to ethyl alcohol is a crucial transformation in organic chemistry.

(a) Hydration of Acetylene : The first step in converting acetylene to ethyl alcohol is the hydration of acetylene, which involves adding water (H_2O) across the triple bond. This reaction is typically catalyzed by mercuric sulphate ($HgSO_4$) in the presence of dilute sulphuric acid (H_2SO_4). The hydration of acetylene results in the formation of an intermediate enol, which rapidly tautomerizes to vinyl alcohol.

(b) Tautomerization : Vinyl alcohol then undergoes tautomerization, a rearrangement process where a hydrogen atom and a double bond are shifted, resulting in the formation of acetaldehyde (ethanal, CH_3CHO).

(c) Reduction of Acetaldehyde : The final step is the reduction of acetaldehyde to ethyl alcohol. This reduction can be carried out using a suitable reducing agent, such as sodium borohydride ($NaBH_4$) or lithium aluminium hydride ($LiAlH_4$). This step adds two hydrogen atoms to the carbonyl group (C=0) of acetaldehyde, converting it into ethanol.

(ii) Conversion of Ethyl Alcohol to Diethyl Ether

The conversion of ethyl alcohol (ethanol, C_2H_50H) to diethyl ether ($C_2H_5OC_2H_5$) involves a dehydration reaction.

(a) Dehydration of Ethyl Alcohol : Ethyl alcohol can be dehydrated to form diethyl ether by using an acid catalyst such as concentrated sulfuric acid (H_2SO_4). The reaction is carried out by heating ethyl alcohol with the acid.

(b) Formation of Ether : The acid-catalyzed dehydration of ethanol proceeds through the formation of an ethyl oxonium ion intermediate. This intermediate then reacts with another molecule of ethanol, leading to the formation of diethyl ether and water.

(c) Distillation : Finally, diethyl ether is separated from the reaction mixture by distillation, as it has a lower boiling point compared to water and unreacted ethanol.

25. (i) Hexaamineplatinum (IV) Chloride

- Formula : $[Pt(NH_3)_6]Cl_4$
- This complex consists of a platinum ion in a +4 oxidation state surrounded by six ammine (NH_3) ligands. The complex cation $[Pt(NH_3)_6]^{4+}$ is balanced by four chloride anions (CI^-).

(ii) Tetrabromidocuprate (II) Ion

- Formula : $[CuBr_4]^{2-}$
- This is a cuprate ion with a copper in the +2 oxidation state and four bromide ions as ligands, forming a tetrabromidocuprate(II) anion.

(iii) Sodium Dicyanidoaurate (I)

- Formula : $Na[Au(CN)_2]$
- This complex is formed from gold in the +1 oxidation state with two cyanide (CN) ligands, and balanced with a sodium cation (Na+).

(iv) Potassium Tetrahydroxozincate (II)

- Formula : $K_2[Zn(OH)_4]$
- In this compound, a zinc ion in a +2 oxidation state is coordinated to four hydroxide (OH^-) ligands to form the anionic tetrahydroxozincate (II) complex, which is balanced by two potassium (K^+) cations.

(v) Potassium Dicyanoargentate (I)

- Formula : $K[Ag(CN)_2]$
- This compound consists of a silver ion in the +1 oxidation state coordinated with two cyanide ligands, forming the anionic dicyanoargentate (I) complex, balanced by a potassium cation (K^+).

26. First order reaction—The reaction whose rate is directly proportional to the concentration of the reactant is called first order reaction. The differential rate equation for a first order reaction is given by

$$R_t = \frac{-d[A]}{dt} = k[A]$$

$$k = \frac{2.303}{t}\log\frac{a}{(a-x)} = \frac{2.303}{t}\log\frac{[A]_0}{[A]_t}$$

The integrated rate law is,

$$[A] = [A]_0 \exp(-k\,t)$$

Examples:

(i) Radioactive Decay : Many naturally occurring radioactive isotopes decay by first-order kinetics. For example, the decay of carbon-14 (14^C) is a first-order reaction used in carbon dating.

(ii) Decomposition of Hydrogen Peroxide : The decomposition of hydrogen peroxide (H_2O_2) into water and oxygen in the presence of a catalyst (like manganese dioxide) follows first-order kinetics.

(ii) Expression for Rate Constant of a First-Order Reaction

For a first order reaction,

$$A \rightarrow \text{Products}$$

Let the initial conc. of [A] be a ML^{-1}.

Let x change into products so that equilibrium concentration after time t is :

$\frac{dx}{dt} \cdot \alpha[A]$ k = Rate constant or, specific rate constant

$\frac{dx}{dt}\alpha(a-x)$

$\frac{dx}{dt} = k(a-x)$ reaction rate or specific

$\frac{dx}{(a-x)} = kdt$

Integrating both sides $\int\frac{1}{a-x} = k\int dt + I_0$

I_0 = constant of integration

$$-\text{In}\,(a-x) = kt + I_0 \quad \ldots (1)$$

when time $t = 0$; $x = 0$

$\therefore \quad -\text{In}\,a = I_0$

Put in equation (1)

$$-\text{In}\,(a-x) = kt - \text{ln at}$$

$$\text{In}\,a - \log(a-x) = kt$$

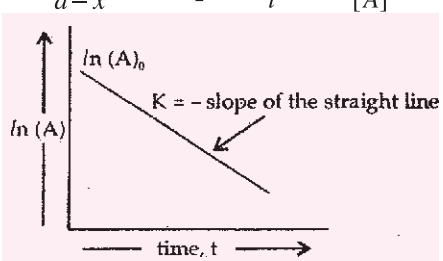
or $k = \frac{1}{t}\ln\frac{a}{a-x}$

$$k = \frac{2.303}{t}\log\frac{a}{a-x}$$

If the initial concentration is 'a' moles per litre, x moles of A change in time t and k is the rate constant, then integrated rate equation is

$$k_1 = \frac{2.303}{t}\log\frac{a}{a-x} \quad \text{or} \quad k_2 = \frac{2.303}{t}\log\frac{[A]_0}{[A]}$$

where $[A]_0$ is the initial concentration and [A] is the concentrration at time t. The value of k can be calculated by substituting the values of a, t and x.



❑ ❑ ❑

BIOLOGY

INTERNET MODEL PAPER – 1

Time : 3 Hours + 15 Minutes] [**Total Mar ks :** 70

Instructions to the Candidates :

1. Candidates are required to give their answers in their own words as far as practicable.
2. Figures in the right hand margin indicate full marks.
3. 15 minutes of extra time has been allotted for the candidate to read the questions carefully.
4. This question paper is divided into two sections : **Section–A** and **Section–B**.
5. In **Section–A**, there are **70 Objective Type Questions**, out of which only 35 objective questions be answers. Darken the circle with blue/black ball pen against the correct option on OMR Sheet provided to you. Do not use **Whitener/Liquid/Blade/Nail** on OMR Paper, otherwise the result will be invalid.
6. In **Section–B**, there are **20 Short Answer Type Questions** (each carrying 2 marks), out of which any 10 questions are to be answered. Apart from this, there are **6 Long Answer Type Questions** (Each carrying 5 Marks), our of which any 3 of them are to be answered.
7. Use of any electronic device is prohibited.

SECTION – A : Objective Type Questions

Directions : *There are 70 Objective Type Questions, out of which only 35 objective questions to be answered. For each question, mark the correct option on the answer sheet.*

35 × 1 = 35

1. In which of the following plants adventitious buds develop from leaves?
(A) Ginger (B) Banana
(C) Dahlia (D) Bryophyllum

2. In which of the following organism meiosis does not occur during gamete formation ?
(A) Haploid organism (B) Diploid organism
(C) Human (D) Chimpanzee

3. Which of the following statements is incorrect ?
(A) Ovules develop into seeds after fertilization
(B) Reptiles and birds are oviparous
(C) Earthworm is monoecious
(D) Gemmule formation occurs in Hydra

4. In seeds of pepper, remnant of nucellus persists, which is called as :
(A) Chalazosperm (B) Endosperm
(C) Pseudo embryo sac (D) Perisperm

5. After fertilization, wall of ovary develops into which structure ?
(A) Epicarp (B) Seed
(C) Mesocarp (D) Pericarp

6. If production of seeds occurs without fertilization, it is called as :
(A) Amphimixis (B) Apomixis
(C) Parthenocarpy (D) Parthenogenesis

7. Pollen grains are well preserved as fossils because :
(A) Pollen grain has a wall
(B) Wall has exine of sporopollenin
(C) Wall has intine of pectocellulose
(D) Wall has cellulose

8. Which of the following cells is not haploid ?
(A) Spermatogonia (B) Spermatid
(C) Secondary spermatocyte (D) Spermatozoon

9. Which of the following secretes gonadotropin releasing hormone ?
(A) Ovary (B) Testis
(C) Posterior pituitary gland (D) Hypothalamus

10. Ovulation occurs after which of the following process ?
(A) After secretion of GnRH
(B) Feedback inhibition
(C) LH surge
(D) After secretion of progesterone

11. Normally the first movement of foetus is observed in which month of pregnancy ?
(A) Third (B) Fourth
(C) Fifth (D) Second

12. Which of the following methods is used to prevent pregnancy permanently in male ?
(A) Vasectomy
(B) Tubectomy
(C) Sterilisation
(D) Medical termination of pregnancy

13. Which of the following sexually transmitted diseases is completely curable ?
(A) Hepatitis-B (B) AIDS
(C) Genital Herpes (D) Syphilis

14. Transfer of either zygote or early embryo to fallopian tube is called as ……
(A) IVF (B) ET
(C) ZIFT (D) IUT

15. Which one is Genotypic ratio of F_2 generation of monohybrid cross conducted by Mendel ?
(A) 3 : 1 (B) 1 : 2 : 1
(C) 9 : 3 : 3 : 1 (D) 1 : 1

16. Which of following statements is incorrect about phenylketonuria ?
(A) Inborn error of metabolism
(B) Autosomal recessive trait
(C) High level of phenylalanine and phenylpyruvate
(D) Phenylalanine and phenylpyrurate are not excreted by kidney.

17. According to Mendel, something is stably passed down unchanged from parent to offspring through the gametes, which was referred as :
(A) Factor (B) Gene
(C) Allele (D) Cistron

18. In which of the following XO – Male type of sex determination is observed ?
(A) Grasshopper (B) Honey bee
(C) Human (D) Birds

19. Backbone of polynucleotide chains of DNA is composed of which of the following ?
(A) Sugar-phosphate-base (B) Phosphate-base
(C) Sugar-phosphate (D) Stack of paired bases

20. Who propounded Central Dogma ?
(A) Watson (B) Crick
(C) Wilkins (D) R. Franklin

21. Which of the following statements, is not true about protein present in nucleosome ?
(A) Non-histone
(B) Histone
(C) Basic protein
(D) Positively charged protein

22. Biochemical nature of transforming principle, was determined by :
(A) Griffith
(B) Lederberg and Tatum
(C) Avery, Mac Leod and Mc Carty
(D) Hershey and Chase

23. Which of the following statements about RNA is incorrect ?
(A) RNA has one polynucleotide strand
(B) Uracil present in RNA
(C) RNA is genetic material in TMV.
(D) Presence of 2'OH in every nucleotide of RNA imparts stability to RNA

24. One of strands of DNA is discontinuously replicated and these fragments are joined by which of the following ?
(A) DNA polymerase (B) DNA ligase
(C) Primase (D) RNA polymerase

25. RNA polymerase III is not responsible for synthesis of which of the following ?
(A) hn RNA (B) t RNA
(C) 5 sr RNA (D) sn RNA

26. In Lac operon where does repressor protein bind ?
(A) Operator (B) Promoter
(C) Structural gene (D) Regulator gene

27. Homologous structures show what type of evolution ?
(A) Divergent (B) Convergent
(C) Parallel (D) Saltatory

28. Which of the following causes change in allele frequency in a population ?
(A) Mutation (B) Gene flow
(C) Genetic drift (D) All of the above

29. Which of the following is an initiation codon ?
(A) AUG (B) UUU
(C) UAG (D) UGA

30. Which of the following diseases is caused by bacteria ?
(A) Typhoid (B) Malaria
(C) Corona (D) Ringworms

31. Which of the following RNA is precursor of messenger RNA ?
(A) sn RNA
(B) 5 sr RNA
(C) Heterogenous nuclear RNA
(D) r RNA

32. Which of the following cell does not phagocytose pathogens ?
(A) Macrophages (B) Neutrophils
(C) Monocytes (D) RBC

33. Which of the following is incorrect statement about antibody ?
(A) Four polypeptide chains are present in antibody molecule.
(B) There are two short and two long chains in antibody molecule.
(C) Antigen binding site is present in heavy chain of antibody molecule.
(D) Antibody molecules are synthesized in humoral immunity.

34. Which of the following plant is the source of morphine ?
(A) Nicotiana tobaccum (B) Papaver somniferum
(C) Datura metel (D) Erythroxylum coca

35. Sporozoite is the infective stage of which of the following diseases ?
(A) Malaria (B) Typhoid
(C) AIDS (D) Pneumonia

36. Which of the following micro-organisms is utilized to prepare 'Swiss Cheese' ?
(A) Penicillium roqueforti
(B) Propionibacterium sharmanii
(C) Yeast
(D) Lactic acid bacteria

37. Who established that penicillin is an effective antibiotic ?
(A) Alexander Fleming
(B) Ernst Chain and Howard Florey
(C) Robert Koch
(D) Pasteur

38. Which of the following rejects graft / transplant ?
(A) Physiological barriers (B) Cellular barriers
(C) Acquired Immunity (D) Cell mediated Immunity

39. Atlas 66, is related to which of the following crop ?
(A) Wheat (B) Rice
(C) Maize (D) Tomato

40. Mating of more closely related individuals within the same breed for 4-6 generations is called as :
(A) Cross breeding (B) Inbreeding
(C) Outbreeding (D) Out crossing

41. Which type of charges are present on DNA ?
(A) Negative charge (B) Positive charge
(C) No charge (D) Variable

42. What is elution ?
(A) Extraction of DNA fragment from the agarose gel pieces
(B) Separation of fragments of DNA
(C) Ligating DNA with cloning vector
(D) Staining DNA with ethidium bromide

43. Which of the following processes is utilized to introduce DNA fragment into bacteria ?
(A) Micro-injection (B) Transformation
(C) Gene gun (D) With the help of T.DNA

44. What is done to make bacterial cell competent to take up DNA ?
(A) Treating bacterial cell with divalent cation.
(B) Treating bacterial cell with divalent anion.
(C) Incubating bacterial cell and recombinant DNA on ice.
(D) Exposing bacterial cell to heat shock.

45. What is added for precipitation of purified DNA during isolation of DNA?
(A) Methanol (B) Calcium
(C) Protease (D) Ethanol

46. Where is the recognition site-Bam H 1 present in pBR322 ?
(A) Ampicillin resistance gene
(B) Ori
(C) Tetracycline resistance gene
(D) rop

47. Which of the following is selectable marker gene in pBR322 ?
(A) tet^R gene (B) amp^R gene
(C) Both A and B (D) None

48. Which of the following is not required for PCR ?
(A) Primers (B) DNA polymerase
(C) Deoxyribonucleotides (D) Cloning vector

49. Which of the following compounds controls the cotton bollworms ?
(A) Proteins encoded by cry^{1AC} and cry^{2AB}
(B) Protein encoded by cry^{1AB}
(C) Amino acids known as Opines
(D) Recombinant protein

50. Which of the following human protein is present in milk of transgenic cow 'Rosie' ?
(A) Alpha lactalbumin (B) Humulin
(C) Glycoproteins (D) Beta galactosidase

51. Golden rice is rich in which of the following ?
(A) Vitamin B_1 (B) Vitamin B_2
(C) Vitamin C (D) Vitamin A

52. Which of the following is not an advantage of GM crops ?
(A) Development of crops more tolerant to abiotic stresses
(B) Development of pest resistant plants
(C) Increase in nutritional value of food
(D) To make somatic hybridization easy

53. For which of the following human diseases, transgenic model is not available ?
(A) Cancer (B) Cystic fibrosis
(C) Alzheimer (D) Malaria

54. On which of the following varieties an American Company got patent rights in 1977 ?
(A) IR 8
(B) Jaya
(C) Padma
(D) Semi-dwarf variety of Basmati

55. Which of the following statement is incorrect about synthesis of genetically engineered insulin ?
(A) Synthesis of separate DNA sequences for chain A and B of insulin
(B) DNA sequences for chain A and B were ligated with plasmid of E.coli
(C) Separate synthesis of chain A and B
(D) Chain A and Chain B were linked with hydrogen bonds to form human insulin.

56. Name of M. S. Swaminathan is associated with which of the following fields ?
(A) Ecology (B) Biotechnology
(C) Green revolution (D) Milk production

57. Which of the following is not included in main biomes of India ?
(A) Tropical rain forest (B) Deciduous forest
(C) Desert biome (D) Grass lands

58. Organisms that can tolerate a variable wide range of temperatures are called as :
(A) Eurythermal (B) Stenothermal
(C) Cold blooded (D) Warm blooded

59. Which of the following is not an attribute of population ?
(A) Sex ratio (B) Population density
(C) Birth rate (D) Energy flow

60. Which plant was introduced in Australia in 1920 which caused havoc in millions of hectares of rangeland ?
(A) Prickly pear cactus (B) Parthenium
(C) Water hyacinth (D) Lantana

61. Who propounded Competitive Exclusion Principle ?
(A) Mac Arthur (B) Gause
(C) Connell (D) Darwin

62. Which of the following is not an example of mutualism ?
(A) Cattle egret and cattle
(B) Lichen
(C) Mycorrhiza
(D) Relationship between fig and wasp

63. In which of the following birds, brood parasitism is observed ?
(A) Sparrow (B) Pigeon
(C) Cuckoo (D) Hen

64. Which of the following statements is incorrect ?
(A) Autotrophs convert inorganic into organic material with the help of the radiant energy
(B) Energy flow is circular
(C) Heterotrophs feed on autotrophs
(D) Decomposers, decompose matter of dead organisms.

65. How many varieties of mangoes are found in India ?
(A) More than 50,000 (B) More than 1,000
(C) More than 10,000 (D) More than 3,000

66. According to IUCN, how many animal and plant species occur on earth ?
(A) Slightly more than 1.5 million
(B) 7 million
(C) 20-25 million
(D) 3 million

67. Tilman's experiments are related to which of the following ?
(A) Conservation
(B) Significance of species diversity in ecosystem
(C) Energy flow
(D) Bio-diversity

68. What is the main reason for extinction of Steller's sea cow ?
(A) Habitat loss and fragmentation
(B) Over explotation
(C) Alien species invasion
(D) Coextinction

69. Which of the following metals is not utilized in catalytic converters ?
(A) Platinum (B) Palladium
(C) Rhodium (D) Polonium

70. Which of the following statements is incorrect about use of pesticides?
(A) Used for enhancing crop production
(B) Not harmful for non-target organisms
(C) Bio-magnification
(D) Manifold increase in use of pesticides

SECTION – B : Non-Objective Type Questions

SHORT ANSWER TYPE QUESTIONS

Directions : *Questions Nos. 1 to 20 are of short answer type. Each question carries 2 marks. Answer any ten questions of them in 50 words.* 10 × 2 = 20

1. **What is the significance of vegetative propagation ?**
2. **What is Endosperm ? What are its types ?**
3. **What are the roles of Sertoli cells and Leydig cells ?**
4. **How IUDs (Intrauterine Contraceptive Devices) prevent pregnancy ?**
5. **What is Codominance ? Explain with the help of example, briefly.**
6. **What is Chromosomal theory of inheritance ?**
7. **Write a brief note on Haemophilia.**
8. **Explain the structure of Nucleosome.**
9. **What is founder effect ?**
10. **Write down the name of infective form of Plasmodium and name of its vector and the toxic substance released after rupture of RBCs.**
11. **What is Metastasis ?**
12. **Define explants and totipotency.**
13. **Write a brief note on Mycorrhiza.**
14. **Why is restriction endonuclease called as 'molecular scissors' ? Explain.**
15. **What are advantages of GM-crops (Genetically Modified Crops)?**
16. **What is the name of genes and proteins which control cotton ballworm ?**
17. **Define diapause and hibernation.**
18. **Write a brief note on decomposition.**
19. **What is an endemic species ?**
20. **What is Polyblend ? Who developed it ?**

LONG ANSWER TYPE QUESTIONS

Directions : *Questions Nos. 21 to 26 are Long Answer Type Questions. Answer any 3 of them in 120 words.* 3 × 5 = 15

21. **Define Greenhouse effect. Name Greenhouse gases and write a brief note on Global Warming.**
22. **Answer the following questions :**
(A) What is energy flow ?
(B) What is Ori ?
23. **Write a brief notes on :**
(A) Plasmid as vector
(B) Transgenic Cow - Rosie
24. **Describe Immune System of Body.**
25. **What is Operon model ? Describe Lac Operon.**
26. **Write a brief notes on the following :**
(A) Amniocentesis
(B) Development of male gametophyte in angiospermic plants

ANSWER WITH EXPLANATIONS

SECTION – A

OMR ANSWER-SHEET

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

ANSWER

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

SECTION – B

1. **Significance of Vegetative Propagation**—Vegetative propagation is a form of asexual reproduction in plants where new individuals arise without the production of seeds or spores. It involves the growth of a new plant from a fragment of the parent plant or a specialized reproductive structure. The significance lies in its ability to produce genetically identical offspring, ensuring consistency in traits, which is valuable in agriculture for propagating desirable crop varieties. It's also used in horticulture for the rapid multiplication of ornamental plants. Moreover, it can help in preserving species that are difficult to grow from seeds and in the rapid recovery of plants from damage.
2. **Endosperm and Its Types**—Endosperm is a tissue produced inside the seeds of most flowering plants following fertilization. It surrounds the embryo and provides nutrition in the form of starch, though it can also contain oils and protein. This nourishment is critical for the development of the seedling upon germination. There are three types of endosperm: nuclear, cellular, and helobial. Nuclear endosperm formation involves free nuclear divisions without cytokinesis, cellular endosperm formation begins with a cell wall formation after the first division, and helobial endosperm has both characteristics.
3. **Roles of Sertoli Cells and Leydig Cells**—Sertoli cells and Leydig cells play crucial roles in the male reproductive system. Sertoli cells, located in the seminiferous tubules of the testes, support and nourish the developing sperm cells through spermatogenesis. They also form the blood-testis barrier, regulate testicular fluid, and secrete inhibin, which regulates the production of sperm. Leydig cells, found adjacent to the seminiferous tubules, are responsible for the production of testosterone, a key hormone necessary for the development of male secondary sexual characteristics and the proper functioning of the male reproductive system.
4. Intrauterine Devices (IUDs) are a form of long-term, reversible contraception. They work primarily by preventing the fertilization of the egg. IUDs alter the uterine and cervical environment making it hostile for system can remember past infections, allowing for a quicker and more effective response to previously encountered pathogens.
   This system is vital for maintaining health and preventing infections. However, it can also be involved in detrimental responses, such as allergies and autoimmune diseases, where the immune system mistakenly targets the body's own cells. The study of the immune system, immunology, is crucial for understanding and treating various diseases, including infectious diseases, autoimmune disorders, and cancers.
5. **Codominance**—Codominance occurs when two different alleles for a genetic trait are expressed simultaneously in a heterozygote. Unlike dominant-recessive inheritance, where only the dominant allele's effect is visible, codominance results in both alleles being distinctly and fully expressed. An example is the ABO blood group system in humans. Individuals with genotype I_AI_B have both A and B antigens on their red blood cells,

demonstrating codominance, as both alleles contribute equally to the phenotype.

6. **Chromosomal Theory of Inheritance**—The chromosomal theory of inheritance, proposed by Sutton and Boveri, states that genes are located on chromosomes, which are the basis for inheritance. This theory bridges the gap between Mendel's principles of heredity and cellular division processes like meiosis and mitosis. It suggests that chromosomes, which segregate and independently assort during meiosis, are carriers of genetic information, explaining Mendel's laws of inheritance at the cellular level.
7. **Haemophilia**—Haemophilia is a genetic disorder, typically inherited, characterized by the inability of blood to clot properly. This condition is caused by the absence or malfunction of certain blood proteins, known as clotting factors. Haemophilia patients suffer from prolonged bleeding especially in muscles and joints, after injuries or surgery. The severity varies depending on the level of costing factors.
   There are two main types—Haemophilia A and Haemophilia B
8. **Structure of Nucleosome**—A nucleosome is the basic structural unit of DNA packing in eukaryotic cells. Each nucleosome consists of a segment of DNA would around a core of eight histone proteins (two each of H_2A, H_2B, H_3 and H_4). The DNA-histone complex is compact and organizes DNA into a higher-order structure, facilitating chromosome condensation. Nucleosomes play a crucial role in regulating gene expression and DNA replication. The DNA wrapped around the histone core is about 147 base pairs long, with a small linker DNA segment connecting adjacent nucleosomes.
9. **Founder Effect**—The founder effect is a type of genetic drift that occurs when a new population is established by a very small number of individuals from a larger population. This small group may not have the same genetic diversity on the original population, leading to a significant change in allele frequencies in the new population. This effect is often seen in isolated populations and can result in rare alleles becoming prevalent due to the reduced genetic variation.
10. The infective form of the Plasmodium parasite, which causes malaria, is the sporozoite. Mosquitoes of the genus, Anopheles, the vector for malaria, transmit sporozoites to humans during a blood meal. Once inside the human body, sporozoites travel to the liver to infect liver cells. After asexual reproduction in the liver cells, merozoites are released into the bloodstream, infecting red blood cells. The destruction of RBCs release toxins, causing symptoms like fever and chills.
11. **Metastasis**—Metastasis is the process by which cancer cells spread from the primary site of origin to distant parts of the body, forming new tumours. This occurs when cancer cells break away from the original tumour, enter the bloodstream or lympathic system, and travel to other organs. Metastasis is a major cause of the severity of cancer as it makes treatment more difficult. The ability to metastasize distinguishes malignant tumors from benign ones and is a key factor in cancer prognosis.
12. **Explants and Totipotency**—Explants are small pieces of plant tissue removed from an organism and used in tissue culture for growth or study. They can be derived from various parts of a plant like leaves, stems or roots. Totipotency is the genetic potential of a plant cell to develop into a entire plant. In plant tissue culture, explants are used to exploit this totipotency, allowing the development of new plants from a single cell or tissue piece under controlled environmental conditions.
13. **Mycorrhiza**—Mycorrhiza refers to a symbiotic association between a fungus and the roots of a vascular plant. In this mutualistic relationship, the fungus aids the plant in nutrient absorption, particularly phosphorus and in return, receives carbohydrates and other organic substances from the plant. The interaction enhances the water and nutrient uptake of the plant, increases growth and survival rates, and can offer protection against root pathogens.
14. **Restriction Endonuclease as 'Molecular Scissors'**—Restriction endonuclease, also known as restriction enzymes, are enzymes that cut DNA at specific nucleotide sequences, known as restriction sites. They are termed 'molecular scissors' due to their ability to precisely cut DNA strands at these specific sites. This property is crucial in molecular biology for various applications, including clothing, genetic engineering and DNA fingerprinting, as it allows scientists to cut and paste DNA sequences in a controlled manner.
15. **Advantages of GM Crops**—Genetically Modified (GM) crops offer several benefits. They can be engineered for higher yields and improved nutritional content, addressing food security and malnutrition. GM crops can be made resistant to pests and diseases, reducing the need for chemical pesticides and increasing crop survival. They can also be designed to tolerate harsh environmental conditions like drought or saline soils, making agriculture feastile in challenging climates. Furthermore, GM technology can lead to the production of a pharmaceuticals and biodegradable plastics, broadening the scope of agricultural applications.
16. The genes of cry1AC and cry2AB control cotton ballworm. These genes, drived from the bacterium Bacillus thuringiensis (Bt), produce proteins toxic to certain insects, including the cotton ballworm. When these genes are introduced into the cotton plant, the resulting transgenic cotton expresses these Bt toxins, making the plant resistant to damage from cotton ballworms, a significant pest in cotton farming.
17. **Diapause and Hibernation**—Diapause is a state of suspended development in insects, allowing them to survive unfavourable environmental conditions, such as extreme temperatures or lack of food. It is a genetically determined and hormonally controlled process. Hibernation, on the other hand, is a state of reduced metabolic activity during the winter in some animals. It helps them conserve energy and survive periods when food is scarce. Both diapause and hibernation are survival strategies to overcome adverse conditions.
18. **Decomposition**—Decomposition is the natural process by which large organic materials and molecules are broken down into simple ones. This process is crucial for the cycling of nutrients in ecosystems. Decomposers, primarily bacteria and fungi, play a key role in this process. They break down dead organisms and waste materials releasing nutrients back into the environment, making them available

for use by plants and other organisms. Decomposition contributes to the nutrient richness of soil and maintains ecological balance. Factors affecting decomposition rates include temperature oxygen availability and the composition of the decomposing material.

19. **Endemic Species**—An endemic species is a species that is native to a particular geographical area and is not naturally found elsewhere. These species are often adapted to specific environmental conditions of their habitat. Endemism is common on isolated islands, mountain ranges, or other unique ecosystems. Endemic species can be particularly vulnerable to extinction due to their limited distribution and potential threats like habitat, destruction, invasive species or climate change. Conservation of endemic species is crucial as they contribute to the unique biodiversity and ecological balance of their habitats.

20. Polyblend is an innovative material developed to address the issue of plastic waste. It is a fine power made from recycled modified plastic, which can be mixed with bitument to lay roads. This blend not only helps in recycling plastic waste but also enhances the quality of roads, making them more durable and less susceptible to wear and tear. The inventor of Polyblend is Dr Rajagoplana Vasudevan, a professor at Thiagarajar College of Engineering, Madurai. His invention offers an eco-friendly solution to plastic waste management and has the potential for widespread application in road construction.

21. **Greenhouse Effect, Greenhouse Gases and Global Warming**—The greenhouse effect is a natural process that plays a critical role in heating the Earth's surface. It occurs when certain gases in the earth's atmosphere, known as greenhouse gases, trap heat from the sun. The sun's energy, in the form of sunlight, passes through the atmosphere to the Earth's surface, where it is absorbed and then radiated back into the atmosphere as heat. Greenhouse gases, which include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and water vapour, absorb this heat, preventing it from escaping back into space. This trapped heat warms the Earths surface, making it habitable.

However, human activities, particularly the burning of fossil fuels like coal, oil and natural gas, have increased the concentration of these greenhouse gases in the atmosphere. This increase enhances the natural greenhouse effect, leading to global warming—a long-term rise in earth's average surface temperature. Global warming is associated with various climate changes, such as more frequent and severe weather events, rising sea levels, melting glaciers and shifts in wildlife populations and habitats. It poses significant challenges to the natural world and human society, necessitating efforts to reduce greenhouse gas emissions and mitigate climate change impacts.

22. (A) **Energy Flow**—Energy flow in ecosystems is a fundamental concept in ecology, describing how energy moves through in ecosystem from the external environment to different organisms and between them. The sun is the primary source of energy for most ecosystems. Through the process of photosynthesis, plants and other photosynthetic organisms capture solar energy, converting it into chemical energy in the form of glucose and other organic compounds. These organisms, known as producers or autotrophic, from the basis of the food web.

Herbivores or primary consumers feed on these producers, transferring the energy into their bodies. Carnivores or secondary consumers then consume the herbivores and this process continues up the trophic levels with tertiary and quaternary consumers. Each time energy is transferred from one trophic level to the next, a significant portion of energy (about 90%) is lost as heat due to metabolic processes, following the second law of thermodynamics. This loss explains why the number of trophic levels in an ecosystem is limited and why the biomass of top predators is much smaller than that of lower trophic levels.

Decomposers, such as bacteria and fungi, play a crucial role in the ecosystem's energy flow. They break down the organic matter from dead organisms, releasing nutrients back into the environment and making them available for uptake by producers, thereby closing the energy loop.

The concept of energy flow in ecosystems is illustrated by ecological pyramids, which include the pyramid of numbers, pyramid of biomass, and pyramid of energy. The pyramid of energy, showing the energy content of the biomass at each trophic level is always upright. Indicate the decrease in available energy as one moves up the tropic levels.

(B) Ori, or Origin of Replication, is a specific sequence within a DNA molecule where replication begins, it critical component in the process of DNA replication, a fundamental mechanism ensuring that genetic information is accurately passed from cell to cell and from one generation to the next.

In Prokaryotes, the Ori is typically a single sequences, while in eukaryotes, there are multiple origins of replication along the length of the chromosomes. The presence of multiple replication origins in eukaryotes allows for the simultaneous replication of their much larger amount of DNA, ensuring that the entire genome is replicated efficiently and accurately during each cell cycle.

The Ori sequence is recognized by a set of proteins that initiate the replication process. In bacteria, the protein DNA binds to the Ori, causing the DNA to unwind. This unwinding allows the replication machinery, including DNA polymerase, to access the DNA strands and begin the process of replication.

In genetic engineering especially in the use of plasmids as vectors, the Ori is a critical feature. Plasmids are small, circular DNA molecules used to insert foreign DNA intra cells. For a plasmid to be a useful vector. It just have an Ori so that it is replicated within the host cell. This replication ensures that the genetic material insected into the plasmid is maintained and propagated within the host cell population.

The study of Ori has also advanced our understanding of cellular control mechanisms in DNA replication and its regulation. This knowledge is crucial for understanding various cellular processes

and has implications in cancer research, where deregulation of DNA replication can lead to uncontrolled cell division.

23. (A) Plasmid as Vector—Plasmids are small, circular, double-stranded DNA molecules, separate from a cell's chromosomal DNA. In genetic engineering, they are used as vectors to carry foreign genes into a host cell. Plasmids are chosen for their ability to replicate independently within a host and for features like antibiotic resistance genes, which facilitate the selection of transformed cells. When a gene of interest is inserted into a plasmid and introduced into a host cell, there gene is replicated and expressed, allowing for the production of proteins coded by the inserted gene. This technology has diverse applications, including in the production of genetically modified organisms, gene therapy and the creation of pharmaceuticals and vaccines.

(B) Transgenic Cow–Rosie—Rosies was a transgenic cow genetically modified to produce milk with enhanced nutritional value. Scientists introduced a human gene encoding alpha-lactalbumin into Rosie's genome. The milk produced by Rosie contained higher levels of this protein, making it more nutritionally suitable for human babies than regular cow's milk. This ground breaking development in genetic engineering demonstrated the potential for transgenic animals to produce complex biological products, such as therapeutic proteins and highlighted the possibilities in biopharmaceutical research and development.

24. The immune system is an intricate and highly coordinated network that defends the body against pathogens, such as bacteria, viruses and parasites. It consists of two main parts: the innate immune system and the adaptive immune system. The input immune system is the first line of defense and responds quickly to pathogens. It includes physical barriers like skin and mucous membranes, chemical barriers like stomach acid and specialized cells that recognize and destroy invaders.

The adaptive immune system is more specific and has a memory component. It involves lymphocytes, which are white blood cells such as B cells and T cells. B cells produce antibodies that target specific system can remember past infections, allowing for a quicker and more effective response to previously encountered pathgoens.

This system is vital for maintaining health and preventing infections. However, it can also be involved in detrimental responses, such as allergies and autoimmune diseases, where the immune system mistakenly targets the body's own cells. The study of the immune system, immunology, is crucial for understanding and treating various diseases, including infectious diseases, autoimmune disorders, and cancers.

25. Operon Model and Lac Operon—The operon model, a fundamental concept in molecular biology, was proposed by Francois Jacob and Jacques Monod in 1961. This model explains how the expression of genes is regulated in prokaryotes, such as bacteria. An operon is a cluster of genes that function as a single unit and includes structural genes, a promoter, an operator, and a regulatory gene.

The Lac operon in E. coli is one of the most studied operons. It is involved in the metabolism of lactose, the sugar found in milk. The operon consists of three structural genes (lacZ, lacY, lacA) that code for enzymes necessary for lactose metabolism. The operon is regulated by two key elements: the promoter, a DNA segment where RNA polymerase binds to start transcription, and the operator, a segment where a represser protein binds.

In the absence of lactose, the represser protein binds to the operator, blocking RNA polymerase and preventing transcription of the operon. When lactose is present, it binds to the represser, changing its shape and preventing it from binding to the operator. This allows RNA polymerase to transcribe the genes, leading to the production of enzymes required for lactose breakdown. The Lac operon is an elegant example of gene regulation and is foundational in understanding genetic control systems.

26. (A) Amniocentesis—Amniocentesis is a prenatal diagnostic procedure that's typically performed during the second trimester of pregnancy, around the 15th to 20th week. This medical test is conducted to detect chromosomal abnormalities and genetic disorders in the fetus, such as Down syndrome, cystic fibrosis, and spina bifida. The process involves using a needle to withdraw a small amount of amniotic fluid, which surrounds the fetus in the womb. This fluid contains fetal cells and various chemicals produced by the baby, which can be analyzed to provide information about the baby's genetic health and development. While amniocentesis is generally safe, it carries a slight risk of miscarriage. The procedure is usually offered to women who have a higher risk of having a child with genetic disorders, which may be due to maternal age, family history, or abnormal results from other prenatal tests.

(B) Development of Male Gametophyte in Angiospermic Plants—The development of the male gametophyte in angiosperms, or flowering plants, takes place within the pollen grains, which are produced in the anthers of the flower. Each pollen grain, initially a microspore, undergoes mitotic division to form a two-celled male gametophyte. This gametophyte comprises a generative cell and a tube cell. The generative cell is responsible for producing two sperm cells through further mitotic division. During the process of pollination, pollen grains are transferred to the stigma of a flower, where they germinate. The tube cell then grows into a pollen tube that extends down the style toward the ovary, carrying the sperm cells. Once the pollen tube reaches the ovule, the sperm cells are released, enabling fertilization of the egg cell and leading to the formation of a zygote and eventually a seed. The development of the male gametophyte is a crucial step in the sexual reproduction of flowering plants, leading to genetic diversity and the production of seeds for the next generation.

❑ ❑ ❑

MATHEMATICS

INTERNET MODEL PAPER – 1

Time : 3 Hours + 15 Minutes] [**Total Marks :** 100

Instructions to the Candidates :

1. Candidates are required to give their answers in their own words as far as practicable.
2. Figures in the right hand margin indicate full marks.
3. 15 Minutes of extra time has been allotted for the candidates to read the questions carefully.
4. This question paper is divided into two sections—**SECTION – A** and **SECTION – B**.
5. In **SECTION – A** there are **100 Objective Type Question,** out of which only 50 objective question be answered. Darken the circle with blue/black ball pen against the correct option on OMR Sheet provided to you. Do not use **Whitener/Liquid/ Blade/Nail** on OMR paper; otherwise the result will be invalid.
6. In **SECTION – B**, there are **30 Short Answer Type Questions** (each carrying 2 marks), out of which any 15 questions are be answered.

   Apart from this, there are **8 Long Answer Type Question** (Each Carrying 5 marks), out of which 4 Questions are to be answered.
7. Use of any electronic device is prohibited.

SECTION – A : Objective Type Questions

Direction : *There are 100 Objective Type Questions, out of which only 50 objective questions to be answered. Mark the correct option on the* ***OMR*** *Answer Sheet.* 50 × 1 = 50

1. $\frac{d}{dx}(x-\sin x) =$

(A) $1+\cos x$ (B) $1-\cos x$
(C) $1+\sin x$ (D) $x-\cos x$

2. The integrating factor of the differential equation $\frac{dy}{dx} - y\cot x = \text{cosec}^2 x$ is :

(A) $\cos x$ (B) $\text{cosec}\, x$
(C) $\sin x$ (D) $-\tan x$

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

(A) $6\vec{j}+9\vec{i}$ (B) $9\vec{i}-6\vec{j}$
(C) $6\vec{j}-9\vec{i}$ (D) $6\vec{k}+9\vec{i}$

4. $|3\vec{i}-5\vec{k}+4\vec{j}| =$

(A) 5 (B) $5\sqrt{2}$
(C) $5\sqrt{3}$ (D) 7

5. The solution of the differential equation $2xdx + 3y^2dy = 0$:

(A) $2x^2 + 3y^3 = K$ (B) $x^2 + 3y^3 = K$
(C) $x^2 + y^3 = K$ (D) $2x^2 + y^3 = K$

6. The solution of the differential equation $e^x - e^{-y}\cdot\frac{dy}{dx} = 0$ is :

(A) $e^x - e^y = K$ (B) $e^x + e^y = K$
(C) $e^x + e^{-y} = K$ (D) $e^x - e^{-y} = K$

7. $\frac{d}{dx}\left(49\sin\frac{x}{7}\right) =$

(A) $49\cos\frac{x}{7}$ (B) $7\cos x$
(C) $7\cos\frac{x}{7}$ (D) $-49\cos\frac{x}{7}$

8. $\frac{d}{dx}(\cos x + \sin 2x) =$

(A) $\sin x + \cos 2x$ (B) $-\sin x + 2\cos 2x$
(C) $-\sin x - 2\cos 2x$ (D) $\cos x + \sin 2x$

9. $\frac{d}{dx}\left(-\cos x + \frac{1}{3}e^{3x}\right) =$

(A) $\sin x + \frac{1}{3}e^{3x}$ (B) $\sin x + e^{3x}$
(C) $-\sin x + \frac{1}{3}e^{3x}$ (D) $-\cos x + e^{3x}$

10. $\frac{d^2}{dx^2}(e^{2x}) =$

(A) e^{2x} (B) $2e^{2x}$ (C) $4e^{2x}$ (D) $8e^{2x}$

11. $\frac{d}{dx}(3\sin^2 x + 3\cos^2 x) =$

(A) 0 (B) 3
(C) 3 sin 2x (D) 3 cos 2x

12. $\frac{d}{dx}(3\cos x.\sec x) =$

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

13. $\frac{d}{dx}\left(4\cos\frac{x}{4}\right) =$

(A) $4\sin\frac{x}{4}$ (B) $-4\sin\frac{x}{4}$

(C) $\sin\frac{x}{4}$ (D) $-\sin\frac{x}{4}$

14. $\frac{d}{dx}[\log_e(5x)] =$

(A) $\frac{1}{5x}$ (B) $\frac{5}{x}$

(C) $\frac{1}{x}$ (D) $5x$

15. $\frac{d}{dx}[\log_e(3x^2)] =$

(A) $\frac{3}{x^2}$ (B) $\frac{1}{3x^2}$

(C) $\frac{2}{3x^2}$ (D) $\frac{2}{x}$

16. $\frac{d}{dx}\left[\frac{1}{5}\tan 5x\right] =$

(A) $\frac{1}{5}\sec^2 5x$ (B) $\frac{1}{25}\sec^2 5x$

(C) $\sec^2 5x$ (D) 5 $\sec^2 5x$

17. $x = a\cos\theta, y = b\sin\theta \Rightarrow \frac{dy}{dx} =$

(A) $\frac{b}{a}\tan\theta$ (B) $\frac{b}{a}\cot\theta$

(C) $-\frac{b}{a}\tan\theta$ (D) $-\frac{b}{a}\cot\theta$

18. $\int \cos^2\theta.\sec^2\theta\, d\theta =$

(A) $\sin\theta + K$ (B) $-\sin\theta + K$
(C) $K + \theta$ (D) $K - \theta$

19. $\int (\sin^3\theta + \sin\theta\cos^2\theta)d\theta =$

(A) $K + \cos\theta$ (B) $K - \cos\theta$
(C) $K + \sin\theta$ (D) $K - \sin\theta$

20. $2\int \frac{xdx}{x^2+5} =$

(A) $\log|x^2 + 5| + K$ (B) $2\log|x^2 + 5| + K$

(C) $\tan^{-1}\frac{x}{\sqrt{5}} + K$ (D) $\frac{2}{\sqrt{5}}\tan^{-1}\frac{x}{\sqrt{5}} + K$

21. $\int \frac{e^x - e^{-x}}{e^x + e^{-x}}dx =$

(A) $\log|e^x - e^{-x}| + K$ (B) $\log|e^x + e^{-x}| + K$
(C) $e^x + e^{-x} + K$ (D) $e^x - e^{-x}| + K$

22. $|-3\vec{i}| =$

(A) 1 (B) –1 (C) –3 (D) 3

23. $3\int \sec 2x.\tan 2x\, dx =$

(A) $\frac{3}{2}\sec 2x + K$ (B) 6 sec $2x + K$
(C) 3 sec $2x + K$ (D) tan $2x + K$

24. $\int 8^x\, dx =$

(A) $8^x + K$ (B) $8^{x+1} + K$

(C) $\frac{8^x}{3\log 2} + K$ (D) $\frac{8^{x+1}}{x+1} + K$

25. $\frac{d}{dx}(\cos x.\ \text{cosec}^2 x - \cos x.\cot^2 x) =$

(A) sin x (B) – sin x
(C) cos x (D) – cos x

26. If $y = \sin^{-1}x$ then $\frac{dy}{dx} - \frac{1}{\sqrt{1-x^2}} =$

(A) y (B) $2y$
(C) 0 (D) 1

27. $\int e^x(\tan x + \sec^2 x)dx =$

(A) $e^x \sin x + K$ (B) $e^x \cos x + K$
(C) $e^x \tan x + K$ (D) $e^x \sec^2 x + K$

28. $\int e^x\left(\log x + \frac{1}{x}\right)dx =$

(A) $xe^x + K$ (B) $e^x.\log x + K$

(C) $\frac{1}{x}e^x + K$ (D) $xe^x \log x + K$

29. $\int e^x(\cos^2 x - \sin 2x)\, dx =$

(A) $e^x \sin 2x + K$ (B) $e^x \cos^2 x + K$
(C) $-e^x \cos^2 x + K$ (D) $-e^x \sin 2x + K$

30. $\int e^x\left(\tan^{-1}x + \frac{1}{1+x^2}\right)dx =$

(A) $e^x.\tan^{-1}x + K$ (B) $\frac{e^x}{1+x^2} + K$

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

31. $\int_2^3 x^2 dx =$

(A) $\frac{29}{3}$ (B) $\frac{28}{3}$

(C) $\frac{19}{3}$ (D) $\frac{17}{3}$

32. $\int_{-\pi}^{\pi} \sin^{15} x dx =$

(A) 0 (B) 1

(C) – 1 (D) $\frac{1}{16}$

33. $\int_{-1}^{1} \sin^5 x \cos^4 x dx =$

(A) 0 (B) 1

(C) –1 (D) $\frac{3}{8}$

34. $\int_1^3 e^{-x} dx =$

(A) $\frac{1-e^2}{e^3}$ (B) $\frac{e^2-1}{e^3}$

(C) $\frac{-(e^2-1)}{e^3}$ (D) $\frac{-(e^2+1)}{e^3}$

35. $\int_0^{\pi/2} \log(\tan x) dx =$

(A) 0 (B) 1

(C) –1 (D) $\frac{1}{6}$

36. $\int_0^{\sqrt{3}} \frac{dx}{1+x^2} =$

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

(C) $\frac{\pi}{6}$ (D) $\frac{\pi}{12}$

37. $\int_0^{2/3} \frac{dx}{4+9x^2} =$

(A) $\frac{\pi}{6}$ (B) $\frac{\pi}{12}$

(C) $\frac{\pi}{24}$ (D) $\frac{\pi}{4}$

38. $\int_0^1 \tan^{-1}\left(\frac{2x-1}{1+x-x^2}\right) dx =$

(A) 1 (B) 0

(C) –1 (D) $\frac{\pi}{4}$

39. Area bounded by the curve $y = x^3$, the x–axis and the ordinates $x = -2$ and $x = 1$ is :

(A) –9 (B) $-\frac{15}{4}$

(C) $\frac{15}{4}$ (D) $\frac{17}{4}$

40. $\int_{-1}^{1} x^{19} \sec^5 x dx =$

(A) $\frac{19}{20}$ (B) $\frac{18}{7}$

(C) 0 (D) 1

41. $\int \frac{dx}{x\sqrt{4x^2-1}} =$

(A) $\sec^{-1}x + K$ (B) $\sec^{-1}2x + K$

(C) $\frac{1}{2}\sec^{-1}2x + K$ (D) $2\sec^{-1}2x + K$

42. $\frac{x}{2}\sqrt{x^2-a^2} - \frac{a^2}{2}\log|x+\sqrt{x^2-a^2}| + K =$

(A) $\int \sqrt{x^2+a^2} dx$ (B) $\int \sqrt{x^2-a^2} dx$

(C) $\int \sqrt{a^2-x^2} dx$ (D) $\int \left[x+\sqrt{x^2-a^2}\right] dx$

43. $\int_0^{\pi/4} \sin 2x dx =$

(A) 0 (B) 1

(C) $\frac{1}{2}$ (D) $\frac{1}{\sqrt{2}}$

44. $\int_{-1}^{1} \tan^{23} x.\sec^{10} x \, dx =$

(A) 0 (B) 1

(C) $\frac{24}{29}$ (D) $\frac{33}{34}$

45. The solution of the differential equation $3x^2 dx - \cos y dy = 0$ is :

(A) $3x^2 - \cos y = K$ (B) $x^3 - \sin y = K$

(C) $x^3 + \sin y = K$ (D) none of these

46. The integrating factor of the differential equation

$$(1-y^2)\frac{dy}{dx} + yx = ay; -1 < y < 1$$

(A) $\frac{1}{y^2-1}$ (B) $\frac{1}{\sqrt{y^2-1}}$

(C) $\frac{1}{1-y^2}$ (D) $\frac{1}{\sqrt{1-y^2}}$

47. $\begin{bmatrix} -3 & 13 \\ 6 & 9 \end{bmatrix}\begin{bmatrix} 3 & 0 \\ 0 & 3 \end{bmatrix} =$

(A) $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$ (B) $\begin{bmatrix} -9 & 13 \\ 6 & 27 \end{bmatrix}$

(C) $\begin{bmatrix} -9 & 39 \\ 18 & 27 \end{bmatrix}$ (D) $\begin{bmatrix} -9 & 0 \\ 0 & 27 \end{bmatrix}$

48. $\begin{bmatrix}2 & 3\\ 3 & 0\end{bmatrix}[3 \quad -5] =$

(A) $\begin{bmatrix}9 & -9\\ 9 & 0\end{bmatrix}$ (B) $\begin{bmatrix}6 & 9\\ -15 & 18\end{bmatrix}$

(C) $\begin{bmatrix}-9 & 9\\ -15 & 0\end{bmatrix}$

(D) Multiplication is not possible

49. $[4 \quad -6]\begin{bmatrix}0\\ -1\end{bmatrix} =$

(A) $\begin{bmatrix}4 & -6\\ -4 & 6\end{bmatrix}$ (B) $\begin{bmatrix}0 & -6\\ 0 & 6\end{bmatrix}$

(C) $[0 \quad 6]$ (D) [6]

50. $[-2]\,[-7 \quad 13] =$

(A) [14 –26] (B) $\begin{bmatrix}14\\ -26\end{bmatrix}$

(C) $\begin{bmatrix}14 & -26\\ 0 & 0\end{bmatrix}$ (D) $\begin{bmatrix}14 & 0\\ 0 & -26\end{bmatrix}$

51. $-2\begin{bmatrix}3 & -5\\ 5 & 9\end{bmatrix} =$

(A) $\begin{bmatrix}-6 & -5\\ 5 & 9\end{bmatrix}$ (B) $\begin{bmatrix}-6 & 10\\ 5 & 9\end{bmatrix}$

(C) $\begin{bmatrix}-6 & 10\\ -10 & 9\end{bmatrix}$ (D) $\begin{bmatrix}-6 & 10\\ -10 & -18\end{bmatrix}$

52. The adjoint matrix of the matrix $\begin{bmatrix}7 & 6\\ 5 & 4\end{bmatrix}$ is :

(A) $\begin{bmatrix}7 & -6\\ -5 & 4\end{bmatrix}$ (B) $\begin{bmatrix}4 & 5\\ 6 & 7\end{bmatrix}$

(C) $\begin{bmatrix}4 & -6\\ -5 & 7\end{bmatrix}$ (D) $\begin{bmatrix}-4 & -6\\ 5 & -7\end{bmatrix}$

53. The value of the determinant $\begin{vmatrix}3 & 5 & 9\\ 6 & 8 & 0\\ 9 & 13 & 9\end{vmatrix}$ is

(A) 2430 (B) 2109

(C) 2845 (D) 0

54. The inverse of the matrix $\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$ is :

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

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

55. The number of all one-one functions from set $A = \{1, 2, 3, 4\}$ to itself is :

(A) 6 (B) 12

(C) 24 (D) None of these

56. The direction ratios of the normal to the plane $3x - 5y - 7z = 6$ are :

(A) 3, 5, 7 (B) 3, –5, 7

(C) 3, 5, –7 (D) 3, –5, –7

57. The direction ratios of the line $x - 1 = y + 2 = z + 3$ are

(A) –1, 2, 3 (B) 1, 1, 1

(C) 1, 2, –3 (D) 1, –2, 3

58. $(3\vec{i} + 4\vec{j} - 7\vec{k}).(11\vec{i} - 6\vec{j} + \vec{k}) =$

(A) 0 (B) 1

(C) 2 (D) 3

59. Through which of the following points does the straight line $\frac{x-3}{2} = \frac{y-4}{5} = \frac{z-5}{6}$ pass ?

(A) (3, 4, 5) (B) (2, 3, 4)

(C) (2, 5, 6) (D) (4, 5, 6)

60. If the direction ratios of two parallel lines are 40, 9, 8 and 120, 27, x then the value of x is :

(A) 8 (B) 16

(C) 24 (D) 32

61. If $f : A \to B$ and $g : B \to C$ are one-one onto then $gof : A \to C$ is :

(A) one-one onto (B) many-one onto

(C) one-one but not onto (D) many-one but not onto

62. $(\vec{i} + 4\vec{j} + 2\vec{k}) \times (3\vec{i} - 2\vec{j} + 7\vec{k}) =$

(A) $\vec{0}$ (B) $16\vec{i} - 2\vec{j} - 32\vec{k}$

(C) $32\vec{i} - \vec{j} - 14\vec{k}$ (D) $\vec{i} - \vec{j} + 6\vec{k}$

63. If $S = \{1, 2, 3\}$, $f : S \to S$ and $f = \{(1, 1), (2, 2), (3, 3)\}$ then :

(A) f is many-one onto.

(B) f is one-one onto.

(C) f is many-one but not onto.

(D) f is one-one but not onto.

64. If $X = \{a, b, c\}$, then the number of all one-one functions from X to X is

(A) 2 (B) 4

(C) 6 (D) 8

65. If $X = \{1, 2, 3, 4\}$ then the number of all onto functions from X to X itself is :

(A) 4 (B) 16

(C) 24 (D) None of these

66. $(3\vec{i} - 5\vec{j} + 7\vec{k}).(2\vec{i} + 5\vec{j} + 4\vec{k}) =$

(A) 3 (B) 6

(C) 9 (D) 0

67. The mean of the numbers obtained on throwing a die having written 1 on three faces, 2 on two faces and 5 on one face is :

(A) 1 (B) 2

(C) 5 (D) none of these

68. Two cards are drawn at random from a deck of cards. If the number of aces obtained is X then the value of $E(X)$ is :

(A) $\frac{37}{221}$ (B) $\frac{5}{13}$

(C) $\frac{1}{13}$ (D) $\frac{2}{13}$

69. The probability distribution of a random variable x is given below :

x	0	1	2	3	4
$P(x)$	0.1	k	$2k$	$2k$	k

Then the value of k is

(A) 1 (B) 0.15

(C) 0.25 (D) 0.35

70. An urn contains 5 red and 2 black balls. Two balls are randomly drawn. If X is the number of black balls then which of the following is not a possible value of X ?

(A) 0 (B) 1

(C) 2 (D) 3

71. The probability of getting exactly 10 heads in the toss of a fair coin ten times is :

(A) ${}^{10}C_9\left(\frac{1}{2}\right)^{10}$ (B) ${}^{10}C_9\left(\frac{1}{2}\right)^{10}$

(C) ${}^{10}C_9\left(\frac{1}{2}\right)^{9}$ (D) None of these

72. If $P(A)=\frac{5}{11}, P(B)=\frac{6}{11}$ and $P(A \cup B) = \frac{8}{11}$ then $P(A \cap B) =$

(A) $\frac{1}{11}$ (B) $\frac{2}{11}$

(C) $\frac{3}{11}$ (D) $\frac{9}{11}$

73. If $P(A \cup B)=\frac{7}{13}, P(A \cap B)=\frac{24}{31}$ and $P(A)=\frac{12}{13}$ then :

(A) $\frac{15}{31}$ (B) $\frac{17}{31}$

(C) $\frac{19}{31}$ (D) $\frac{29}{31}$

74. If $P(A \cap B) = \frac{4}{13}$ and $P(B) = \frac{9}{13}$ then $P\left(\frac{A}{B}\right) =$

(A) $\frac{2}{9}$ (B) $\frac{4}{9}$

(C) $\frac{6}{9}$ (D) $\frac{8}{9}$

75. For two independent events E and F when $P(F) \neq 0$ then $P\left(\frac{E}{F}\right) =$

(A) $P(E)$ (B) $2P(E)$

(C) $P(F)$ (D) $2P(F)$

76. For two independent events E and F, $P(E \cap F) =$

(A) $P(E) + P(F)$ (B) $P(E).\ P(F)$

(C) $P(E) - P(F)$ (D) $\frac{P(E)}{P(F)}$

77. $\left|(3\vec{i}+\vec{j}+4\vec{k})\times(\vec{i}-\vec{j}+\vec{k})\right| =$

(A) $\sqrt{42}$ (B) $\sqrt{47}$

(C) 7 (D) 1

78. $\vec{i}\cdot(\vec{j}\times\vec{k})+\vec{j}\cdot(\vec{i}\times\vec{k})+\vec{k}\cdot(\vec{i}\times\vec{j}) =$

(A) 3 (B) 0

(C) 1 (D) –1

79. If $x(\vec{i}+\vec{j}+\vec{k})$ be the unit vector then the value of x is :

(A) $\pm\frac{1}{\sqrt{2}}$ (B) $\pm\frac{1}{\sqrt{3}}$

(C) $\pm\frac{1}{\sqrt{5}}$ (D) ± 1

80. If $\vec{a}$ and $\vec{b}$ are parallel then

(A) $\vec{a}\times 3\vec{b} = \vec{0}$ (B) $\vec{a}\times 2\vec{b} = \vec{0}$

(C) $\vec{a}\times\vec{b} = \vec{0}$ (D) All of these

81. Which of the following are non-negative constraints ?

(A) $x \geq 0, y \geq 0$ (B) $z = x + 5y$

(C) $x \leq 0, y \leq 0$ (D) None of these

82. Which of the following is an objective function ?

(A) $z = 3x + 11y$ (B) $x \geq 0$

(C) $y \geq 0$ (D) $x + y \leq 7$

83. $\begin{vmatrix} 9 & 11 \\ 7 & 9 \end{vmatrix} =$

(A) 1 (B) 2

(C) 3 (D) 4

84. The maximum value of $z = 5x + 7y$ subject to the constraints $x + y \leq 4, x \geq 0, y \geq 0$ is :

(A) 20 (B) 28

(C) 48 (D) 140

85. The maximum value of $z = 4x - 3y$ subject to the constraints $x + y \leq 2, x \geq 0, y \geq 0$ is :

(A) 8 (B) 6

(C) 0 (D) 2

86. The minimum value of $z = 5x + 7y$ subject to the constraints $2x + 3y \leq 6, x \geq 0, y \geq 0$ is :

(A) 14 (B) 15
(C) 0 (D) –23

87. The minimum value of $z = 4x - 5y$ subject to the constraints $3x + 4y \le 24$, $x \ge 0$, $y \ge 0$, is :
(A) 32 (B) –30
(C) 0 (D) None of these

88. The minimum value of $z = -7x - 8y$ subject to constraints $x + y \le 11$, $x \ge 0$, $y \ge 0$ is :
(A) 0 (B) –77
(C) –88 (D) None of these

89. The distance of a point (2,4,6) from origin is :
(A) 56 (B) $2\sqrt{14}$
(C) 12 (D) $\sqrt{102}$

90. Distance between the two planes $2x + 3y + 4z = 4$ and $4x + 6y + 8z = 12$ is :
(A) 2 (B) 4
(C) 8 (D) 6

91. $\sin^{-1}\left(\frac{1}{\sqrt{2}}\right) =$
(A) $-\frac{\pi}{4}$ (B) $\frac{\pi}{4}$
(C) $\frac{3\pi}{4}$ (C) $\frac{\pi}{2}$

92. $\cot^{-1}\left(-\frac{1}{\sqrt{3}}\right) =$
(A) $\frac{\pi}{3}$ (B) $\frac{2\pi}{3}$
(C) $\frac{\pi}{6}$ (D) $\frac{\pi}{4}$

93. $x \in R$, $\cot^{-1}(-x) =$
(A) $-\cot^{-1} x$ (B) $\pi - \cot^{-1} x$
(C) $2\pi - \cot^{-1} x$ (C) $\cot^{-1} x - \pi$

94. $\begin{vmatrix} 4 & 6 & 7 \\ 3 & -2 & 9 \\ -1 & -8 & 2 \end{vmatrix} =$
(A) 0 (B) 1269
(C) –2354 (D) 1

95. $|x| \le 1, \sin^{-1}\frac{2x}{1+x^2} =$
(A) $2\sin^{-1}x$ (B) $2\cos^{-1}x$
(C) $2\tan^{-1}x$ (D) $2\sec^{-1}x$

96. Angle between two planes $2x + 3y + 4z = 9$ and $x - 2y + z = 5$ is :
(A) $\frac{\pi}{2}$ (B) $\frac{\pi}{4}$
(C) $\frac{\pi}{6}$ (D) $\sin^{-1}\frac{3\sqrt{3}}{5}$

97. $xy > 1$; $y > 0$, $\Rightarrow \tan^{-1}x + \tan^{-1} y =$
(A) $\tan^{-1}\left(\frac{x+y}{1-xy}\right)$ (B) $\pi + \tan^{-1}\left(\frac{x+y}{1-xy}\right)$
(C) $\tan^{-1}\left(\frac{x+y}{1+xy}\right)$ (D) $\tan^{-1}\left(\frac{1+xy}{x-y}\right)$

98. The acute angle between the two lines whose direction ratios are (1, 1, 2) and $(\sqrt{3}-1, -\sqrt{3}-1, 4)$ is :
(A) $\frac{\pi}{3}$ (B) $\frac{\pi}{4}$
(C) $\frac{\pi}{2}$ (D) $\frac{\pi}{6}$

99. The equation of a line passing through two points (3, 5, 7) and (2, 4, 9) is :
(A) $\frac{x-3}{4} = \frac{y-2}{5} = \frac{z-7}{9}$ (B) $\frac{x-2}{1} = \frac{y-4}{1} = \frac{z-9}{-2}$
(C) $x - 2 = y - 4 = z - 9$ (D) none of these

100. $\begin{vmatrix} 2002 & 2003 & 2004 \\ 2005 & 2008 & 2017 \\ 3 & 5 & 13 \end{vmatrix} =$
(A) 21645 (B) 39780
(C) 42375 (D) 0

SECTION – B : Non-Objective Type Questions

SHORT ANSWER TYPE QUESTIONS

Direction : *Question Nos. 1 to 30 are of short answer type. Answer only 15 questions from these.* $15 \times 2 = 30$

1. If $Y = \{n^2 : n \in N\} \subset N$ and the function $f : N \to Y$ as $f(n) = n^2$ show that f is invertible. Also find the inverse of f.

2. solve : $\tan^{-1}\frac{1-x}{1+x} = \frac{1}{2}\tan^{-1} x, x > 0$

3. Find the principal value of $\text{cosec}^{-1}(-2)$.

4. Find the inverse of the matrix $\begin{bmatrix} 1 & 2 \\ 2 & -1 \end{bmatrix}$ by elementry operations.

5. If $a, b, c,$ are positive and different then find the value of the determinant $\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}$.

6. If $y = \sqrt{\frac{(x-3)(x^2+4)}{3x^2+4x+5}}$, find $\frac{dy}{dx}$.

7. If $x=\frac{3at}{1+t^3}, y=\frac{3at^2}{1+t^3}$ then find $\frac{dy}{dx}$ at $t=\frac{1}{2}$.

8. If $y = \tan^{-1} x$ then prove that $\left(1+x^2\right)\frac{d^2y}{dx^2}+2x\frac{dy}{dx}=0$

9. Find the equation of the normal to the curve

$x = a\cos^3\theta, y = a\sin^3\theta$ at $\theta=\frac{\pi}{4}$

10. Use differential to find the approximate value of $\sqrt{36.6}$.

11. Verify Mean value theorem for the function $f(x)= x^2$ in the interval [2, 4].

12. Find : $\int\frac{x^3\sin(\tan^{-1}x^4)}{1+x^8}dx$

13. Find : $\int\frac{1}{\cos(x-a)\cos(x-b)}dx$

14. Find : $\int\frac{3x-2}{(x+1)^2(x+3)}dx$

15. Integrate : $\int\sqrt{\frac{a+x}{a-x}}dx$

16. Find the value of $\int_{-5}^{5}|x+2|dx$.

17. Find the value of $\int_0^{\pi/4}\frac{\sin x+\cos x}{9+16\sin 2x}dx$.

18. Find the area of the circle $x^2 + y^2 = a^2$

19. Solve the differential equation $\frac{dy}{dx}=\frac{y\cos\left(\frac{y}{x}\right)+x}{x\cos\left(\frac{y}{x}\right)}$.

20. Solve the differential equation $(e^x + 1)\,ydy = (y + 1)e^x dx$.

21. Find the vector of magnitude 8 in the direction of the vector $5\vec{i}-\vec{j}+2\vec{k}$.

22. Find λ and μ if $(2\vec{i}+6\vec{j}+27\vec{k})\times(\vec{i}+\lambda\vec{j}+\mu\vec{k})=\vec{0}$.

23. If $|\vec{a}|=3,|\vec{b}|=4,|\vec{c}|=2$ and $\vec{a}+\vec{b}+\vec{c}=\vec{0}$ then find the value of $\vec{a}.\vec{b}+\vec{b}.\vec{c}+\vec{c}.\vec{a}$.

24. Find the angle between the pair of lines

$\vec{r}=2\vec{i}-5\vec{j}+\vec{k}+\lambda(3\vec{i}+2\vec{j}+6\vec{k})$ and

$\vec{r}=7\vec{i}-6\vec{k}+\mu(\vec{i}+2\vec{j}+2\vec{k})$

25. Prove that the lines $\frac{x-a+d}{\alpha-\delta}=\frac{y-a}{\alpha}=\frac{z-a-d}{\alpha+\delta}$ and

$\frac{x-b+c}{\beta-\gamma}=\frac{y-b}{\beta}=\frac{z-b-c}{\beta+\gamma}$ are coplanar.

26. Find the equation of the plane that contains the point (1, –1, 2) and is perpendicular to each of the planes $2x + 3y - 2z = 5$ and $x + 2y - 3z = 8$.

27. Minimize $z = -3x + 4y$ subject to constraints $x + 2y \le 8$, $x \ge 0, y \ge 0$.

28. Maximize $z = 6x + 7y$ subject to constraints $x + y \ge 4$, $x \ge 0, y \ge 0$.

29. Find $P(A \cup B)$ if $2P(A) = P(B) = \frac{5}{13}$ and $P\left(\frac{A}{B}\right)=\frac{2}{5}$

30. A fair coin is tossed ten times. Find the probability of getting at least nine heads.

LONG ANSWER TYPE QUESTIONS

Direction : *Question Nos. 31 to 38 are long answer type question. Answer any 4 questions from these.* $5 \times 4 = 20$

31. Solve the differential equation

$\frac{dy}{dx}+y\cot x=2x+x^2\cot x(x\neq 0)$

32. Find the value : $\int_0^{\pi}\frac{x\tan x}{\sec x+\tan x}dx$.

33. Find the variances of the number obtained on a throw of an unbaised die.

34. Minimize $z = -50x + 20y$ subject to constraints

$2x - y \ge -5$

$3x + y \ge 3$

$2x - 3y \le 12$

$x \ge 0, y \ge -0$

35. Prove that :

$$\begin{vmatrix}1+a^2-b^2 & 2ab & -2b\\ 2ab & 1-a^2+b^2 & 2a\\ 2b & -2a & 1-a^2-b^2\end{vmatrix}=(1+a^2+b^2)^3$$

36. A line makes angles α, β, γ, δ with the diagonals of a cube. Prove that

$\cos^2\alpha+\cos^2\beta+\cos^2\gamma+\cos^2\delta=\frac{4}{3}$

37. Prove that $\tan^{-1}\frac{1}{4}+\tan^{-1}\frac{2}{9}=\frac{1}{2}\cos^{-1}\frac{3}{5}=\frac{1}{2}\sin^{-1}\frac{4}{5}$

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

ANSWER WITH EXPLANATIONS

SECTION – A

OMR ANSWER-SHEET

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

ANSWER

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

SECTION – B

1. Given $f(n) = n^2$

Let $n_1, n_2 \in N$

Therefore $f(n_1) = f(n_2)$

$\Rightarrow \quad n_1^2 = n_2^2 \quad \Rightarrow \quad n_1 = n_2 \Rightarrow$ function is one-one.

Cadomain = $y = n^2$ = Range

$\Rightarrow$ function is onto.

$\therefore$ f is invertible

Given $f(x) = x^2$

Let $y \Rightarrow f(n) \Rightarrow y = n^2$

$\Rightarrow \quad n = \sqrt{y}$

$\Rightarrow \quad f^{-1}(n^2) = \sqrt{n^2} \quad \Rightarrow \quad f^{-1}(n) = \sqrt{n}$, **Ans.**

2. $\tan^{-1}\dfrac{1-x}{1+x} = \dfrac{1}{2}\tan^{-1}x$

$\Rightarrow \tan^{-1}\dfrac{1-x}{1+1x} = \dfrac{1}{2}\tan^{-1}x$

$\Rightarrow \tan^{-1}1 - \tan^{-1}x = \dfrac{1}{2}\tan^{-1}x$

$\Rightarrow \dfrac{\pi}{4} = \dfrac{1}{2}\tan^{-1}x + \dfrac{\tan^{-1}x}{1}$

$\Rightarrow \dfrac{\pi}{4} = \dfrac{\tan^{-1}x + 2\tan^{-1}x}{2}$

$\Rightarrow \dfrac{\pi}{2} = 3\tan^{-1}x$

$\Rightarrow 3\tan^{-1}x = \frac{\pi}{2}$

$\Rightarrow \tan^{-1}x = \frac{\pi}{6}$

$\Rightarrow x = \tan\frac{\pi}{6}$

$\therefore x = \frac{1}{\sqrt{3}}$, **Ans.**

3. $\text{cosec}^{-1}(-2) = -\text{cosec}^{-1}2$

$= -\sin^{-1}\left(\frac{1}{2}\right)$

$= -\sin^{-1}\sin\frac{\pi}{6} = -\frac{\pi}{6}$, **Ans.**

4. Let $A = \begin{bmatrix}1 & 2\\ 2 & -1\end{bmatrix}$

Let $A = IA$

$\Rightarrow \begin{bmatrix}1 & 2\\ 2 & -1\end{bmatrix} = \begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}A$

$\Rightarrow \begin{bmatrix}1 & 2\\ 0 & -5\end{bmatrix} = \begin{bmatrix}1 & 0\\ -2 & 1\end{bmatrix}A \qquad [R_2 \to R_2 - 2R_1]$

$\Rightarrow \begin{bmatrix}1 & 2\\ 0 & 1\end{bmatrix} = \begin{bmatrix}1 & 0\\ \frac{2}{5} & \frac{-1}{5}\end{bmatrix}A \qquad [R_2 \to -\frac{1}{5}R_2]$

$\Rightarrow \begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix} = \begin{bmatrix}\frac{1}{5} & \frac{2}{5}\\ \frac{2}{5} & \frac{-1}{5}\end{bmatrix}A \qquad [R_1 \to R_2 - 2R_2]$

$\Rightarrow I = BA$

$\therefore A^{-1} = B = \begin{bmatrix}\frac{1}{5} & \frac{2}{5}\\ \frac{2}{5} & \frac{-1}{5}\end{bmatrix}$, **Ans.**

5. Given,

$$\Delta = \begin{vmatrix}a & b & c\\ b & c & a\\ c & a & b\end{vmatrix}$$

$$= \begin{vmatrix}a+b+c & b & c\\ b+c+a & c & a\\ c+a+b & a & b\end{vmatrix} \quad [C_1 \to C_1 + C_2 + C_3]$$

$$= (a+b+c)\begin{vmatrix}1 & b & c\\ 1 & c & a\\ 1 & a & b\end{vmatrix}$$

$$= (a+b+c)\begin{vmatrix}0 & b-c & c-a\\ 0 & c-a & a-b\\ 1 & a & b\end{vmatrix} \quad \begin{bmatrix}R_1 \to R_1 - R_2\\ R_2 \to R_2 - R_3\end{bmatrix}$$

$= (a + b + c)\ 1\ (ab - b^2 - ca + bc - c^2 + ca + ca + a^2)$

$= (a + b + c)\ (ab + bc + ca - a^2 - b^2 - c^2)$

$= -(a + b + c)\ (a^2 + b^2 + c^2 - ab - bc - ca)$, **Ans.**

6. Given $y = \left[\frac{(x-3)(x^2+4)}{3x^2+4x+5}\right]^{\frac{1}{2}}$

Taking log on both sides,

$\Rightarrow \log y = \log\left[\frac{(x-3)(x^2+4)}{3x^2+4x+5}\right]^{\frac{1}{2}}$

$\Rightarrow \log y = \frac{1}{2}\log\left[\frac{(x-3)(x^2+4)}{3x^2+4x+5}\right]$

$\Rightarrow \log y = \frac{1}{2}[\log(x-3) - \log(x^2+4) - \log(3x^2+4x+5)]$

Diff. with respect to x,

$\frac{1}{y}\cdot\frac{dy}{dx} = \frac{1}{2}\left[\frac{1}{x-3} + \frac{1.2x}{x^2+4} - \frac{1(6x+4)}{3x^2+4x+5}\right]$

$\frac{dy}{dx} = \frac{y}{2}\left[\frac{1}{x-3} + \frac{2x}{x^2+4} - \frac{6x+4}{3x^2+4x+5}\right]$ **Ans.**

7. Given, $x = \frac{3at}{1+t^3}$

Diff. with respect to t,

$\frac{dx}{dt} = \frac{3a(1+t^3) - 3t^2(3at)}{(1+t^3)^2}$

$\frac{dx}{dt} = \frac{3a + 3at^3 - 9at^3}{(1+t^3)^2}$

$\frac{dx}{dt} = \frac{3a - 6at^3}{(1+t^3)^2}$ ... (i)

and $y = \frac{3at^2}{1+t^3}$

Diff. with respect to t.

$\frac{dy}{dt} = \frac{3a.\,2t + (1+t^3) - 3t^2(3a+2)}{(1+t^3)^2}$

$\frac{dy}{dt} = \frac{6at + 6at^4 - 9at^4}{(1+t^3)^2}$

$\frac{dy}{dt} = \frac{6at - 3at^4}{(1+t^3)^2}$ ... (ii)

From eq (ii) ÷ eq. (i)

$\frac{dy}{dx} = \frac{6at - 3at^4}{3a - 6at^3}$

$\frac{dy}{dx} = \frac{3a(2t - t^4)}{3a(1 - 2t^3)}$

$\frac{dy}{dx} = \frac{2t - t^4}{1 - 2t^3}$

$\left(\frac{dy}{dx}\right)_{t=\frac{1}{2}} = \frac{2\times\frac{1}{2} - \left(\frac{1}{2}\right)^4}{1 - 2\left(\frac{1}{2}\right)^3} = \frac{1 - \frac{1}{16}}{1 - \frac{1}{4}} = \frac{\frac{16-1}{16}}{\frac{4-1}{4}} = \frac{\frac{15}{16}}{\frac{3}{4}}$

$= \frac{15}{16}\times\frac{4}{3} = \frac{5}{4}$, **Ans.**

8. Given, $y = \tan^{-1}x$

D.w.r. to x

$$\frac{dy}{dx} = \frac{1}{1+x^2}$$

$$(1 + x^2)\ \frac{dy}{dx} = 1$$

Again d.w.r. to x,

$$2x.\frac{dy}{dx} + \frac{d^2y}{dx^2}(1+x^2) = 0$$

$$\Rightarrow\ (1 + x^2)\ \frac{d^2y}{dx^2} + 2x\frac{dy}{dx} = 0\text{, Ans.}$$

9. Given, $x = a\cos^3\theta$

$$\frac{dx}{d\theta} = a.3\cos^2\theta(-\sin\theta)$$

$$\frac{dx}{d\theta} = -3a\cos^2\theta\sin\theta \qquad \text{... (i)}$$

Again $y = a\sin^3\theta$

$$\frac{dy}{d\theta} = a\cdot 3\sin^2\theta\cdot\cos\theta \qquad \text{... (ii)}$$

From eq (ii) ÷ eq. (i),

$$\frac{dy}{dx} = \frac{3a\sin^2\theta\cos\theta}{3a\cos^2\theta\sin\theta}$$

$$\frac{dy}{dx} = -\tan\theta$$

On, $\theta = \frac{\pi}{4}$

$$x = a\cos^3\frac{\pi}{4} = a\frac{1}{\sqrt{2}}\cdot\frac{1}{\sqrt{2}}\cdot\frac{1}{\sqrt{2}} = \frac{a}{2\sqrt{2}}$$

$$y = a\sin^3\frac{\pi}{4} = a.\frac{1}{\sqrt{2}}\cdot\frac{1}{\sqrt{2}}\cdot\frac{1}{\sqrt{2}} = \frac{a}{2\sqrt{2}}$$

$$\left(\frac{dy}{dx}\right)_{\theta=\pi/4} = -\tan\frac{\pi}{4} = -1$$

Equation of normal

$$y - y_1 = \frac{-1}{\frac{dy}{dx}(x_1, x_2)}(x - x_1)$$

$$\Rightarrow\ y - \frac{a}{2\sqrt{2}} = \frac{-1}{-1}\left(x - \frac{a}{2\sqrt{2}}\right)$$

$$\Rightarrow\ y - \frac{a}{2\sqrt{2}} = x - \frac{a}{2\sqrt{2}}$$

$$\therefore\ y = x\text{; Ans.}$$

10. Let $f(x) = \sqrt{x}$

$$\Rightarrow\ f'x = \frac{1}{2\sqrt{x}}$$

Again Let $x = 36,\ \Delta x = 0.6$

Now, $f(x+\Delta x) = f(x) + f'(x)\,\Delta x$

$$\Rightarrow\ \sqrt{x+\Delta x} = \sqrt{x} + \frac{1}{2\sqrt{x}}(0.6)$$

$$\Rightarrow\ \sqrt{36+0.6} = \sqrt{36} + \frac{1}{2\sqrt{36}}(0.6)$$

$$\Rightarrow\ \sqrt{36.6} = 6 + \frac{1}{2\times 6}\times\frac{6}{10}$$

$$\Rightarrow\ \sqrt{36.6} = 6 + \frac{1}{20}$$

$$\Rightarrow\ \sqrt{36.6} = 6 + 0.05$$

$$\therefore\ \sqrt{36.6} = 6.05\text{; Ans.}$$

11. $\because$ Square function is continuous and differentiable every where.

$\therefore$ $f(x) = x^2$, continues in [2, 4]

$f(x) = x^2$, differentiable in[2, 4]

Hence, all of the conditions of mean value theorem are satisfied.

Now $f'(x) = 2x$

$$\Rightarrow\ f'(c) = 2c$$

From Mean-value theorem,

$$f'c = \frac{f(b) - f(a)}{b - a}$$

$$\Rightarrow\ 2c = \frac{f(4) - f(2)}{4 - 2}$$

$$\Rightarrow\ 2c = \frac{16-4}{2} = \frac{12}{2} = 6$$

$$\therefore\ c = \frac{6}{2} = 3$$

Hence, mean-value theorem is proved.

12. Let, $\tan^{-1}x^4 = t$

Diff. with respect to x

$$\frac{1}{1+x^8}.4x^3 = \frac{dt}{dx}$$

$$\Rightarrow\ dx = \frac{(1+x^8)dt}{4x^3}$$

$$\therefore\ I = \int \frac{x^3\sin t}{1+x^8}.\frac{(1+x^8)dt}{4x^3}$$

$$= \frac{1}{4}\int \sin t dt = \frac{1}{4}(-\cos t) + C$$

$$= \frac{1}{4}\cos(\tan^{-1}x^4) + C\text{; Ans.}$$

13. $\int \frac{1}{\cos(x-a)\cos(x-b)}dx$

$$= \frac{1}{\sin(b-a)}\int \frac{\sin[(x-a)-(x-b)]}{\cos(x-a)\cos(x-b)}dx$$

$$= \frac{1}{\sin(b-a)}\int \frac{\sin(x-a)\cos(x-b) - \cos(x-a)(\sin(x-b)}{\cos(x-a)\cos(x-b)}dx$$

$$= \frac{1}{\sin(b-a)}\int [\tan(x-a)-\tan(x-b)]\,dx$$

$$= \frac{1}{\sin(b-a)}\left[\log|\sec(x-a)|-\log|\sec(x-b)|\right]+C \text{ ; Ans.}$$

14. Let $\frac{3x-2}{(x+1)^2(x+3)} = \frac{A}{x+1}+\frac{B}{(x+1)^2}+\frac{C}{x+3}$

$\Rightarrow 3x-2 = A(x+1)(x+3)+B(x+3)+C(x+1)^2$

Put, $x = -1$

$3(-1)-2 = 0 + B(-1+3) + 0$

$\Rightarrow -5 = 2B$

$\Rightarrow B = \frac{-5}{2}$

Put, $x = -3$

$3(-3) - 2 = 0 + 0 + C(-3+1)^2$

$\Rightarrow -11 = 4C$

$\Rightarrow C = \frac{-11}{4}$

Compairing coefficient of x^2,

$0 = A + C$

$\Rightarrow A = -C$

$\Rightarrow A = -\left(\frac{-11}{4}\right) \Rightarrow A = \frac{11}{4}$

$$\therefore \quad I = \int \frac{3x-2}{(x+1)^2(x+3)}dx$$

$$= \int \left(\frac{A}{x+1}+\frac{B}{(x+1)^2}+\frac{C}{x+3}\right)dx$$

$$= A\int\frac{1}{x+1}dx + B\int(x+1)^{-2}dx + C\int\frac{1}{x+3}dx$$

$$= \frac{11}{4}\log|x+1| - \frac{5}{2}\frac{(x+1)^{-1}}{-1} + \frac{-11}{4}\log|x+3| + C$$

$$= \frac{11}{4}[\log|x+1| - \log|x+3| + \frac{5}{2(x+1)}+C$$

$$= \frac{11}{4}\log\left|\frac{x+1}{x+3}\right| + \frac{5}{2(x+1)}+C \text{ ; Ans.}$$

15. Put $x = a\cos 2\theta$

Diff. with respect to x,

$1 = a(-\sin 2\theta)\,2\,\frac{d\theta}{dx}$

$dx = -2a\sin 2\theta\,d\theta$

$$\therefore \quad I = \int\sqrt{\frac{a+x}{a-x}}dx$$

$$= \int\sqrt{\frac{a+a\cos 2\theta}{a-a\cos 2\theta}}.-2a\sin 2\theta d\theta$$

$$= \int\sqrt{\frac{a(1+\cos 2\theta)}{a(1-\cos 2\theta)}}.-2a\sin 2\theta\,d\theta$$

$$= \int\sqrt{\frac{2\cos^2\theta}{2\sin^2\theta}}.-2a\sin 2\theta\,d\theta$$

$$= \int\frac{\cos\theta}{\sin\theta}.-2a\,2\sin\theta\cos\theta\,d\theta$$

$$= -2a\int 2\cos^2\theta\,d\theta$$

$$= -2a\int(1+\cos 2\theta)\,d\theta$$

$$= -2a\left[\theta+\frac{\sin 2\theta}{2}\right]$$

$$= -a\left[2\theta+\sin 2\theta\right]$$

$\because \quad x = a\cos 2\alpha$

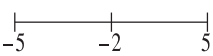
$\Rightarrow \cos 2\theta = \frac{x}{a}$

$\Rightarrow 2\theta = \cos^{-1}\frac{x}{a}$

$$= -a\left[\cos^{-1}\frac{x}{a}+\frac{a^2-x^2}{a}\right]+C \text{ , Ans.}$$

16. If $x + 2 = 0$

$x = -2$



$$\therefore \quad I = \int_{-5}^{-2}|x+2|\,dx + \int_{-2}^{5}|x+2|\,dx$$

$$= \int_{-5}^{-2}-(x+2)\,dx + \int_{-2}^{5}(x+2)\,dx$$

$$= \left[-\frac{(x+2)^2}{2}\right]_{-5}^{-2} + \left[\frac{(x+2)^2}{2}\right]_{-2}^{5}$$

$$= 0 - \left[\frac{-(-3)^2}{2}\right] + \left[\frac{7^2}{2}-0\right]$$

$$= \frac{9}{2}+\frac{49}{2} = \frac{58}{2} = 29 \text{ ; Ans.}$$

17. $$I = \int_0^{\pi/4}\frac{\sin x+\cos x}{9+16\sin 2x}dx$$

$$= \int_0^{\pi/4}\frac{\sin x+\cos x}{9+16(1-(1-\sin 2x))}dx$$

$$= \int_0^{\pi/4}\frac{\sin x+\cos x}{25-16(\sin^2 x+\cos^2 x-2\sin x\cos x)}dx$$

$$= \int_0^{\pi/4}\frac{\sin x+\cos x}{25-16(\sin x-\cos x)^2}dx$$

Let $\sin x - \cos x = t$

$(\cos x + \sin x)\,dx = dt$

When $x = 0$, $t = \sin 0 - \cos 0 = -1$

When $x = \frac{\pi}{4}$, $t = \sin\frac{\pi}{4}-\cos\frac{\pi}{4} = 0$

$$\therefore \quad I = \int_{-1}^{0}\frac{dt}{25-16t^2}$$

$$= \int_{-1}^{0}\frac{dt}{5^2-(4t)^2}$$

$$= \left[\frac{1}{2\times5\times4}\log\left|\frac{5-4t}{5-4t}\right|\right]_{-1}^{0}$$

$$= \frac{1}{40}\left[\log 1-\log\left|\frac{5+4(-1)}{5-4(-1)}\right|\right]$$

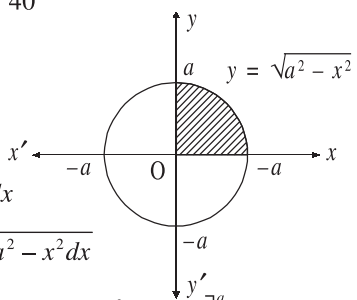
$$= \frac{1}{40}\log\left(\frac{1}{9}\right)^{-1} = \frac{1}{40}\log 9\text{, Ans.}$$

18. Given $x^2 + y^2 = a^2$

$\Rightarrow y^2 = a^2 - x^2$

$\Rightarrow y = a^2 - x^2$

$\Rightarrow y = \pm\sqrt{a^2-x^2}$



Required Area $= 4\int_0^a y\,dx$

$$= 4\int_0^a \sqrt{a^2-x^2}\,dx$$

$$= 4\left[\frac{x}{2}\sqrt{a^2-x^2}+\frac{a^2}{2}\sin^{-1}\frac{x}{2}\right]_0^a$$

$$= 4\left[0+\frac{a^2}{2}\sin^{-1}\frac{a}{a}-0\right]$$

$$= 4\,.\,\frac{a^2}{2}\sin^{-1}1$$

$$= 4\,.\,\frac{a^2}{2}.\frac{\pi}{2} = \pi a^2\text{, Ans.}$$

19. Given, $\dfrac{dy}{dx} = \dfrac{y\cos\left(\frac{y}{x}\right)+x}{x\cos\left(\frac{y}{x}\right)}$ ... (i)

Put, $y = vx$

Diff. with respect to x,

$$\frac{dy}{dx} = \frac{dv}{dx}.x + 1.v$$

$$\frac{dy}{dx} = \frac{dv}{dx}x + v$$

From eq (i),

$$\frac{dv}{dx}x+v = \frac{vx.\cos\left(\frac{vx}{x}\right)+x}{x\cos\left(\frac{vx}{x}\right)}$$

$$\frac{dv}{dx}x+v = \frac{x(v\cos v+1)}{x\cos v}$$

$$\frac{dv}{dx}x+v = \frac{v\cos v}{\cos v}+\frac{1}{\cos v}$$

$$\frac{dv}{dx}x+v = v+\frac{1}{\cos v}$$

$$\frac{dv}{dx}x = \frac{1}{\cos v}$$

$\Rightarrow \int \cos v\,dv = \int \dfrac{dx}{x}$

$\Rightarrow \sin v = \log|x| + c$

$\Rightarrow \sin\dfrac{y}{x} = \log|x| + c$, **Ans.**

20. $(e^x + 1)\,y\,dy = (y + 1)\,e^x\,dx$

$$\Rightarrow \int\frac{y\,dy}{y+1} = \int\frac{e^x dx}{e^x+1}$$

$$\Rightarrow \int\frac{y+1-1}{y+1}dy = \int\frac{e^x}{e^x+1}dx$$

$$\Rightarrow \int\left(\frac{y+1}{y+1}\frac{-1}{y+1}\right)dy = \int\frac{e^x}{e^x+1}dx$$

$$\Rightarrow \int\left(1-\frac{1}{y+1}\right)dy = \int\frac{e^x}{e^x+1}dx$$

$\Rightarrow y - \log|y+1| = \log|e^x+1| + c$, **Ans.**

21. Let $\vec{a} = 5\vec{i} - \vec{j} + 2\vec{k}$

$$\hat{a} = \frac{\vec{a}}{|\vec{a}|} = \frac{5\hat{i}-\hat{j}+2\hat{k}}{\sqrt{5^2+(-1)^2+2^2}}$$

$$= \frac{5\hat{i}-\hat{j}+2\hat{k}}{30}$$

Vector of magnitude 8 in the direction of $\vec{a}$

$$= 8\hat{a} = 8\,.\,\frac{5\hat{i}-\hat{j}+2\hat{k}}{\sqrt{30}}\text{, Ans.}$$

22. Given, $(2\vec{i}+6\vec{j}+27\vec{k})\times(\vec{i}+\lambda\vec{j}+\mu\vec{k}) = 0$

$$\Rightarrow \begin{vmatrix}\hat{i}&\hat{j}&\hat{k}\\2&6&27\\1&\lambda&\mu\end{vmatrix} = 0$$

$\Rightarrow (6\mu-27\lambda)\hat{i}-(2\mu-27)\hat{j}+(2\lambda-6)\hat{k} = 0\hat{i}+0\hat{j}+0\hat{k}$

compairing, we get,

$6\mu - 27\lambda = 0$

$-(2\mu-27) = 0 \Rightarrow 2\mu = 27 \Rightarrow \mu = \dfrac{27}{2}$

$2\lambda - 6 = 0 \Rightarrow 2\lambda = 6 \Rightarrow \lambda = 3$

$\therefore$ $\boxed{\lambda = 3, \mu = \frac{27}{2}}$, **Ans.**

23. Given, $\vec{a}+\vec{b}+\vec{c} = \vec{0}$

$\Rightarrow |\vec{a}+\vec{b}+\vec{c}| = |\vec{0}|$

$\Rightarrow |\vec{a}+\vec{b}+\vec{c}| = 0$

$\Rightarrow |\vec{a}+\vec{b}+\vec{c}|^2 = 0$

$\Rightarrow |\vec{a}|^2+|\vec{b}|^2+|\vec{c}|^2+2(\vec{a}.\vec{b}+\vec{b}.\vec{c}+\vec{c}.\vec{a}) = 0$

$\Rightarrow 3^2+4^2+2^2+2(\vec{a}.\vec{b}+\vec{b}.\vec{c}+\vec{c}.\vec{a}) = 0$

$\Rightarrow \quad 29+2(\vec{a}.\vec{b}+\vec{b}.\vec{c}+\vec{c}.\vec{a})=0$

$\Rightarrow \quad 2(\vec{a}.\vec{b}+\vec{b}.\vec{c}+\vec{c}.\vec{a})=-29$

$\Rightarrow \quad \vec{a}.\vec{b}+\vec{b}.\vec{c}+\vec{c}.\vec{a}=\dfrac{-29}{2}$, **Ans.**

24. Here $\vec{b_1}=3\vec{i}+2\vec{j}+6\vec{k}$

$\vec{b_2}=\vec{i}+2\vec{j}+2\vec{k}$

$\vec{b_1}.\vec{b_2}=3+4+12=19$

$|\vec{b_1}|=\sqrt{3^2+2^2+6^2}=\sqrt{49}=7$

$|\vec{b_2}|=\sqrt{1^2+2^2+2^2}=\sqrt{9}=3$

Now $\cos\theta=\dfrac{\vec{b_1}.\vec{b_2}}{|\vec{b_1}||\vec{b_2}|}$

$\Rightarrow \quad \cos\theta=\dfrac{19}{7.3}=\dfrac{19}{21}$

$\therefore \quad \theta=\cos^{-1}\dfrac{19}{21}$; **Ans.**

25. Here $x_1=a-b,\ y_1=a,\ z_1=a+d$

$x_2=b-c,\ y_2=b,\ z_2=b+c$

$a_1=\alpha-\delta,\ b_1=\alpha,\ c_1=\alpha+\delta$

$a_2=\beta-\gamma,\ \ b_2=\beta,\ c_2=\beta+\gamma$

Now $\begin{vmatrix} x_2-x_1 & y_2-y_1 & z_2-z_1 \\ a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \end{vmatrix}$

$= \begin{vmatrix} b-c-a+d & b-a & b+c-a-d \\ \alpha-\delta & \alpha & \alpha+\delta \\ \beta-\gamma & \beta & \beta+\gamma \end{vmatrix}$

$= \begin{vmatrix} 2b-2z & b-a & b+c-a-d \\ 2\alpha & \alpha & \alpha+\delta \\ 2\beta & \beta & \beta+\gamma \end{vmatrix}$ $[C_1 \to C_1+C_3]$

$= 2\begin{vmatrix} b-a & b-a & b+c-a-d \\ \alpha & \alpha & \alpha+\delta \\ \beta & \beta & \beta-\gamma \end{vmatrix}$

$= 0$

Hence, given lines are coplaner. **Proved**

26. Let, equation of plane is $ax + by + cz + d = 0$ ... (i)

$\because$ eq (i) passes through point (1, –2, 2).

$\Rightarrow \quad a \,.\, 1 + b \,.\, -1 + c \,.\, 2 + d = 0$

$\Rightarrow \quad a - b + 2c + d = 0$ ... (ii)

$\because$ eq. (i) $\perp 2x + 3y - 2z = 5$

$\Rightarrow \quad 2a + 3b - 2c = 0$ ... (iii)

$\because$ eq. (i) $\perp x + 2y - 3z = 8$

$\Rightarrow \quad a + 2b - 3c = 0$ ... (iv)

Solving eq. (iii) and (iv) by Cross-multiplication,

$2a + 3b - 2c = 0$

$a + 2b - 3c = 0$

$\dfrac{a}{-9-(-4)}=\dfrac{-b}{-6-(-2)}=\dfrac{c}{4-3}$

$\dfrac{a}{-5}=\dfrac{-b}{-4}=\dfrac{c}{1}=\lambda$ (Let)

$\Rightarrow \quad a=-5\lambda;\ b=4\lambda;\ c=\lambda$

From eq. (ii)

$a-b+2c+d=0$

$\Rightarrow \quad -5\lambda-4\lambda+2\lambda+d=0$

$\Rightarrow \quad -7\lambda+d=0$

$\Rightarrow \quad d=7\lambda$

eq. (i), $ax + by + cz + d = 0$

$\Rightarrow \quad -5\lambda x+4\lambda y+\lambda z+7\lambda=0$

$\Rightarrow \quad -\lambda(5x-4y-z-7)=0$

$\Rightarrow \quad 5x - 4y - z - 7 = \dfrac{0}{-\lambda}$

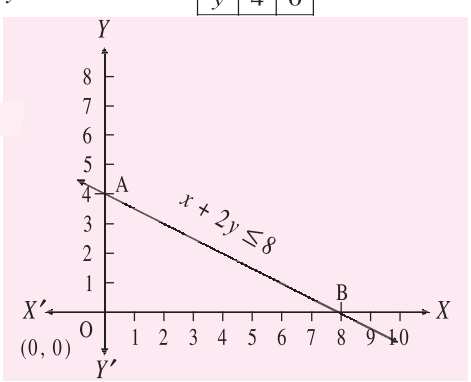
$\therefore \quad 5x-4y-z-7=0$

It is required equation. **Ans.**

27. $z = -3x + 4y$

$x + 2y \le 8$

x	0	8
y	4	0



The value of Z at these points

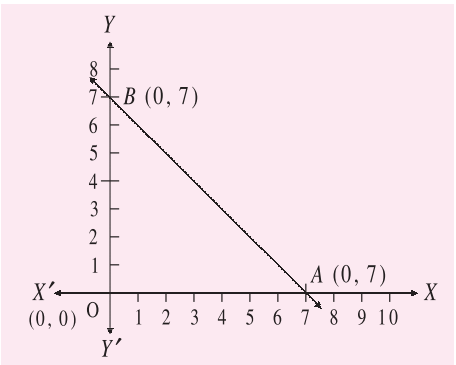
Corner Point	$Z = -3x + 4y$
0 (0,0)	0
A (0,4)	16
B(8,0)	–24 minimum

Hence, minimum value of Z will be point B (8, 0).

28. The corner points of the feasible region are 0 (0, 0), A (7, 0) and B (0, 7)

The value of Z at these points are—

Corner Point	$Z = 6x + 7y$
0 (0,0)	0
A (7,0)	42
B(0,7)	49 Maximum



Hence, maximum value of Z will be on point B (0, 7)

29. $\because \quad 2P(A) = \frac{5}{13} \Rightarrow P(A) = \frac{5}{26}$

$$P(B) = \frac{5}{13}$$

$$\therefore \quad P(A/B) = \frac{2}{5}$$

$$\Rightarrow \quad \frac{P(A \cap B)}{P(B)} = \frac{2}{5}$$

$$\Rightarrow \quad \frac{P(A \cap B)}{5/13} = \frac{2}{5}$$

$$\therefore \quad P(A \cap B) = \frac{2}{5} \times \frac{5}{13} = \frac{2}{13}$$

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

$$= \frac{5}{26} + \frac{5}{13} - \frac{2}{13} = \frac{5+10-4}{26}$$

$$= \frac{15-4}{26} = \frac{11}{26}$$ **Ans.**

30. $\because$ Possible outcomes for each of 10 coins that are tossed.
Total no. of outcomes = $2^{10} = 1024$
9 heads i.e. 1 tail.
Each coin can be only one tail.
Other 9 are all heads.
So, 10 of the 1024 outcomes exactly 9 heads.
$\therefore$ The probability of at least 9 heads

$$= \frac{10}{1024} = \frac{5}{512},$$ **Ans.**

31. Given

$$\frac{dy}{dx} + y \cot x = x^2 \cot x + 2x \qquad \ldots (1)$$

It is linear differential equation in the from of $\frac{dy}{dx} + Py = Q$

Where $P = \cot x$ and $Q = x^2 \cot x + 2x$

$$\therefore \text{ I.F.} = e^{\int P dx} = e^{\int \cot x dx} = e^{\log \sin x} = \sin x$$

Hence, the solution will be,

$$y \sin x = \int (x^2 \cot x + 2x) \sin x \, dx + c$$

$$= \int (x^2 \cos x dx + 2\int x \sin x dx + c$$

$$= x^2 \sin x - \int 2x . \sin x \, dx + 2\int x \sin dx + c = x^2 \sin x + c$$

Or $y = x^2 + \text{cosec} x \qquad \ldots (2)$

Second part : Given : when $x = \frac{\pi}{2}, y = 0$

$$\therefore \text{ From (2), } 0 = \frac{\pi^2}{4} + c \Rightarrow c = -\frac{\pi^2}{4}$$

Putting the value of c in eq. (2), we have, $y = x^2 - \frac{\pi^2}{4} \text{cosec} x$
This is required solution.

32. Let $I = \int_0^{\pi} \frac{x \tan x}{(\sec x + \tan x)} bx \qquad \ldots$ (i)

then $I = \int_0^{\pi} \frac{(\pi - x) \tan(\pi - x)}{[\sec(\pi - x) + \tan(\pi - x)]} dx$

$$[\because \int_0^a (x)dx = \int_0^a f(a-x)dx]$$

or $I = \int_0^{\pi} \frac{(\pi - x) \tan x}{(\sec x + \tan x)} dx \qquad \ldots$ (ii)

Adding (i) and (ii), we get

$$2I = \pi \int_0^{\pi} \frac{\tan x}{(\sec x + \tan x)} dx = \pi \int_0^{\pi} \frac{\tan x (\sec x - \tan x)}{(\sec^2 x - \tan^2 x)} dx$$

$$= \pi \left[\int_0^{\pi} \sec x \tan x \, dx - \int_0^{\pi} \tan^2 x dx \right]$$

$$= \pi \left\{ [\sec x]_0^{\pi} - \int_0^{\pi} (\sec^2 x - 1) dx \right\}$$

$$= \pi . \{-2 - [\tan x]_0^{\pi} + [x]_0^{\pi}\} = \pi(\pi - 2)$$

$$\therefore \quad I = \pi \left(\frac{\pi}{2} - 1 \right) \text{ i.e., } \int_0^{\pi} \frac{x \tan x}{\sec x + \tan x} dx = \pi \left(\frac{\pi}{2} - 1 \right);$$ **Ans.**

33. Here $S = \{1, 2, 3, 4, 5, 6\}$
Let X denotes the number obtained on a throw.
Then clearly X can assume the value1, 2, 3, 4, 5 or 6.

$$p(1) = p(2) = p(3) = p(4) = p(5) = p(6) = \frac{1}{6}$$

Hence, probability distribution is given by,

$X(x_i)$	1	2	3	4	5	6
$P(X)_{(P_i)}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$

Now $E(X) = \sum_{i=1}^{n} X_i p(X_i)$

$$= 1 \times \frac{1}{6} + 2 \times \frac{1}{6} + 3 \times \frac{1}{6} + 4 \times \frac{1}{6} + 5 \times \frac{1}{6} + 6 \times \frac{1}{6} = \frac{21}{6}$$

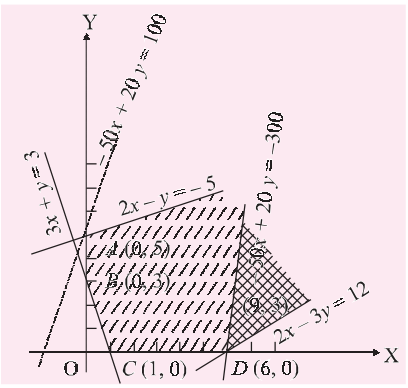
$$E(X^2) = 1^2 \times \frac{1}{6} + 2^2 \times \frac{1}{6} + 3^2 \times \frac{1}{6} + 4^2 \times \frac{1}{6} + 5^2 \times \frac{1}{6} + 6^2 \times \frac{1}{6}$$

$$= \frac{91}{6}$$

Variance $= E(X^2) - (E(X))^2$

$$= \frac{91}{6} - \left(\frac{21}{6} \right)^2 = \frac{91}{6} - \frac{441}{36} = \frac{35}{12},$$ **Ans.**

34. Fistly we draw the graph of the lines,



$2x - y = -5$ ... (1)

$3x + y = 3$ ... (2)

$2x - 3y = 12$ ... (3)

Thus, the shaded region is the feasible region. Vertices of shaded region are A (0, 5), B (0, 3), C (1, 0) and D (6, 0).

Given $Z = -50x + 20y$

Corner point	$Z = -50x + 20y$
(0, 5)	100 (Maximum)
(0, 3)	60
(1, 0)	– 50
(6, 0)	– 300 (Minimum)

Hence, the minimum value of Z is – 300 found on point (6, 0). **Ans.**

35. L.H.S. $= \begin{bmatrix} 1+a^2-b^2 & 2ab & -2b \\ 2ab & 1-a^2+b^2 & 2a \\ 2b & -2a & 1-a^2-b^2 \end{bmatrix}$

$= \begin{vmatrix} 1+a^2+b^2 & 0 & -2b \\ 0 & 1+a^2+b^2 & 2a \\ b(1+a^2+b^2) & -a(1+a^2+b^2) & 1-a^2-b^2 \end{vmatrix}$

$(C_1 \to C_1 - bC_3$ and $C_2 \to C_2 + aC_3$ ls)

$= (1+a^2+b^2)^2 \begin{vmatrix} 1 & 0 & -2b \\ 0 & 1 & 2a \\ b & -a & 1-a^2-b^2 \end{vmatrix}$

[Taking common $(1 + a^2 + b^2)$ from C_1 and C_2]

$= (1 + a^2 + b^2)^2$

$\begin{vmatrix} 1 & 0 & -2b \\ 0 & 1 & 2a \\ 0 & 0 & 1+a^2+b^2 \end{vmatrix}$ $(R_3 \to R_3 - bR_1 + aR_2$ ls)

Expanding by R_1,

$= (1 + a^2 + b^2)^2 [1(1 + a^2 + b)^2]$

$= (1 + a^2 + b^2)^3$ = R.H.S. **Proved.**

36. भुजा a के घन (cube) की तीन संलग्न कोरों (edges) OA, OB, OC को निर्देशांक लेने पर घन के शीर्षों के निर्देशांक निम्न होंगे—

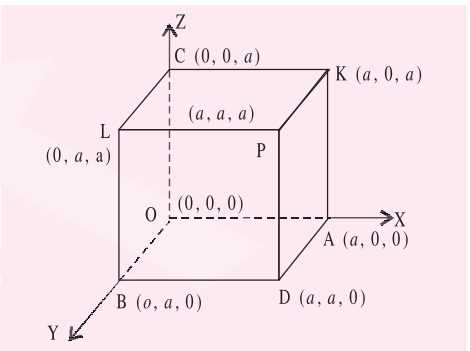
O (0, 0, 0), A (a, 0, 0)

B (0 a, 0), C (0, 0, a)

D (a, a, 0), K (a, 0, a)

L (0, a, a), P (a, a, a)

विकर्ण OP के दिक्-अनुपात (direction-ratios) $a - 0$; $a - 0$, $a - 0$ अर्थात् $|a, a, a|$ हैं।



Direction-cosines of OP,

$$\frac{a}{\sqrt{a^2+a^2+a^2}}, \frac{a}{\sqrt{a^2+a^2+a^2}}, \frac{a}{\sqrt{a^2+a^2+a^2}}$$

$$= \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}$$

Therefore, direction cosines of AL, BK and CD are

$$\left(-\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}\right), \left(\frac{1}{\sqrt{3}}, -\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}\right), \left(\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}, -\frac{1}{\sqrt{3}}\right)$$

respectively.

मान लिया कि OP, AL, BK, CD के साथ क्रमशः $\alpha, \beta, \lambda, \delta$ कोण बनानेवाली रेखा की दिक्-कोज्याएँ l, m, n हैं।

rks cos $\alpha = l \frac{1}{\sqrt{3}} + m \frac{1}{\sqrt{3}} + n \frac{1}{\sqrt{3}} = \frac{l+m+n}{\sqrt{3}}$

blh izdkj $\cos\beta = \frac{l}{\sqrt{3}} + \frac{m}{\sqrt{3}} + \frac{n}{\sqrt{3}} = \frac{-l+m+n}{\sqrt{3}}$

$\cos\lambda = \frac{1}{\sqrt{3}} - \frac{m}{\sqrt{3}} + \frac{n}{\sqrt{3}} = \frac{l-m+n}{\sqrt{3}}$

and $\cos\delta = \frac{l}{\sqrt{3}} + \frac{m}{\sqrt{3}} - \frac{n}{\sqrt{3}} = \frac{l+m-n}{\sqrt{3}}$

$\therefore \cos^2\alpha + \cos^2\beta + \cos^2\lambda + \cos^2\delta$

$= \frac{(l+m+n)^2}{3} + \frac{(-l+m+n)^2}{3} + \frac{(l-m+n)^2}{3} + \frac{(l+m-n)^2}{3}$

$= \frac{4}{3}(l^2+m^2+n^2) = \frac{4}{3}$ **Proved** $(\because \ l^2+m^2+n^2 = 1)$

37. $\tan^{-1}\frac{1}{4} + \tan^{-1}\frac{2}{9} = \tan^{-1}\left\{\frac{\frac{1}{4}+\frac{2}{9}}{1-\left(\frac{1}{4}\times\frac{2}{9}\right)}\right\} = \tan^{-1}\frac{1}{2}$

Now, $2\tan^{-1}x = \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$

$\Rightarrow \quad \tan^{-1}x = \frac{1}{2}\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$

$\Rightarrow \quad \tan^{-1}\frac{1}{2} = \frac{1}{2}\cos^{-1}\left(\frac{1-\frac{1}{4}}{1+\frac{1}{4}}\right) = \frac{1}{2}\cos^{-1}\frac{3}{5}$

and, $2\tan^{-1}x = \sin^{-1}\left(\frac{2x}{1+x^2}\right)$

$\Rightarrow \quad \tan^{-1}x = \frac{1}{2}\sin^{-1}\left(\frac{2x}{1+x^2}\right)$

$\Rightarrow \quad \tan^{-1}\frac{1}{2} = \frac{1}{2}\sin^{-1}\left(\frac{2\times\frac{1}{2}}{1+\frac{1}{4}}\right) = \frac{1}{2}\sin^{-1}\frac{4}{5}$

Hence $\tan^{-1}\frac{1}{4}+\tan^{-1}\frac{2}{9} = \frac{1}{2}\cos^{-1}\frac{3}{5} = \frac{1}{2}\sin^{-1}\frac{4}{5}$ **Proved**

38. Let $y = u + v$, where $u = (x)^{\cos x}$ and $v = (\cos x)^{\sin x}$

Now, $u = (x)^{\cos x}$

$\Rightarrow \log u = (\cos x)(\log x)$

$\Rightarrow \frac{1}{u}\frac{du}{dx} = (\cos x).\frac{d}{dx}(\log x) + (\log x).\frac{d}{dx}(\cos x)$

[on differentiating w.r.t. x]

$= (\cos x).\frac{1}{x} + (\log x)(-\sin x)$

$\Rightarrow \frac{du}{dx} = u\left\{\frac{\cos x}{x} - (\log x)(\sin x)\right\}$

$\Rightarrow \frac{du}{dx} = (x)^{\cos x}\left\{\frac{\cos x}{x} - (\log x)(\sin x)\right\}$ ... (i)

and, $v = (\cos x)^{\sin x}$

$\Rightarrow \log v = (\sin x)\log(\cos x)$

$\Rightarrow \frac{1}{v}.\frac{dv}{dx} = (\sin x).\frac{d}{dx}\{\log(\cos x)\} + \log(\cos x).\frac{d}{dx}(\sin x)$

[on differentiating w.r.t. x]

$\Rightarrow \frac{dv}{dx} = v\left\{(\sin x).\frac{(-\sin x)}{\cos x} + \log(\cos x).\cos x\right\}$

$\Rightarrow \frac{dv}{dx} = (\cos x)^{\sin x}.\{-\sin x\tan x + \cos x.\log(\cos x)\}$

... (ii)

$\therefore \quad y = (u + v)$

$\Rightarrow \frac{dy}{dx} = \frac{du}{dx} + \frac{dv}{dx}$

$\Rightarrow \frac{dy}{dx} = (x)^{\cos x}.\left\{\frac{\cos x}{x} - (\log x)\sin x\right\}$

$+ (\cos x)^{\sin x}.\{-\sin x\tan x + \cos x.\log(\cos x)\}$. **Ans.**

❑ ❑ ❑

ENGLISH (100 MARKS)

INTERNET MODEL PAPER – 1

Time : 3 Hours 15 Min.] **[Full Marks : 100**

Instructions for the Candidates :

1. Candidates must enter his/her Question Booklet Serial No. (10 Digits) in the OMR Answer Sheet.
2. Candidates are required to give answers in their own words as far as practicable.
3. Figures in the right hand margin indicate full marks.
4. 15 minutes of extra time has been allotted for the candidates to read the questions carefully.
5. This question booklet is divided into two sections—**Section-A** and **Section-B**.
6. In **Section-A**, there are 100 Objective Type Questions, out of which any 50 questions are to be answered. If more than 50 questions are answered, only the first 50 will be evaluated. Each question carries 1 mark. Darken the circle with blue/black ball pen against the correct option on OMR Answer Sheet provided to you. Do not use whitener / liquid / blade / nail etc. on OMR Answer Sheet, otherwise the result will be invalid.
7. In **Section-B**, there are 7 Descriptive Type Questions. While answering the questions, candidates should adhere to the word limit as far as practicable.
8. Use of any electronic appliances is strictly prohibited.

SECTION – A
OBJECTIVE TYPE QUESTIONS

❑ **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) Integration (B) Entigration
(C) Entegration (D) Intigrition

2. A poor man lives from .....
(Choose the correct phrase)
(A) Hand to mouth (B) In the air
(C) Eye to eye (D) In quest of

3. ..... gold of South Africa is famous.
(Choose the correct option)
(A) A (B) An
(C) The (D) No article

4. Rohan is still dancing, ... ?
(Choose the correct option)
(A) is not he (B) isn't he
(C) wasn't he (D) shouldn't he

5. Choose the correct antonym of 'gather'.
(A) Decrease (B) Gentle
(C) Scatter (D) Separate

6. Sita loves to ..... expensive clothes.
(Choose the correct option)
(A) by (B) bi
(C) bye (D) buy

7. The chairperson had to ..... the meeting.
(Choose the correct option)
(A) defer (B) differ
(C) difference (D) different

8. Choose the correct sentence :
(A) He is fond to read novels.
(B) He is fond by reading novels.
(C) He is fond at reading novels.
(D) He is fond of reading novels.

9. I ..... go out for a walk.
(Choose the correct option)
(A) was not (B) should
(C) dare (D) need

10. Has the train arrived ..... the station?
(Choose the correct option)
(A) by (B) at
(C) in (D) for

11. The wind ..... over the trees.
(Choose the correct option)
(A) blow (B) blew
(C) flu (D) clue

12. People speak Hindi in Bihar.
(Choose the correct passive voice)
(A) Hindi is spoken in Bihar.
(B) Bihar speaks Hindi by people.
(C) People are spoken Hindi in Bihar.
(D) Hindi speaking is people in Bihar.

13. You are ..... to help the poor.
(Choose the correct option)
(A) requesting (B) request
(C) requests (D) requested

14. The meeting was cancelled as ..... important members did not turn up.
(Choose the correct option)
(A) little (B) few
(C) the little (D) some

15. He killed the tiger ..... a gun.
(Choose the correct option)
(A) at (B) to
(C) with (D) for

16. The children ..... requested to sit down.
(Choose the correct option)
(A) is (B) has
(C) are (D) have

17. Somresh will always remember you.
(Choose the correct negative sentence)
(A) Somresh will never forget you.
(B) Somresh does not remember you.
(C) Somresh did not have remember you.
(D) Somresh had not forgotten you.

18. He said, "I am happy today."
(Choose the correct indirect narration)
(A) He can say that he is happy today.
(B) He said that he was happy today.
(C) He says that he is happy this day.
(D) He said that he was happy that day.

19. She is not ..... she looks.
(Choose the correct option)
(A) so tall as (B) tall when
(C) as tall if (D) but tall as

20. There were trees on ..... side of the road.
(Choose the correct option)
(A) neither (B) nor
(C) either (D) or

21. He ..... said this.
(Choose the correct option)
(A) herself (B) theirself
(C) himself (D) itself

22. Study hard, you will not pass.
(Choose the correct combination)
(A) You will not pass and you will have to study hard.
(B) Pass you will not if you do not study hard.
(C) Hard study you otherwise you will not pass.
(D) Study hard otherwise you will not pass.

23. The question of the last examination ..... out.
(Choose the correct option)
(A) leak (B) leaking
(C) leaked (D) will leak

24. He travelled all ..... the world.
(Choose the correct option)
(A) in (B) over
(C) with (D) of

25. She ..... hurt while crossing the road.
(Choose the correct option)
(A) got (B) did
(C) had (D) were

26. ..... the habit of smoking.
(Choose the correct option)
(A) give into (B) give up
(C) gave off (D) give at

27. Choose the correct spelling.
(A) Improvement (B) Emprovement
(C) Imprevement (D) Emproevement

28. He said, "He is playing tennis."
(Choose the correct indirect speech)
(A) He said that he was playing tennis.
(B) He says that he is play tennis.
(C) He will say that he is playing tennis.
(D) He had said that he played tennis.

29. We saw the tree ..... with fruits.
(Choose the correct option)
(A) laden (B) lead
(C) leading (D) lade

30. None but ..... brave deserve the fair.
(Choose the correct option)
(A) the (B) a
(C) an (D) no article

31. He dealt very politely ..... me.
(Choose the correct option)
(A) with (B) at
(C) in (D) far

32. Choose the correct meaning of :
'Once in a blue moon'
(A) an event that happens infrequently
(B) an event that happens frequently
(C) the moon is blue
(D) the moon is seen once.

33. Choose the odd one out.
(A) Chair (B) Table
(C) Bed (D) Pool

34. ..... is going to take the dog for a walk?
(A) Which (B) Whose
(C) Who (D) Whom

35. Choose the correct synonym of 'Delicious' :
(A) Bland (B) Insipid
(C) Tasty (D) Sour

36. The antonym of 'Clever' is :
(A) Angry (B) Naughty
(C) Cunning (D) Stupid

37. Choose the correct sentence.
(A) She's married with a dentist.
(B) She's married by a dentist.
(C) She's married to a dentist.
(D) She's married of a dentist.

38. The phone is ..... .
(Choose the correct option)
(A) ringing (B) rings
(C) rangs (D) rung

39. Birds can fly but dogs ..... .
(A) will not (B) may not
(C) shouldn't (D) can't

40. Choose the mis-spelt word :
(A) Advice (B) Address
(C) Adiction (D) Adhere

41. Choose the correctly spelt word :
(A) Harmoeny (B) Harmony
(C) Harmany (D) Harmeny

42. Choose the correct one word substitution of :
'A sound that cannot be heard'
(A) Incomparable (B) Inaudible
(C) Impudent (D) Immune

43. I don't want to go to Africa ..... I love my country.
(Choose the correct option)
(A) either (B) and
(C) because (D) then

44. Which of these two pens is ..... ?
(Choose the correct option)
(A) good (B) better
(C) more good (D) more better

45. Choose the odd one out
(A) Boxing (C) Wrestling
(C) Karate (D) Long Jump

46. These questions are very easy, ... ?
(Choose the correct option)
(A) are they (B) aren't they
(C) won't they (D) weren't they

47. Choose the correct meaning of 'To break the ice".
(A) A strong man
(B) To start a quarrel
(C) to break the awkward silence
(D) to become violent

48. I am ..... a piece of cake.
(Choose the correct option)
(A) has (B) have
(C) had (D) having

49. Green chilly is very rich ..... Vitamin C.
(Choose the correct option)
(A) of (B) about
(C) on (D) in

50. He does not ..... any control over his anger.
(Choose the correct option)
(A) has (B) have
(C) had (D) will have

51. It is time for the shop to be opened.
(Choose the correct active voice)
(A) Time to open the shop it is.
(B) It is time to open the shop.
(C) Open the shop on time it is.
(D) Shop to be opened on time.

52. Girija was born in Hyderabad, but ..... mother was born in Bihar.
(Choose the correct option)
(A) his (B) than
(C) her (D) whose

53. My sister ..... go to work today.
(Choose the correct option)
(A) doesn't have to (B) must had to
(C) hasn't (D) wasn't

54. I refused to ..... the bribe offered to me.
(Choose the correct option)
(A) accept (B) except
(C) acept (D) adept

55. We arrived on ..... fourth of July.
(Choose the correct option)
(A) a (B) an
(C) the (D) no article

56. I ..... Shahbaaz's family.
(Choose the correct option)
(A) am not know (B) does not
(C) not know (D) don't know

57. Choose the correct sentence.
(A) I congratulate you for your success.
(B) I congratulate you with your success.
(C) I congratulate you at yours success.
(D) I congratulate you on your success.

58. We ..... arrive tomorrow.
(Choose the suitable option)
(A) will (B) need
(C) can (D) lest

59. The meeting has been ..... until next week.
(Choose the correct option)
(A) put out (B) put in
(C) put off (D) none of these

60. Were there ..... guests in the wedding ?
(Choose the correct option)
(A) much (B) lot
(C) many (D) lots

❑ **Instruction :** *Questions from 61 to 100 are based on the prescribed texts.*

61. Our ancestors were very happy with true ..... rule.
(A) National (B) International
(C) Home (D) Society

62. ..... was overwhelmed by the love and trust of Indian people.
(A) Mahatma Gandhi (B) Shiga Naoya
(C) Bertrand Russel (D) Dr Zakir Hussain

63. Nanukaka visited Delhi to meet some .....
(A) governors (B) relatives
(C) doctors (D) ministers

64. 'A Marriage Proposal' ends with the :
(A) fight between Natalie and her father
(B) debate over the Ok-Meadows
(C) marriage of Lomov and Natalia
(D) fight between Choobookov and Lomov

65. ..... is what should be learned from Indian people.
(A) Superstition (B) Illiteracy
(C) Humanity (D) Cruelly

66. Benjy's parents did not like ..... .
(A) Mary (B) Stella
(C) Martha (D) Florence

67. Martin Luther King, Jr. wanted to see ..... as a developed state.
(A) Alaska (B) Tennesse
(C) Texas (D) Alabama

68. In ancient time, the ..... was a very rare species.
(A) birds (B) animal
(C) homo-sapiens (D) natural vegetation

69. The import of Western medicine in traditional societies is one of the most problematic areas of ..... .
(A) industrialization (B) hospitalization
(C) modernization (D) realization

70. Seibei was fascinated by ..... .
(A) gourds (B) flower
(C) grass (D) birds

71. The poet John Donne is not weary of ..... .
(A) his wife (B) his girlfriend
(C) his sister (D) his mother

72. 'I, now thirty-seven years old in perfect health begin', ... is from:
(A) Song of Myself (B) An Epitaph
(C) Ode to Autumn (D) The Soldier

73. 'And the prams go rolling on' ..... is from:
(A) Now the Leaves are Falling Fast
(B) An Epitaph
(C) The Soldier
(D) Ode to Autumn

74. Rupert Brooke expresses his love for his ..... .
(A) beloved (B) country
(C) war (D) nature

75. Who wrote 'Ode to Autumn'?
(A) John Keats (B) John Donne
(C) William Wordsworth (D) William Shakespeare

76. 'However, rare ..... rare it be', is from :
(A) The Soldier (B) Fire Hymn
(C) Song of Myself (D) An Epitaph

77. The poet witnessed ..... left on the burning ghat.
(A) grey ashes (B) leaves
(C) clothes (D) fruits

78. 'He's the bafflement of Scotland Yard', ... is from :
(A) Macavity, the Mystery Cat
(B) Fire Hymn
(C) Song of Myself
(D) The Soldier

79. The poetess got ..... from her grandmother.
(A) property (B) jewellery
(C) books (D) love

80. 'But must I confess how I liked him', ... is from :
(A) Snake (B) Song of Myself
(C) Ode to Autumn (D) The Soldier

81. Who were together called the Anglo-Saxons ..... the Angles, the Saxons and the ..... .
(A) Jutes (B) Romans
(C) Indians (D) Scandinavians

82. In India and Pakistan, English is spoken as a ..... .
(A) second language (B) foreign language
(C) mother- tongue (D) native language

83. Macavity 'always has an .....'.
(A) Alibi (B) Admiral
(C) Orange (D) Honest cat

84. The Pharaohs were the rulers of ..... .
(A) Greece (B) Egypt
(C) Rome (D) Japan

85. Dr. Zakir Hussain was also the ..... of Bihar.
(A) Chief Minister (B) Governor
(C) Home Minister (D) Finance Minister

86. The basket handed over to the narrator by Nanukaka had ..... in it.
(A) vegetables (B) fruits
(C) kitten (D) sweets

87. "Let us not wallow in the valley of despair", was said by .....
(A) Martin Luther King, Jr. (B) Dr. Zakir Hussain
(C) Mahatma Gandhi (D) Jawaharlal Nehru

88. ..... has enabled us to get a variety of enjoyment.
(A) Our ancestors (B) Our friends
(C) Our strength (D) Our intelligence

89. Freedom of press is ..... during war.
(A) utilized (B) restricted
(C) rewarded (D) sold

90. Pearl S. Buck visited India to ..... .
(A) see the Taj Mahal
(B) see poverty of India
(C) meet the young intellectuals and peasants of India
(D) see various temples

91. John Donne wanted to go on a ..... .
(A) space trip (B) voyage
(C) continental trip (D) cycle trip

92. Autumn is the reason of mellow ..... .
(A) fire (B) storm
(C) rain (D) fruitfulness

93. 'In hearts at peace, under an English heaven' - is from :
(A) Ode to Autumn (B) The Soldier
(C) An Epitaph (D) Fire-Hymn

94. '..... pick an armful of darkness to bring it here to lie' is from :
(A) My Grandmother's House
(B) Ode to Autumn
(C) An Epitaph
(D) Snake

95. Who is 'Hoping to cease not till death' ?
(A) Walter de la mare (B) Walt Whitman
(C) Rupert Brook (D) W. H. Auden

96. 'Starving through the leafless wood' is from :
(A) Now the Leaves are Falling Fast
(B) Ode to Autumn
(C) Snake
(D) Song of Myself

97. Langland wrote during the ..... English Period.
(A) Old (B) Modern
(C) Middle (D) Post-modern

98. The early 18th Century is also known as the ..... age.
(A) Jacobean (B) Classical
(C) Augustan (D) Romantic

99. ..... scholars were known as the 'University Wits'.
(A) Indian (B) Britisher
(C) Elizabethan (D) Greek

100. ..... has enriched the English language.
(A) Borrowing (B) Giving
(C) Withdrawing (D) Depositing

SECTION – B
DESCRIPTIVE TYPE QUESTIONS

1. Write an essay on <u>any one</u> of the following in about 150-200 words : 1 × 8 = 8
(A) Online Education
(B) National Security
(C) Pollution
(D) Global Warming
(E) Sense of cleanliness

2. Explain any one of the following : 1 × 4 = 4
(A) When the van had gone they stood alone on the pavement, looking at the ground.
(B) 'Mother was waiting on the doorstep, her face wreathed in smiles'.

(C) 'European civilization' is, no doubt, suited for the Europeans but it will mean ruin for India if we endeavour to copy it.'

(D) 'Yet gradually his father had begun to scold him for painting pictures.'

3. Explain any one of the following : **1 × 4 = 4**

(A) Whose white waterfall could bless
Travellers in their last distress.

(B) And still more, later flowers for the bees,
Until they think warm days never cease;

(C) Here lies a most beautiful lady,
Light of step and heart was she;

(D) Nor in the hope the world can show
A fitter love for mee;

4. Write a letter to your uncle asking him for his blessings for your forthcoming examinations. **5**

Or,

Write an application to the Cultural Secretary of your school to allow you to organize a debate competition in your class.

5. Answer any five of the following in about 40-50 words : **5 × 2 = 10**

(A) A pregnant woman in a traditional society does not feel that she is alone. Why ?

(B) What did Dr. Radhakrishnan bring to the Presidency ?

(C) What is civilization in the real sense of the term ?

(D) Why did the Indians always blame the Britishers for their suffering ?

(E) What did the fire-hymn say to him ?

(F) Why does the poet call Macavity a mystery cat ?

(G) What does Walter de la Mare say about 'beauty' ?

(H) What does T. S. Eliot say about the weaknesses of modern civilization in his early poems ?

(I) What is the differences between a short story and a novel ?

(J) Write a note on 'borrowings' in English ?

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) Now The Leaves Are Falling Fast
(iii) An Epitaph

(B) Write the summary of any one of the following prose pieces :

(i) India Through a Traveller's Eyes
(ii) A Child is Born
(iii) I Have a Dream

(C) Write a note on English as the second language of India.

Or,

Discuss the importance of English as a world language.

Or,

Write a note on Middle English.

(D) Match the name of the poems given in List-A with their poets in List-B.

List-A	List-B
(i) Now the Leaves are Falling Fast	(a) K. N. Daruwala
(ii) Fire-Hymn	(b) Rupert Brooke
(iii) Snake	(c) John Keats
(iv) The Soldier	(d) W.H. Auden
(v) To Autumn	(e) D. H. Lawrence

(E) Translate any five into English:

(i) क्या तुम्हें अमरूद खाना पसंद है ?
(ii) मेरे चार भाई हैं।
(iii) मुझे पढ़ाई करना अच्छा लगता है।
(iv) गंगा एक पवित्र नदी है।
(v) महावीर एक महान पुरुष थे।
(vi) मेरे द्वार पर एक भिखारी खड़ा था।
(vii) राजा का स्वभाव बहुत विन्रम है।
(viii) हमें सब का आदर करना चाहिए।

(F) Match the name of the prose-pieces in List-A with their authors in List-B.

List-A	List-B
(i) The Artist	(a) Germaine Greer
(ii) A Marriage Proposal	(b) H. E. Bates
(iii) A Child is Born	(c) Shiga Naoya
(iv) The Earth	(d) Dr. Zakir Hussain
(v) Bharat is My Home	(e) Anton P. Chekhov

7. Read the passage carefully and answer the questions that follow : **4**

Fuel is a material that is burned in order to get heat and light and also to generate power. The process of burning is a chemical reaction. A material combines with oxygen from the air and gives out energy. The energy is given out in the form of heat and light. Fuels can also be classified as solid, liquid and gas. Wood was one of the first fuels used by man. It was the easiest and the cheapest form. After wood started becoming scarce, it was replaced by coal. Coal contains a high percentage of carbon. Carbon is the most important ingredient in most fuels. Fuels with a high percentage of carbon burn evenly and with a hot flame.

Questions :

(a) What is produced with the burning of the fuel ?

(b) Why was wood replaced by coal ?

(c) How does fuel with a high percentage of carbon burn ?

(d) What is the source of energy ?

Or,

Write a precis of the following passage and give a suitable title to it :

Meditation is a practice that focuses the mind on a specific object, thought or activity to train attention and awareness. It has been shown to have many benefits for physical and mental health, including reducing stress and anxiety, improving sleep, and increasing feelings of calmness and relaxation. Studies have also shown that meditation can have positive effects on the brain. It helps in learning, boosts memory and surely decreases stress. It is never too late to start meditation. To do that one can use a good app or join a meditation group.

ANSWER WITH EXPLANATION

SECTION – A

OMR ANSWER-SHEET

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

ANSWER

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

SECTION – B

1. **(A) Online Education**

The advent of online education has been a game-change in the realm of learning, especially highlighted during the COVID-19 pandemic. This digital approach to education transcends geographical barriers, making quality education accessible to a broader audience regardless of location. Students can access diverse courses offered by global institutions, fostering a rich, multicultural learning environment. One of the greatest advantages of online learning is its flexibility; students have the liberty to learn at their own pace, accommodating different learning styles and life commitments.

However, online education is not without its challenges. The digital divide poses a significant hurdle, with students in remote or underprivileged areas often lacking access to necessary technological resources. Additionally, the lack of physical interaction can impact the social aspects of learning and student engagement.

Despite these challenges, online education offers unparalleled opportunities for continuous learning and professional development. It promotes self-discipline and time management skills and incorporates the latest technological advancements, making education more interactive and engaging. As the world increasingly moves towards a digital future, online education stands as a testament to the adaptability and resilience of the education sector, offering a complementary approach to traditional classroom learning.

(B) National Security

National security remains a paramount concern for any nation, encompassing the protection of its citizens, economy, and institutions from external threats and fostering internal stability. The concept extends beyond military might to include economic strength, cyber security, and environmental resilience. In an era marked by global interconnectivity, national security faces multifaceted challenges ranging from terrorism and cyber attacks to geopolitical tensions and pandemics.

Ensuring national security requires a holistic approach that balances defensive measures with proactive strategies. This

includes maintaining a strong defense force, effective intelligence gathering, and robust cybersecurity systems. Equally important is the need to foster economic stability, as a strong economy underpins a nation's ability to defend itself and influence global affairs.

However, national security is not solely the government's responsibility. It requires the active participation of citizens in safeguarding their country's interests and values. Public awareness and cooperation in issues like cyber security and community resilience are vital.

In conclusion, national security is a comprehensive concept that demands a strategic blend of military preparedness, economic robustness, technological advancement, and public participation. It is essential for preserving a nation's sovereignty, ensuring its citizens' well-being, and maintaining its position on the global stage.

(C) Pollution

Pollution, an unfortunate by product of modern civilization, poses a significant threat to the environment and human health. The rapid pace of industrialization and urbanization has exacerbated this issue, leading to various forms of pollution, including air, water, and soil contamination. The consequences are dire: air pollution causing respiratory diseases, water pollution affecting aquatic ecosystems and human health, and soil pollution degrading land and food quality.

Combatting pollution requires a multi-faceted approach. On a governmental level, it is crucial to implement and enforce stringent environmental regulations. Investment in green technologies and sustainable infrastructure can significantly reduce pollution levels. Encouraging industries to adopt environmentally friendly practices is also vital.

Individual actions, though seemingly small, can collectively make a significant impact. Simple practices like reducing vehicle use, conserving energy, and recycling can contribute to lowering pollution levels. Public awareness campaigns and education about the impact of pollution and sustainable practices are essential to foster a culture of environmental responsibility.

In conclusion, addressing pollution is a shared responsibility that calls for coordinated efforts from governments, industries, and individuals. It is a critical task that requires immediate action to protect our planet and ensure a sustainable future for coming generations.

(D) Global Warming

Global warming, characterized by an increase in Earth's average surface temperature, presents one of the most pressing challenges of our time. Human activities, particularly the burning of fossil fuels and deforestation, have significantly contributed to this phenomenon, leading to a rise in greenhouse gas emissions. The impacts are far-reaching and devastating, including melting ice caps, rising sea levels, and extreme weather patterns, which pose a threat to ecosystems, biodiversity, and human livelihoods.

Combating global warming requires collective action on a global scale. Transitioning to renewable energy sources such as solar, wind, and hydroelectric power is crucial in reducing carbon emissions. Governments and international bodies must work together to enforce environmental regulations and promote sustainable development practices. Individual actions also play a crucial role. Simple changes in lifestyle, like using public transport, reducing energy consumption, and supporting sustainable products, can collectively make a significant difference. Public awareness and education about the causes and effects of global warming are essential in mobilizing collective action.

In conclusion, global warming is a crisis that demands immediate and sustained action from all sectors of society. The future of our planet depends on our ability to reduce greenhouse gas emissions and adopt sustainable practices to mitigate the impacts of climate change.

(E) Sense of Cleanliness

A sense of cleanliness is integral to public health and environmental sustainability. It encompasses personal hygiene, clean living spaces, and maintaining a pollution-free environment. Cleanliness is not just a personal habit but a societal responsibility that demands collective effort and awareness. Effective waste management, recycling, and public cleanliness initiatives play a crucial role in achieving this goal.

Educational institutions have a pivotal role in instilling cleanliness habits from a young age. Incorporating hygiene and environmental care into curricula can foster a lifelong commitment to cleanliness. Community involvement in cleanliness drives and awareness programs can further reinforce these values.

On an individual level, simple practices like regular hand washing, proper waste disposal, and reducing pollution contribute to maintaining cleanliness. These practices not only prevent the spread of diseases but also promote environmental conservation.

In conclusion, a sense of cleanliness is essential for a healthy society and environment. It requires a concerted effort from individuals, communities, and governments to create and maintain clean and healthy surroundings. Cultivating and promoting cleanliness habits is crucial for societal well-being and environmental preservation.

2. (A) The line has been taken from the lesson 'The Earth' which has been beautifully written by H.E. Bates. This story shows that how the earth can change the life system.

The author has represented the life of a farmer Johnson, who has a few lands to grow crops. He does not work in the field. He says, "Everything is in the hands of God." He preaches in the streets while his crops are dying in the fields.

He has a simple minded son 'Benjy' on advice of Doctor Johnson keeps Benjy engaged in hens, at first giving him ten or almost a dozen of hens on which Benjy works hard and becomes rich and buys some land in his own name. Even he marries Florence named lady against his parents.

At last, he banishes his parents in a town on the pavement. Now they are looking at the ground realizing that very this earth made this change a lot.

(B) The present line has been taken from the most reading lesson "A Pinch of Snuff" which has been written by Manohar Malgaonkar in comedian style.

In this story the maternal uncle of the narrator Nanukaka is arriving at the narrator's house to see some minister. The narrator was very sad to hear the purpose of arriving his maternal uncle. He knows that he vexes the narrator so much. So, first he tries to convince his mother to inform him that we are out of station but his mother says that nothing can happen he is at the station and you have to pick up him.

The mother is waiting on the doorstep, her face wreathed in smiles to see her own brother with her favourite kittens, but the narrator was tensed.

(C) This sentence offers a critical perspective on cultural emulation and the consequences of unreflective adoption of foreign ways of life. It acknowledges that while European civilization is aptly suited for Europeans, its replication in a country with a vastly different cultural heritage like India could lead to detrimental outcomes. The word "ruin" suggests catastrophic results, implying cultural, social, or economic degradation. This statement could be part of a larger discourse on the importance of preserving indigenous cultures and identities in the face of globalization. It points to the idea that blindly imitating another civilization, without considering local contexts and values, could lead to the erosion of one's cultural roots and identity. The sentence challenges the notion of the universality of Western civilization and underscores the need for cultural self-awareness and respect for diversity. It could be a call for introspection and the development of a cultural ethos that is reflective of one's own history and societal needs.

(D) This sentence reflects a change in the father-son relationship, possibly due to differing views on the son's interest in painting. The gradual onset of the father's scolding suggests a shift from initial tolerance or indifference to disapproval, indicating a deeper conflict beneath the surface. This could stem from practical concerns about the son's future, societal expectations, or the father's own values and aspirations for his child. The son's interest in painting might be seen as impractical or frivolous in the face of societal norms that favor more traditional career paths. This sentence encapsulates a common generational conflict, where the younger generation's passions and inspirations clash with the older generation's more conventional expectations. It touches upon themes of artistic expression, parental authority, and the struggle to balance personal desires with familial expectations. The phrase "for painting pictures" highlights the innocent and harmless nature of the son's activity, further emphasizing the father's harsh response as potentially unjustified or rooted in a misunderstanding of the son's artistic passion.

3. **(A)** This line paints a vivid image of *a* majestic white waterfall, positioned as a symbol of blessing and relief for weary travelers. The waterfall's whiteness might signify purity, peace, or a sense of serenity. The phrase "in their last distress" implies that the travelers are experiencing significant hardship or are at a critical point in their journey. The waterfall, in this context, becomes a source of spiritual or emotional solace, offering comfort and rejuvenation. The line encapsulates the power of nature to provide refuge and hope in times of difficulty, highlighting the deep connection between humans and the natural world. The imagery is evocative, suggesting a scene of both beauty and compassion, where the natural environment plays a crucial role in the healing and support of individuals.

(B) This line from a poem reflects an idyllic and harmonious natural scene where bees are surrounded by an abundance of flowers, even late in the season. The phrase suggests a continuous and plentiful supply of flowers, creating an environment where bees are led to believe in the perpetuity of warm days. This could symbolize an eternal summer or a Utopian state of endless abundance and beauty. The line also speaks to the symbiotic relationship between flowers and bees, emphasizing the importance of each in sustaining the other. The imagery here is one of tranquility, continuity, and a kind of optimistic illusion nurtured by the enduring presence of nature's gifts. It evokes a sense of timelessness and the cyclical nature of life, where the end of one phase seamlessly transitions into the beginning of another.

(C) This line likely refers to an epitaph, a tribute to a woman known for her beauty and light-hearted nature. The phrase "light of step and heart" suggests that she was graceful and cheerful, bringing joy and lightness wherever she went. The past tense "was she" indicates that she is no longer alive, and the speaker is reminiscing about her qualities with admiration and fondness. This line could evoke a sense of loss and nostalgia, as the speaker remembers the positive attributes of the deceased. It's a bittersweet reflection that celebrates the life and spirit of the woman, while also acknowledging her absence. The imagery is gentle and affectionate, painting a picture of someone who was beloved and cherished for her vivacity and kindness.

(D) This line expresses a deep sense of contentment and fulfillment in the love that the speaker has found. It suggests that no other love in the world could be more suitable or desirable. The speaker seems to have a profound conviction that the love they have is the best match for them, dismissing the need to seek love elsewhere. This line embodies the sentiment of rinding one's perfect counterpart and being entirely satisfied with that discovery. It conveys a strong sense of finality and certainty, indicating a deep and unwavering connection. The line is a testament to the power of love and the belief in a soulmate or an ideal partner, where no other love could compare or compete.

4.

Kankarbagh, Patna, Bihar
2nd January, 2024

Dear Uncle,

I hope this letter finds you in the best of health and spirits. I am writing to share some news and seek your blessings.

As you know, my final examinations are approaching next month. These exams are crucial for my academic progress and future aspirations. Over the past few months, I have been diligently preparing, trying to cover all the subjects comprehensively, I remember how you always emphasized the importance of education and hard work. Your guidance and support have been instrumental in my journey so far.

I am feeling a mix of nervousness and excitement. While I am confident in my preparation, the pressure to perform well is quite overwhelming. In these times, I often recall your words of wisdom and the stories of your own academic endeavors, which inspire me to give my best.

Uncle, your blessings have always been a source of strength for me. As I stand on the threshold of this significant phase, I seek your blessings and good wishes. Your encouragement means a lot to me and it gives me the confidence to face the challenges ahead.

Please convey my regards to Aunt and cousins. I am looking forward to visiting you after my exams and sharing my experiences.

Thanking you in anticipation of your blessings and support.

Warm regards,

Anand

Address :
.....
.....

Or,

To,
The Cultural Secretary,
Modern High School
Police Line, Patna

Subject: Permission to Organize a Debate Competition

Respected Sir,

1 am Anand, a student of class X at Modern High School. I am writing to seek your permission to organize a debate competition in our class. The proposed event is scheduled for 10.02.2023, during the 7th period.

Debate competitions play a crucial role in fostering critical thinking, public speaking skills, and healthy discussions among students. It is an excellent platform for students to express their views and learn to respect diverse opinions. Such activities also enhance our understanding of current affairs and social issues, thereby contributing to our overall intellectual development.

The topic for the debate is proposed to be 'Education for All'. This topic is relevant and will encourage students to engage with current societal issues, enhancing their awareness and understanding.

I have discussed this idea with our class teacher, R.K. Mishra, and my classmates, and have received an enthusiastic response. We plan to conduct the debate in an orderly and disciplined manner, ensuring active participation and adherence to the school's code of conduct.

We would be grateful if you could provide us with the necessary permissions and guidance to successfully organise this event. Your support in this endeavor would be highly appreciated.

Thank you for considering our request. I look forward to a positive response.

Yours sincerely
Anand
Class : X
Roll No. 1

Date : 02.01.2024

5. (A) In traditional societies, a pregnant woman is often surrounded by a strong support system comprising family, friends, and community members. This collective approach provides emotional, physical, and spiritual support, ensuring she never feels isolated. The communal culture prevalent in such societies plays a crucial role in nurturing and supporting expectant mothers.

(B) Dr. Sarvepalli Radhakrishnan, a renowned philosopher and scholar, brought intellectual depth and a philosophical perspective to the Indian Presidency. His tenure was marked by his emphasis on education, moral values, and cultural unity. He was also a great advocate for peace and understanding, significantly influencing India's approach to internal and international affairs.

(C) Civilization, in its true essence, transcends beyond technological advancements or material prosperity. It encompasses the development of social, moral, and cultural values that promote harmony, empathy, and respect for diversity. A true civilization is characterized by its adherence to principles of justice, equality, and the collective welfare of its members.

(D) Indians often blamed the British colonizers for their suffering due to the oppressive and exploitative nature of British rule. Colonial policies led to economic hardships, cultural suppression, and social upheaval. The sense of national exploitation and the struggle for independence further fueled resentment towards the British.

(E) Without specific context, this question is open to interpretation. Generally, a fire-hymn could symbolize purification, transformation, or inspiration. It might convey messages of resilience, change, or the destruction of old ways to make way for the new. It could also be a call to action or a source of spiritual awakening.

(F) The poet calls Macavity a mystery cat due to his elusive nature. Macavity is portrayed as a .master criminal who is never caught, always one step ahead of the law. His mysteriousness lies in his ability to vanish and evade capture, making him an enigmatic figure.

(G) Walter de la Mare often explores the transient and subjective nature of beauty. He suggests that beauty lies in perception and is often found in simple, everyday things. His work implies that beauty transcends physical appearances and is more about the emotional and spiritual connection one feels.

(H) T. S. Eliot's early poems often critique the alienation and spiritual barrenness of modern civilization. He points out the loss of meaning and purpose in the increasingly industrialized and fragmented world, highlighting the moral and cultural decay of society.

(I) A short story is a brief work of fiction that typically focuses on a single plot, a small set of characters, and a singular theme, often aiming to evoke a single emotional effect. A novel, on the other hand, is a longer work of fiction that explores complex plots, multiple characters, and various themes, allowing for greater depth and character development.

(J) English language has evolved significantly through borrowings from other languages. Words and phrases from Latin, Greek, French, and many other languages have been integrated into English, enriching its vocabulary, and making it a diverse and dynamic language. These borrowings reflect the historical and cultural interactions over centuries.

6. (A) (i) John Donne's poem "Sweetest Love I Do not Goe" is a passionate declaration of love and sorrow at parting. The speaker, likely Donne himself, addresses his beloved, explaining that his departure is not due to a lack of love but a necessity. He emphasizes the depth of his love and the pain of separation. The poem explores themes of love, separation, and the enduring emotional connection between lovers. Donne uses rich imagery and metaphors to express the intensity of his feelings, making the poem a powerful expression of love's paradox-the pain of leaving and the strength of the bond that remains,

(ii) W. H. Auden's "Now The Leaves Are Falling Fast" is a reflection on the passage of time and the approach of winter. The poem conveys a sense of urgency and a melancholic tone as it describes the changing season. Auden uses the imagery of falling leaves to symbolize the end of a cycle and the inevitable progression towards decay and death. The poem captures the transient nature of life and the fleeting moments of beauty and joy. It also touches on themes of nostalgia and the human response to the relentless march of time.

(iii) 'An Epitaph' by Walter de la Mare is a contemplative poem reflecting on the life and death of an individual. The poem serves as a tombstone inscription, succinctly summarizing the life of the deceased. It speaks to the transience of life and the universal nature of death. De la Mare uses simple but powerful language to evoke a sense of peace and acceptance. The poem's reflective and somber tone invites

readers to consider their own mortality and the legacy they will leave behind. It's a poignant reminder of life's brevity and the enduring impact of one's deeds and character.

(B) (i) 'Indian Through a Traveller's Eyes' is an extract written by Pearl S. Buck. This prose piece is likely a travelogue or an account by a visitor to India, offering an outsider's perspective: on the country's diverse culture, history, and landscapes. The narrative may explore the contrasts and contradictions of India, from bustling cities to serene landscapes, ancient traditions to modern developments. The traveller's observations could include reflections on the social and economic aspects of Indian life, the challenges faced by the country, and the unique experiences that make India a fascinating destination.

(ii) 'A Child is Born' is written by Germaine Greer. "A Child is Born" could be a narrative focusing on the miracle of childbirth and the beginning of a new life. This prose piece might explore the emotions, challenges, and transformations associated with becoming a parent. It could delve into themes of hope, responsibility, and the profound impact of a child's birth on the family and community. The story might also touch on broader social and cultural attitudes towards childbirth and parenthood.

(iii) "I Have a Dream" is a famous speech by Martin Luther King Jr., delivered during the March on Washington for Jobs and Freedom in 1963. This powerful and inspiring speech calls for an end to racism and for civil and economic rights and an appeal for peace and equality in America. King eloquently expresses his vision of a future where people are judged not by the colour of their skin but by the content of their character. The speech is a seminal moment in the American Civil Rights Movement and a timeless message of hope and justice.

(C) English, as the second language in India, holds a unique and significant position.It serves as a bridge across the country's diverse linguistic landscape, linking people from different regions and backgrounds. Introduced during the British colonial era, English has since become deeply embedded in Indian society. It is widely used in government, business, education, and media, making it a crucial tool for communication and information.

In the realm of education, English is often the medium of instruction in schools and universities, especially in urban areas. This has implications for social mobility, as proficiency in English can open up greater opportunities in higher education and employment, both within India and globally.

Moreover, English in India has evolved into a distinct dialect, incorporating elements of Indian languages and culture, which is sometimes referred to as Indian English. This reflects the dynamic nature of language and how it adapts to local contexts.

However, the prominence of English also highlights issues of linguistic inequality. Those without access to English education may find themselves at a disadvantage in a society where English proficiency is increasingly equated with intelligence and capability. This has sparked debates about language policy and the importance of promoting multilingualism, where English is one of many languages valued and taught.

In conclusion, while English as a second language in India acts as a unifying force and a key to global integration, it also raises important questions about linguistic diversity and equity in the country. The challenge lies in balancing the benefits of English proficiency with the need to preserve and promote India's rich linguistic heritage.

Or,

English is read and spoken all over the world. It is used as a mother-tongue or first language in the U.K., U.S.A., Ireland, Canada, Australia, Newzealand and South Africa. These countries are generally known as the mother-tongues countries of English. It is used as a second official language in many Asian and African countries such as India, Singapore, Malaysia, Namibia etc. It is widely used and studied as a foreign language in China, Japan, France, Germany, Switzerland, Saudi Arabia, Egypt, Iraq etc. This language belongs to the whole world. It is now the main language of science and technology. It is used all over the world as a language of learning, communication, international trade and commerce, diplomacy, international sports etc. Thus, it can be said that English is an international language.

Or,

The second stage in the history of English is known as Middle English period. This period is from AD 1150 to AD 1500. During this period English was a mixture of dialects. There were five dialects in Middle English. They were Northern, Southern, East midland, West midland and Knetish. The introduction of printing technology and the 'Great Vowel Shift' are two significant events of this period. The most important feature of Middle English is its great variety in different part of England. The variety was not confined to English as it was spoken. It appears in the writing literature. The Middle English period was marked by intensive and fundamental changes in the phonological and grammatical systems of English. Chancer, Gower, Langland and Wyclif are important writers of this period.

(D) (i)–(d), (ii)–(a), (iii)–(e), (iv)–(b), (v)–(c)

(E) (i) Do you like to eat guava?
(ii) I have four brothers.
(iii) I like studying.
(iv) Ganga is a sacred river.
(v) Mahavir was a great person.
(vi) There was a beggar standing at my door.
(vii) The king's nature is very humble.
(viii) We should respect everyone.

(F) (i)–(b), (ii)–(e), (iii)–(a), (iv)–(c), (v)–(d)

7. (i) The burning of fuel produces energy in the form of heat and light.

(ii) Wood started becoming scarce and was subsequently replaced by coal.

(iii) Fuels with a high percentage of carbon burn evenly and with a hot flame. This makes them more efficient and effective as a source of energy.

(iv) The source of energy in the process of burning fuel is the chemical reaction that occurs when the fuel combines with oxygen. This reaction releases energy stored within the fuel, primarily in the form of heat and light.

Or,

Title : 'The Transformative Power of Meditation'

Meditation, a practice of focusing the mind, significantly enhances physical and mental well-being. It involves concentrating on a particular object, thought, or activity, training attention and awareness. This practice is known to alleviate stress and anxiety, promote better sleep, and foster feelings of calmness and relaxation.

Total words : 92 Precised words : 46

❑ ❑ ❑

हिन्दी (100 अंक)

INTERNET MODEL PAPER – 1

समय : 3 घंटा 15 मिनट] [पूर्णांक : 100

परीक्षार्थियों के लिए निर्देश :

1. परीक्षार्थी OMR उत्तर-पत्रक पर अपना प्रश्न पुस्तिका क्रमांक (10 अंकों का) अवश्य लिखें।
2. परीक्षार्थी यथासंभव अपने शब्दों में ही उत्तर दें।
3. दाहिनी ओर हाशिये पर दिये हुए अंक पूर्णांक निर्दिष्ट करते हैं।
4. इस प्रश्न पत्र को ध्यानपूर्वक पढ़ने के लिए 15 मिनट का अतिरिक्त समय दिया गया है।
5. यह प्रश्न-पत्र दो खण्डों में है, खण्ड-अ एवं खण्ड-ब ।
6. **खण्ड-अ** में 100 वस्तुनिष्ठ प्रश्न हैं, जिनमें से किन्हीं 50 प्रश्नों का उत्तर देना अनिवार्य है। 50 से अधिक प्रश्नों के उत्तर देने पर प्रथम 50 प्रश्नों का ही मूल्यांकन किया जायगा। प्रत्येक के लिए 1 अंक निर्धारित है। इनका उत्तर उपलब्ध कराये गये OMR उत्तर-पत्रक में दिये गये सही विकल्प को नीले/काले बॉल पेन से प्रगाढ़ करें। किसी भी प्रकार के ह्वाइटनर/तरल पदार्थ/ब्लेड/नाखून आदि का OMR उत्तर-पत्रक में प्रयोग करना मना है, अन्यथा परीक्षा परिणाम अमान्य होगा।
7. **खण्ड-ब** में कुल 6 विषयनिष्ठ प्रश्न हैं। प्रत्येक प्रश्न के समक्ष अंक निर्धारित हैं।
8. किसी प्रकार के इलेक्ट्रॉनिक उपकरण का प्रयोग पूर्णतया वर्जित है।

खण्ड-अ
वस्तुनिष्ठ प्रश्न

❑ **प्रश्न संख्या 1 से 100 तक के प्रत्येक 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 गये सही विकल्प को OMR उत्तर-पत्रक पर चिह्नित करें।** $50 \times 1 = 50$

1. 'उसने कहा था'-शीर्षक कहानी में सूबेदारनी ने युद्ध भूमि में अपने पति और पुत्र को बचाने के लिए किससे कहा था ?
   (A) लहना सिंह से (B) वजीरा सिंह से
   (C) कीरत सिंह से (D) बोध सिंह से
2. 'संपूर्ण क्रांति भाषण' निम्न में से किसने दिया था ?
   (A) जयप्रकाश नारायण (B) नामवर सिंह
   (C) भगत सिंह (D) जे॰ कृष्णमूर्ति
3. 'ओ सदानीरा' शीर्षक निबंध निम्न में से किस रचनाकार का है ?
   (A) मोहन राकेश (B) जगदीशचंद्र माथुर
   (C) बालकृष्ण भट्ट (D) मलयज
4. 'जूठन' शीर्षक आत्मकथा निम्न में से किनकी रचना है ?
   (A) ओमप्रकाश वाल्मीकि (B) उदय प्रकाश
   (C) नामवर सिंह (D) जे॰ कृष्णमूर्ति
5. 'शिक्षा' निम्न में से किनकी रचना है ?
   (A) नामवर सिंह (B) जे॰ कृष्णमूर्ति
   (C) उदय प्रकाश (D) मलयज
6. 'जायसी' की रचना निम्न में से कौन है ?
   (A) पद्मावत (B) उर्वशी
   (C) बीजक (D) अधिनायक
7. 'जहाँ भय है, वहाँ मेधा नहीं हो सकती'-यह कथन किस लेखक का है ?
   (A) जे॰ कृष्णमूर्ति (B) उदयप्रकाश
   (C) मोहन राकेश (D) मलयज
8. 'सूरदास' के पद में कौन रस नहीं पाया जाता है ?
   (A) वीर रस (B) वात्सल्य रस
   (C) भक्ति रस (D) शृंगार रस
9. 'हिन्दी साहित्य का सूर्य' किसे कहा जाता है ?
   (A) तुलसीदास को (B) कबीरदास को
   (C) सूरदास को (D) जायसी को
10. पठित पाठ के आधार पर 'पंचायती राज' में क्या खो गया है ?
    (A) ईमानदारी (B) पंचपरमेश्वर
    (C) ग्राम पंचायत (D) विश्व-बंधुत्व
11. 'एक लेख और एक पत्र' में भगत सिंह ने निम्न में से किसको पत्र लिखा था ?
    (A) सुखदेव (B) चन्द्रशेखर आजाद
    (C) राजगुरू (D) बिस्मिल
12. जयशंकर प्रसाद की नाट्यकृति निम्न में से कौन है ?
    (A) ध्रुवस्वामिनी (B) कोणार्क
    (C) आधे-अधूरे (D) आषाढ़ का एक दिन
13. 'तार सप्तक' का प्रकाशन वर्ष है :
    (A) 1943 (B) 1940
    (C) 1945 (D) 1942
14. सुभद्रा कुमारी चौहान के पिता निम्न में से कौन हैं ?
    (A) ठाकुर हरिनाथ सिंह (B) ठाकुर रामनाथ सिंह
    (C) ठाकुर जगमोहन सिंह (D) ठाकुर नामवर सिंह
15. 'सेकसरिया पुरस्कार' निम्न में से किनको मिला है ?
    (A) सुभद्रा कुमारी चौहान (B) सरोजनी नायडू
    (C) मीराबाई (D) महादेवी वर्मा

16. 'अर्द्धनारीश्वर' हिन्दी साहित्य की कौन विधा है ?
(A) निबंध (B) कहानी
(C) नाटक (D) आलोचना

17. 'सरोज-स्मृति' शीर्षक रचना की कौन विधा है ?
(A) देशभक्ति गीत (B) लोकगीत
(C) शोकगीत (D) भक्तिगीत

18. चन्द्रधर शर्मा गुलेरी का जन्म-स्थान कहाँ है ?
(A) जयपुर (B) पटना
(C) वाराणसी (D) देहरादून

19. रामधारी सिंह दिनकर का जन्म-स्थान है ?
(A) सिमरिया, बेगूसराय (B) लमही, वाराणसी
(C) गुलेर, काँगड़ा (D) सिरही, उत्तर प्रदेश

20. 'संस्कृति के चार अध्याय' के रचयिता निम्न में से कौन हैं ?
(A) नामवर सिंह (B) सुभद्रा कुमारी चौहान
(C) रामधारी सिंह दिनकर (D) जयशंकर प्रसाद

21. 'अज्ञेय' का जन्म-स्थान कहाँ है ?
(A) कुशीनगर, उत्तर प्रदेश (B) लमही, वाराणसी
(C) जयपुर, राजस्थान (D) बेगूसराय, बिहार

22. जगदीश चंद्र माथुर का जन्म-स्थान है :
(A) शाहजहाँपुर, उत्तर प्रदेश (B) जयपुर, राजस्थान
(C) बेगूसराय, बिहार (D) कुशीनगर, उत्तर प्रदेश

23. 'मोहन राकेश' के बचपन का नाम क्या था ?
(A) मदन मोहन गुगलानी (B) राधामोहन गुगलानी
(C) कृष्ण गुगलानी (D) राकेश गुगलानी

24. रामधारी सिंह दिनकर को उनकी किस कृति पर 'भारतीय ज्ञानपीठ पुरस्कार' मिला था ?
(A) उर्वशी (B) रश्मिरथी
(C) कुरूक्षेत्र (D) रेणुका

25. हिन्दी कहानी के विकास में 'मील का पत्थर' निम्न में से कौन कहानी है ?
(A) शिक्षा (B) उसने कहा था
(C) तिरिछ (D) रोज

26. 'हजारा सिंह' किस कहानी का पात्र है ?
(A) तिरिछ (B) रोज
(C) जूठन (D) उसने कहा था

27. 'कल, देखते नहीं यह रेशम से कढ़ा हुआ सालू'-यह उक्ति किस शीर्षक पाठ से है ?
(A) उसने कहा था (B) ओ सदानीरा
(C) तिरिछ (D) जूठन

28. 'महेश्वर' किस कहानी के पात्र हैं ?
(A) रोज (B) जूठन
(C) तिरिछ (D) ओ सदानीरा

29. 'कुंती' किस एकांकी की पात्र है ?
(A) सिपाही की माँ (B) आधे-अधूरे
(C) लहरों के राजहंस (D) आषाढ़ का एक दिन

30. 'कविता के नये प्रतिमान' के रचयिता निम्न में से कौन हैं ?
(A) मलयज (B) उदय प्रकाश
(C) नामवर सिंह (D) ओमप्रकाश वाल्मीकि

31. 'सच है, जब तक मनुष्य बोलता नहीं तब तक उसका गुण-दोष प्रकट नहीं होता'- यह उक्ति किस शीर्षक पाठ से है ?
(A) बातचीत (B) रोज
(C) तिरिछ (D) जूठन

32. 'डॉ॰ अंबेडकर राष्ट्रीय पुरस्कार' निम्नलिखित में से किनको मिला है ?
(A) ओमप्रकाश वाल्मीकि (B) नामवर सिंह
(C) मलयज (D) जे॰ कृष्णमूर्ति

33. 'इनसे ये न कराओ ... भूखे रह लेगें ... इन्हें इस गंदगी में ना घसीटो' - यह उक्ति किस शीर्षक पाठ से है ?
(A) रोज (B) जूठन
(C) तिरिछ (D) शिक्षा

34. पंडित राम औतार वैद्य एवं पिताजी किस कहानी के पात्र हैं ?
(A) तिरिछ (B) रोज
(C) जूठन (D) ओ सदानीरा

35. 'जसवीर और जनेसर' किस आत्मकथा के पात्र हैं ?
(A) जूठन (B) रोज
(C) शिक्षा (D) बातचीत

36. 'प्रेमाख्यानक काव्य-धारा' के कवि निम्न में से कौन हैं ?
(A) सूरदास (B) कबीरदास
(C) जायसी (D) तुलसीदास

37. 'गाढ़ी प्रीति नैन जल भेई' - यह पंक्ति किस शीर्षक कविता से है ?
(A) सूर के पद (B) कड़बक
(C) तुलसी के पद (D) छप्पय

38. 'कलि कराल दुकाल दारून, सब कुभाँति कुसाजु' - यह पंक्ति किस शीर्षक कविता से है?
(A) तुलसी के पद (B) छप्पय
(C) हार-जीत (D) पुत्रा-वियोग

39. 'डरा हुआ मन बेमन जिसका बाजा रोज बजाता है' - यह पंक्ति किस शीर्षक कविता से है?
(A) पुत्र-वियोग (B) हार-जीत
(C) अधिनायक (D) उषा

40. 'कि जिन बुलौओं से, गाँव के घर की रीढ़ झुरझुराती है' - यह पंक्ति किस शीर्षक कविता से है ?
(A) अधिनायक (B) गाँव का घर
(C) उषा (D) हार-जीत

41. 'जिस पुरुष में नारीत्व नहीं, अपूर्ण है' - यह उक्ति किस शीर्षक पाठ से है ?
(A) अर्धनारीश्वर (B) रोज
(C) तिरिछ (D) ओ सदानीरा

42. 'ओ सदानीरा' शीर्षक पाठ में किस नदी की चर्चा है ?
(A) गंगा नदी (B) यमुना नदी
(C) गंडक नदी (D) कोशी नदी

43. 'आज तक तो सुना नहीं था कि काँटों के चुभने से मर जाते हैं ...' - किस शीर्षक पाठ की पंक्ति है ?
(A) हँसते हुए मेरा अकेलापन (B) रोज
(C) तिरिछ (D) जूठन

44. 'तिरिछ' कहानी किस प्रकार की रचना है ?
(A) मनोवैज्ञानिक (B) आदर्शवादी
(C) आध्यात्मिक (D) जादुई यथार्थवादी

45. 'ग्रेंग्रीन' शीर्षक रचना के रचयिता निम्न में से कौन हैं ?
(A) अज्ञेय (B) मुक्तिबोध
(C) मलयज (D) उदय प्रकाश

46. 'तिरिछ' शीर्षक पाठ में तिरिछ क्या है ?
(A) विषैला कीड़ा (B) खिलौना
(C) सिपाही (D) नदी

47. 'दलित साहित्य का सौंदर्यशास्त्रा' के रचयिता निम्न में से कौन हैं ?
(A) ओमप्रकाश वाल्मीकि (B) मुक्तिबोध
(C) नामवर सिंह (D) जे॰ कृष्णमूर्ति

48. पुंडलीकजी का संबंध निम्न में से किस रचना से है?
(A) रोज (B) ओ सदानीरा
(C) तिरिछ (D) बातचीत

49. 'सिपाही की माँ' एकांकी में निम्न में से कौन पात्र नहीं है ?
(A) कुंती (B) मुन्नी
(C) बिशनी (D) मालती

50. 'उन दिनों गाँव में मरने वाले पशुओं को उठाने का काम भी चूहड़ों के जिम्मे था' - यह पंक्ति किस पाठ से है ?
(A) रोज (B) उसने कहा था
(C) तिरिछ (D) जूठन

51. 'बिना वेतन के' - के लिए एक शब्द क्या है ?
(A) अवैतनिक (B) वैतनिक
(C) मानदेय (D) प्रतिमान

52. 'कलम की कमाई खाने वाला' के लिए एक शब्द क्या है ?
(A) मसिजीवी (B) दीर्घजीवी
(C) अल्पजीवी (D) इनमें से कोई नहीं

53. 'जहाँ पुस्तकें छपती हों' - के लिए एक शब्द क्या है ?
(A) टंकणालय (B) गौशाला
(C) निर्माणशाला (D) मधुशाला

54. 'जल में रहने वाली सेना' के लिए एक शब्द क्या है ?
(A) नौसेना (B) भू सेना
(C) वीर सेना (D) हवाई सेना

55. 'जो फल आहार करता है'-के लिए एक शब्द क्या है ?
(A) फलाहारी (B) शाकाहारी
(C) माँसाहारी (D) सर्वाहारी

56. 'छात्रों के रहने का स्थान' के लिए एक शब्द क्या है ?
(A) छात्रावास (B) धर्मशाला
(C) कोचिंग संस्थान (D) महाविद्यालय

57. 'राजदूत' शब्द कौन समास है ?
(A) कर्मधारय (B) बहुव्रीहि
(C) तत्पुरुष (D) द्विगु

58. 'यथाशक्ति' शब्द कौन समास है ?
(A) अव्ययीभाव (B) कर्मधारय
(C) द्वन्द्व (D) तत्पुरुष

59. 'भला-बुरा' शब्द कौन समास है ?
(A) कर्मधारय (B) द्वन्द्व
(C) द्विगु (D) बहुव्रीहि

60. 'दोपहर' शब्द कौन समास है ?
(A) द्विगु (B) द्वन्द्व
(C) कर्मधारय (D) बहुव्रीहि

61. 'माँ-बाप' शब्द कौन समास है ?
(A) द्वन्द्व (B) अव्ययीभाव
(C) बहुव्रीहि (D) द्विगु

62. 'चतुरानन' शब्द कौन समास है ?
(A) बहुव्रीहि (B) द्वन्द्व
(C) नञ् (D) तत्पुरुष

63. 'बुढ़ापा' शब्द कौन संज्ञा है ?
(A) भाववाचक (B) व्यक्तिवाचक
(C) समूहवाचक (D) द्रव्यवाचक

64. 'पाटलिपुत्र' शब्द कौन संज्ञा है ?
(A) व्यक्तिवाचक (B) जातिवाचक
(C) द्रव्यवाचक (D) समूहवाचक

65. 'गुच्छा' शब्द कौन संज्ञा है ?
(A) समूहवाचक (B) जातिवाचक
(C) व्यक्तिवाचक (D) भाववाचक

66. 'चीनी' शब्द कौन संज्ञा है ?
(A) जातिवाचक (B) व्यक्तिवाचक
(C) द्रव्यवाचक (D) समूहवाचक

67. निम्न में से शुद्ध शब्द कौन है ?
(A) आशीर्वाद (B) आर्शीवाद
(C) आर्सीवाद (D) अशीर्वाद

68. निम्न में से शुद्ध शब्द कौन है ?
(A) प्रशंसा (B) प्रशाद
(C) प्रनाम (D) समीती

69. 'इतिहास' शब्द का विशेषण क्या है ?
(A) ऐतिहासिक (B) इतिहासिक
(C) एतिहासिक (D) इतिहासक

70. 'लोक' शब्द का विशेषण क्या है ?
(A) लोकपरक (B) लौकिक
(C) लोकिक (D) लालिमा

71. 'भारत' का विशेषण क्या है ?
(A) भारती (B) भारतीय
(C) भरतीया (D) भारतिय

72. 'खून-पसीना एक करना' मुहावरे का अर्थ क्या है ?
(A) बहुत परिश्रम करना (B) युद्ध करना
(C) उल्टा काम करना (D) क्रोधित होना

73. 'ईंट से ईंट बजाना' मुहावरे का अर्थ क्या है ?
(A) विकास करना (B) मदद करना
(C) लड़ाई करना (D) अनहोनी होना

74. 'गाल बजाना' मुहावरे का अर्थ क्या है ?
(A) डींग हाँकना (B) उदास होना
(C) चाल चलना (D) शर्म करना

75. 'अग्नि' शब्द का पर्यायवाची क्या है ?
(A) पावक (B) हय
(C) व्योम (D) बाजि

76. 'कपड़ा' शब्द का पर्यायवाची क्या है ?
(A) वस्त्र (B) पद्मान
(C) सिलाई (D) कमीज

77. 'काजल' शब्द क्या है ?
(A) पुंलिंग (B) स्त्रीलिंग
(C) उभयलिंग (D) इनमें से कोई नहीं

78. 'आत्मा' शब्द क्या है ?
(A) स्त्रीलिंग (B) पुंलिंग
(C) उभयलिंग (D) इनमें से कोई नहीं

79. 'प्राण' शब्द क्या है ?
(A) पुंलिंग (B) स्त्रीलिंग
(C) उभयलिंग (D) इनमें से कोई नहीं

80. 'पुरस्कार' शब्द का विलोम क्या है ?
(A) सम्मान (B) दंड
(C) आदर (D) पारिश्रमिक

81. 'अनुराग' शब्द का विलोम क्या है ?
(A) विराग (B) प्रहार
(C) प्रेम (D) समाहार

82. 'कृपा' शब्द का विलोम क्या है ?
(A) करूणा (B) दया
(C) कोप (D) आशीर्वाद

83. 'गणतंत्र' शब्द का विलोम क्या है ?
(A) राजतंत्र (B) वितंत्र
(C) परतंत्र (D) गुलामी

84. 'साकार' शब्द का विलोम क्या है ?
(A) निराकार (B) अतिकार
(C) बेकार (D) इनमें से कोई नहीं

85. 'दक्षिण' शब्द का विलोम क्या है ?
(A) उत्तर (B) पूर्व
(C) पश्चिम (D) दिशा

86. 'नीलकमल' शब्द कौन समास है ?
(A) द्विगु (B) द्वन्द्व
(C) अव्ययीभाव (D) कर्मधारय

87. 'थोड़ा पानी' किस विशेषण का उदाहरण है ?
(A) सार्वनामिक (B) प्रविशेषण
(C) परिमाणबोधक (D) गुणवाचक

88. 'जगन्नाथ' शब्द का संधि-विच्छेद क्या है ?
(A) जगत् + नाथ (B) जग + नाथ
(C) जग + अनाथ (D) जगत + नाथ

89. 'विद्यार्थी' शब्द का संधि-विच्छेद क्या है ?
(A) विद्या + अर्थी (B) विद्या + र्थी
(C) विदा + आथी (D) इनमें से कोई नहीं

90. 'दिगम्बर' शब्द का संधि-विच्छेद क्या है ?
(A) दिक + अंबर (B) दिक् + अम्बर
(C) दिगम् + बार (D) दिक + अंबार

91. 'मदिरालय' शब्द का संधि-विच्छेद क्या है ?
(A) मंदिर + आलय (B) मदिरा + आलय
(C) मदिर + आलय (D) मद + आलय

92. 'अनजान' शब्द में उपसर्ग क्या है ?
(A) अ (B) अन
(C) अन् (D) अनज

93. 'पुरातन' शब्द में उपसर्ग क्या है ?
(A) पु (B) पुरा
(C) उ (D) पुर

94. 'प्रतिनिधि' शब्द में उपसर्ग क्या है ?
(A) प्रति (B) प्रतिनि
(C) प्रत (D) धि

95. 'उपभाषा' शब्द में उपसर्ग क्या है ?
(A) उ (B) उप
(C) उपमा (D) उपभा

96. 'विशेष' शब्द में उपसर्ग क्या है ?
(A) विष (B) विश
(C) वि (D) बीस

97. 'सुकर्म' शब्द में उपसर्ग क्या है?
(A) सु (B) सू
(C) सुक (D) सुकम

98. 'मैं स्वयं खा लूँगा' - यह किस सर्वनाम का उदाहरण है ?
(A) निश्चयवाचक (B) संबंधवाचक
(C) निजवाचक (D) अनिश्चयवाचक

99. 'बेईमान' शब्द है ?
(A) देशज (B) विदेशज
(C) तत्सम (D) तद्भव

100. 'लिंग' के हिन्दी में कितने प्रकार है ?
(A) दस (B) चार
(C) दो (D) पाँच

खण्ड-ब
विषयनिष्ठ प्रश्न

1. निम्नलिखित में से किसी एक विषय पर निबंध लिखिए : **1 × 8 = 8**

(i) हमारे प्रिय उत्सव
(ii) मेरे प्रिय कवि
(iii) विज्ञान के चमत्कार
(iv) वन-संरक्षण
(v) आरक्षण-नीति
(vi) मोबाइल और विद्यार्थी

2. निम्नलिखित में से किन्हीं दो अवतरणों की सप्रसंग व्याख्या करें : **2 × 4 = 8**

(i) ''आदमी यथार्थ को जीता ही नहीं, यथार्थ को रचता भी है।''

(ii) ''कितने क्रूर समाज में रह रहे हैं हम, जहाँ श्रम का कोई मोल नहीं, बल्कि निर्धनता को बरकरार रखने का षडयंत्र ही था यह सब।''

(iii) ''फिर भी कोई कुछ न कर सका
छिन ही गया खिलौना मेरा
मैं असहाय विवश बैठी ही
रही उठ गया छौना मेरा।''

(iv) ''आशामयी लाल - लाल किरणों से अंधकार
चीरता सा मित्र का स्वर्ग एक :
जन-जन का मित्र एक।''

3. अपने प्रधानाचार्य के पास एक आवेदन-पत्र लिखें जिसमें किसी पर्यटन स्थल पर घूमने जाने का अनुरोध हो। 1 × 5 = 5

अथवा,

एण्टीएम॰ कार्ड हेतु बैंक-प्रबंधक के पास एक आवेदन-पत्र लिखें।

4. निम्नांकित प्रश्नों में से किन्हीं पाँच के उत्तर दें : 5 × 2 = 10

(i) मानक स्वयं को वहशी और जानवर से भी बढ़कर क्यों कहता है ?

(ii) जहाँ भय है वहाँ मेधा नहीं हो सकती। क्यों ?

(iii) 'धरती का क्षण' से क्या आशय है ?

(iv) प्यार का इशारा और क्रोध का दुधारा से क्या तात्पर्य है ?

(v) हृदय की बात का क्या अर्थ है ?

(vi) तुलसी ने अपने किन-किन दुर्गुणों का बखान किया है ?

(vii) भगत सिंह ने कैसी मृत्यु को 'सुंदर' कहा है ?

(viii) कबीर विषयक छप्पय में नाभादास ने कबीर के बारे में क्या कहा है ?

(ix) सुभद्रा जी के पति के व्यक्तित्व के बारे में बताएँ।

(x) नदियों की वेदना का क्या कारण है ?

5. निम्नलिखित प्रश्नों में से किन्हीं तीन का उत्तर दें :3 × 5 = 15

(i) 'बातचीत' के संबंध में बेन जॉनसन और एडीसन के क्या विचार हैं ?

(ii) 'संपूर्ण क्रांति' पाठ का सारांश लिखिए।

(iii) 'रोज' कहानी में कहानीकार ने किस प्रकार मालती की अंत:स्थिति व बाह्य स्थिति का वर्णन किया है ?

(iv) सूरदास के प्रथम पद का भावार्थ लिखिए।

(v) 'उषा' शीर्षक कविता का भाव स्पष्ट करें।

(vi) 'क्लर्क की मौत' शीर्षक कहानी का सारांश लिखें।

6. निम्नलिखित अवतरणों में से किसी एक का संक्षेपण कीजिए : 1 × 4 = 4

(i) अँग्रेजी पढ़ना खराब नहीं है, पर अँग्रेजी पढ़कर अँग्रेज हो जाना खराब है। अँग्रेजी पढ़कर अपने देश को, अपनी भाषा को अपनी संस्कृति को भूल जाना खराब है। यह बात इसलिए कह रहा हूँ कि आज के अधिकतर अँग्रेजी पढ़े-लिखे सज्जन अपने देश की प्रत्येक चीज को हीन दृष्टि से देखते हैं। उसकी आलोचना करते हैं और उसे अपनाने में अपनी मान-हानि समझते हैं। पर्व को ही लीजिए। पढ़े-लिखे लोग कहते हैं कि यह, स्त्रियों का ढोंग है, यह पंडितों का पोंग है। पर्व बेकार है, पर्व फिजूल खर्ची है। पर्व-त्योहार अंध भक्तों का पेशा है। अंध-भक्ति इंसानों के विकास-पथ का रोड़ा है। अंध-भक्ति से मनुष्य का विकास गति रूक जाती है।

(ii) राजनीतिक दाँव-पेंच के इस युग में चुनाव व्यवसाय बना है। चुनाव में मतदाताओं को ठगने एवं उनको मायाजाल में फँसाने के लिए रंग-बिरंगे, लोभ-लुभावन वायदे किये जाते हैं। गरीबी हटाने, बेरोजगारी मिटाने, सड़क बनवाने, विद्यालय खुलवाने, नौकरी दिलवाने, आरक्षण लागू करवाने आदि अनेक प्रकार के झूठे वायदे चुनाव के समय किये जाते हैं। गरीबी हटाने और बेरोजगारी को हटाने के लिए उद्योगों की स्थापना करनी होगी। वायदों और जुमलेबाजी की रंगीन परिकल्पनाओं से मतदाता की आस्था धीरे-धीरे समाप्त होने लगी है।

व्याख्यासहित उत्तर

खण्ड – अ

OMR ANSWER-SHEET

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

ANSWER

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

खण्ड – ब

1. (i) हमारे प्रिय उत्सव (होली)

भूमिका—भारत उत्सवों का देश है। होली सबसे अधिक रंगीन और मस्ती भरा उत्सव है। इस दिन भारतवर्ष में सभी फक्कड़ता और मस्ती की भँग में मस्त रहते हैं।

होली—होली वाले दिन लोग छोटे-बड़े, ऊँच-नीच, गरीब-अमीर, ग्रामीण-शहरी का भेद भूलकर एक-दूसरे से गले मिलते हैं तथा परस्पर गुलाल लगाते हैं।

पौराणिक कथा—होली के मूल में हिरण्यकश्यप के पुत्र प्रह्लाद और होलिका का प्रसंग आता है। हिरण्यकश्यप ने प्रह्लाद को मार डालने के लिए होलिका को नियुक्त किया था। होलिका के पास एक ऐसी चादर थी, जिसे ओढ़ने पर व्यक्ति आग के प्रभाव से बच सकता था। होलिका ने उस चादर को ओढ़कर प्रह्लाद को गोद में ले लिया और अग्नि में कूद पड़ी, वहाँ दैवी चमत्कार हुआ। होलिका आग में जलकर भस्म हो गई, परंतु प्रह्लाद का बाल भी बाँका न हुआ। तब से लेकर आज तक होलिका-दहन की स्मृति में होली का पर्व मनाया जाता है।

होली की विशेषता—होली का उत्सव दो प्रकार से मनाया जाता है। होली के एक या दो दिन पहले रात्रि में लकड़ी, झाड़-झंखाड़ एकत्र कर उसमें आग लगा देते है और समूह में इकट्ठे होकर गीत गाते हैं। आग जलाने की यह प्रथा होलिका-दहन की याद दिलाती है। ये लोग रात को आतिशबाजी आदि जलाकर भी अपनी खुशी प्रकट करते हैं।

उपसंहार—इस दिन गली-मुहल्लों में ढोल-मजीरे बजते सुनाई देते हैं। कोई नीले-पीले वस्त्र पहने घूमता है, तो कोई जोकर की मुद्रा में मस्त है। बच्चे पानी के रंगों में एक-दूसरे को नहलाने का आनंद लेते हैं। बच्चे पिचकारियों से भी रंग की वर्षा करते दिखाई देते हैं। परिवारों में इस दिन लड़के-लड़कियाँ, बच्चे-बूढ़े, तरूण-तरूणियाँ सभी मस्त होते हैं। प्रौढ़ महिलाओं की रंगबाजी रोचक बन पड़ती है। इस प्रकार यह उत्सव मस्ती और आनंद से भरपूर है।

(ii) मेरे प्रिय कवि

मेरे प्रिय कवि सूरदास हैं। हिन्दी साहित्य के इस अमर कलाकार सूरदास का जन्म 1478 ई॰ में वैशाख शुक्ल 5 को अलीगढ़ के निकट सीही नामक ग्राम में हुआ था। ये जाति के ब्राह्मण थे। इनके वंश एवं परिवार के बारे में ठोस प्रमाणों का अभाव है। इनकी कृति 'साहित्य लहरी' से पता चलता है कि ब्रजवासी बाबा रामदास के सात पुत्रों में ये सबसे छोटे पुत्र थे। इनका प्रारम्भिक जीवन अत्यन्त कष्टपूर्ण बीता, इसी से ये आध्यात्म की ओर प्रवृत्त होकर भजन-कीर्त्तन करने में रम गये। ये संगीत प्रेमी तो थे ही सुकण्ठ भी थे। कालान्तर में ये अपने ग्राम सीही से मथुरा आये और वहाँ से गऊ घाट। यह आगरा से 22 मील दूर स्थित है। यहाँ सूरदास 22 वर्षों तक आध्यात्मिक साधना में रत रहे। यहाँ महाप्रभु बल्लभाचार्य से इनकी भेंट हुई। सुकण्ठ सूरदास के भजनों को सुनकर बल्लभाचार्य ने इनकी संगीतकला और साहित्य रचना की मुक्त-कंठ से प्रशंसा की और इन्हें अपने सम्प्रदाय में दीक्षित कर लिया। इसके बाद गोवर्द्धन चले गये, जहाँ श्रीनाथ जी मन्दिर के प्रधान गायक के रूप में नियुक्त हुए। यहाँ उनकी आध्यात्मिक साधना काफी पुष्ट हुई। और ये पुष्टिमार्ग के जहाज ही माने जाने लगे। इनका यह काल हिन्दी साहित्य का स्वर्ण युग कहा जाता है। संवत् 1638 में इन्होंने अपना शरीर त्याग किया।

सूरदास सगुणोपासक भक्त थे। श्रीकृष्ण इनके आराध्य थे। महाप्रभु बल्लभाचार्य के पुष्टिमार्ग में दीक्षित होने के कारण सूरदास ने श्रीकृष्ण की लीलाओं का वर्णन किया है; क्योंकि पुष्टिमार्ग के अनुसार श्रवण, कीर्तण और स्मरण के माध्यम से ही भगवान श्रीकृष्ण की कृपा प्राप्त हो सकती है। फलतः सूरदास ने श्रीकृष्ण की भक्ति दासभाव और सखाभाव से की हैं। दासभाव वाले पदों में आत्म निवेदन और आत्म-समर्पण के भाव मुखर हुए; सखाभाव वाले पदों में बालकृष्ण के साथ ग्वालवालों की बालसुलभ चेष्टाएँ तथा राधा-कृष्ण के प्रेम प्रसंगों का हृदयग्राही वर्णन हुआ है। सूरदास के अनुसार श्रीकृष्ण अलौकिक परब्रह्मा ईश्वर स्वरूप विष्णु के अवतार हैं। श्रीकृष्ण आदि पुरूष हैं और राधा आदि प्रकृति। दोनों दो शरीर और एक प्राण ईश्वर स्वरूप हैं। अतः अनुग्रह-प्राप्ति के लिए सूरदास ने श्रीकृष्ण और राधा की सगुण-भक्ति तन्मय होकर की है।

वे मूलतः ब्रजभाषा के कवि हैं। इनकी काव्य भाषा साहित्यिक सरस और सरल है। भाव के अनुरूप भाषा में प्रवाह और लालित्य दोनों हैं। चूँकि इन्हें संगीत शास्त्र का पूरा ज्ञान था इसलिए इनके पद विभिन्न राग-रागिनियों से बँधे हैं। कम शब्दों में विपुल भावाभिव्यंजन इनकी अप्रतिम दक्षता है। इनका अलंकार विधान भी उच्चकोटि का है। इनकी रचित पाँच कृतियाँ बतायी जाती हैं—(1) सूर-सागर (2) सूर-सारावली (3) साहित्य-लहरी (4) नल-दमयन्ती और (5) ब्याहली। परन्तु इन सब में प्रारम्भ के तीन की ही, प्रामाणिकता निस्संदिग्ध है, हालाँकि इनको महाकवि सिद्ध करने के लिए 'सूर-सागर' में जीवन लीला से संबंधित चार हजार पदों की रचना ही पर्याप्त है।

(iii) विज्ञान के चमत्कार

प्रस्तावना—आज विज्ञान का युग है। विज्ञान ने विश्व के सभी क्षेत्रों में अपनी विजय पताका फहरा रखी है। यह अतिशयोक्ति नहीं होगी कि आज के युग को यदि हम वैज्ञानिक युग का नाम दे दें। प्राचीन और आधुनिक काल में पूर्णतः विपरीतता आ गई है। रहन-सहन, वस्त्र पहनावा, यातायात तथा जीवन प्रणाली पूर्णतः परिवर्तित हो गई है। उसमें नवीनता का समावेश हो चुका है। आज की दुनिया प्रतिक्षण बदलती दिखती है। परिवर्तन ही विकास है।

विज्ञान के चमत्कार—किसी भी वस्तु के बारे में जानकारी प्राप्त कराना और जानकारी को सही तरीके से लागू करना किसी भी वस्तु का सही अवलोकन अथवा विश्लेषण करना ही विज्ञान है। 'वि' का अर्थ है विकास करना, इससे तात्पर्य है कि विकास करने वाले ज्ञान को ही विज्ञान कहते हैं। आज विज्ञान के चमत्कार के माध्यम से ही मानव जाति इतनी समृद्ध हो पाई है। यदि प्राचीन काल की बात करें, तो मानव विकास उसकी चेतना के जागृत होने तथा उसकी जिज्ञासा का समुद्र की तरह विशाल होने के कारण ही हो पाया है। सबसे पहले मानव ने अपनी कमजोरियों को समझ और उसके बाद अपनी सीमाओं को, फिर मानव ने अपने दृढ़ निश्चय से अपनी कमजोरियों को दूर करने तथा अपनी सीमाओं को पार करने का अथक प्रयास किया।

मानव द्वारा अपनी आवश्यकताओं को पूरा करने के लिए किए गए अथक प्रयासों की वजह से और विज्ञान के चमत्कार से ही ऐसा संभव हो पाया है। मानव ने हर क्षेत्र में अपना विकास किया, पृथ्वी से लेकर ब्रह्मांड तक मानव ने विज्ञान के चमत्कार के माध्यम से अपने लक्ष्यों को प्राप्त करने का प्रयास किया। हमारे वैज्ञानिकों ने ऐसे प्रयोगों को सफल बनाया।

यातायात के क्षेत्र में विज्ञान के ऐसे बहुत से विज्ञान के चमत्कार हैं जो अकल्पनीय हैं, जैसे पानी के बड़े-बड़े जहाज, बुलेट ट्रेन, मेट्रा ट्रेन, हवाई जहाज, अंतरिक्ष में पहुँचने के लिए स्पेस क्राफ्ट आदि जो आज इस समाज के विकास में अपना योगदान दे रहे हैं।

आवागमन के साधन—आज आवगमन के साधन भी विज्ञान की कृपा से सर्वसुलभ हो गये हैं। रेल, मोटर साइकिल, स्कूटर तथा वायुयान इस क्षेत्र में अभूतपूर्व चुनौती दे रहे हैं। राष्ट्रीय पर्वों एवं शोक के अवसर पर समस्त

राष्ट्र के राष्ट्राध्यक्षों का एक मंच पर उपस्थित होना इस बात का ज्वलन्त उदाहरण है।

बिजली वरदान स्वरूप—बिजली प्रतिपल एक दासी की भाँति सेवा में जुटी रहती है। कारखाने, रेडियो, टेलीविजन बिजली की सहायता से चलते हैं। बिजली से चलने वाले पंखे दुपहरी में निरन्तर चलकर मानव को परम शान्ति प्रदान कर रहे हैं।

कृषि में योगदान—कृषि के लिए नये यंत्र विज्ञान से आविष्कृत किये हैं। विज्ञान द्वारा उपलब्ध रासायनिक खाद एवं बीज से उत्पादन क्षमता में वृद्धि हुई है।

चिकित्सा के क्षेत्र में योगदान—एक्स-रे शरीर का आन्तरिक फोटो लेकर अनेक बीमारियों का पता लगा रहा है। कैंसर तथा एड्स जैसे रोगों पर निरन्तर शोध जारी है। परमाणु शक्ति भी विज्ञान की ही देन है।

श्रम की बचत—विज्ञान के द्वारा आविष्कृत मशीनों के माध्यम से पूरे देश का कार्य मनुष्य कुछ घंटों में समाप्त कर लेता है। बचे हुए समय को मनुष्य मनोरंजन या स्वाध्याय में व्यतीत करता है।

अन्तरिक्ष के क्षेत्र में योगदान—अन्तरिक्ष के क्षेत्र में भी आज मनु पुत्र अपने कदम बढ़ा चुका है। जो चन्दा मामा कभी बालकों के लिए अगम बना हुआ था, आज वैज्ञानिक उसके तल पर पहुँचने में सक्षम हुए हैं।

विज्ञान से हानि—हर अच्छाई के पीछे बुराई छिपी है। जहाँ विज्ञान ने मनुष्य को अनेक सुख सुविधाएँ प्रदत्त की हैं, वहाँ अशान्ति तथा दुःख का भी सृजन किया है। अगर हम सावधानीपूर्वक विचार करें तो विदित होता है कि इसमें विज्ञान का इतना दोष नहीं है जितनी कि मानव की कुत्सित प्रवृत्तियाँ दोषी हैं।

उपसंहार—विज्ञान स्वयं में अच्छा-बुरा नहीं है। यह मानव के प्रयोग पर निर्भर है। आज विज्ञान के गलत प्रयोग के फलस्वरूप ही दुनिया में विनाशकारी दृश्य नजर आ रहा है। अतः आज हमें विज्ञान को मानव के कल्याण के निमित्त प्रयोग करके सुख एवं समृद्धि का साधन बनाना है। इसी में सबका हित सन्निहित है।

(iv) वन संरक्षण

वन संरक्षण का अर्थ वनों को विभिन्न कारकों द्वारा नष्ट होने से बचाना है। आबादी बढ़ने के साथ लोग वनों पर ज्यादा आश्रित हो रहे हैं, नगरीकरण और बस्ती बसाने के लिए पेड़ काटे जा रहे हैं फलतः विशाल वन क्षेत्रफल घटता जा रहा है, वन बचाव के उपाय अपनाते हुए जंगलों के पेड़ की निर्दयता से कटाव को रोककर तथा वृक्षारोपण के जरिये वन संपदा के क्षय को रोका जा सकता है।

वन ही जीवन है क्योंकि विश्व के समस्त प्राणी कई जरूरतों के लिए वनों पर ही निर्भर है, जंगलों से वन्यप्राणी को आश्रय और मानव को औषधि प्राप्त होता है। वन में तरह-तरह के वृक्षों का विशाल आवरण जहाँ रंग बिरंगे फूल, लाभप्रद औषधियाँ, आहार रूप में कंदमूल और स्वादिष्ट फल मिलते हैं।

धरती पर उपस्थित सभी वृक्ष-पौधे साँस लेने के लिए शुद्ध हवा देकर मानव जाति को अनुकूलित वातावरण प्रदान करते हैं। अनेकों उद्योग वन संसाधन पर पूरी तरह आश्रित हैं, दरवाजा, फर्नीचर, टेबल, सोफे, पेंसिल व खेलों के लिए आवश्यक सामग्री जैसे हॉकी, स्टंप, बल्ला आदि बनाने वाले उद्योगों में लकड़ी की अधिक माँग है।

बहुत से उद्योगों में कच्चे माल की आपूर्ति वनों से हो पाती है, वनों पर निर्भर उद्योगों द्वारा कई चीजें बनाकर देशभर में पहुँचाया जाता है, वन संसाधनों का प्रत्यक्ष या अप्रत्यक्ष रूप से मनुष्य को लाभ मिलता ही है। जनसंख्या का बहुत बड़ा हिस्सा वनों से ईमारती लकड़ी वनस्पति व जलाऊ लकड़ी प्राप्त करता है।

वन बादलों को अपनी ओर खींचते हैं और वन्य क्षेत्रों में अच्छी वर्षा कराते हैं। वृक्षों के जड़ें मिट्टी को जकड़े रखते हैं इस कारण धरती के जिन हिस्सों में वन पाए जाते हैं वहाँ भूमि क्षरण नहीं होता। यह ग्रीनहाउस गैस को अवशोषित करके वातावरण संतुलित रखते हैं।

पहाड़ों से गिरने वाले झरनों का प्रवाह बनाए रखने में वन महत्त्वपूर्ण भूमिका निभाते हैं। उनके छाया से छोटे-बड़े जलकुंड सूखते नहीं उनमें जल संरक्षित रहता है। जहाँ घने जंगल हो वहाँ जल की उपलब्धता अधिक होती है। वृक्ष गर्मी के दिनों में ठंडक महसूस कराते हैं। भारत में तो पेड़-पौधों की सदियों से पूजा होती है।

वन संसाधनों का प्रयोग—मनुष्यों द्वारा वन संसाधनों का जीवनपर्यंत उपयोग किया जाता है, प्रत्येक मनुष्य वन संपदा/संसाधनों का प्रत्यक्ष अथवा अप्रत्यक्ष रूप से उपयोग करता है। सदियों से लेकर अब तक मानव धीरे-धीरे करके वन का विनाश करने में लगा है लेकिन फिर भी निरंतर जरूरत के सामाना मिलते रहते हैं, अगर जंगलें नष्ट होती रही तो दिन दूर नहीं जब शुद्ध वायु के लिए लोग तरसेंगे, जंगलों पर मात्र मनुष्य नहीं अपितु समस्त वन्य प्राणी पूर्णतया आश्रित हैं, यह प्राकृतिक आपदाओं से हमारी रक्षा करते हैं।

वन संरक्षण के उपाय—वन संरक्षण का सबसे अच्छा तरीका वृक्षारोपण अथवा पौधरोपण करना है। जंगलों का क्षेत्रफल घटने लगा है इसलिए वहाँ अब पेड़ लगाने होंगे। आसपास के पर्यावरण संरक्षण हेतु पौधरोपण करते रहना होगा। वन कटौती में कमी तथा वृक्षरोपण अधिक करना होगा। गर्मी के दिनों में जंगलों में आग लग जाती है, प्राकृतिक या मानवों द्वारा वनों में आग लगने पर रोक लगाना आवश्यक है। पक्की सड़कें बनाने में वन क्षेत्र प्रभावित न हो इसका ध्यान रखना होगा। पेड़-पौधों का विस्तार करने हेतु शहर और गाँवों के लोगों को जागरूक करके उन्हें वृक्षारोपण के लिए प्रोत्साहित करना होगा। वनों की कटाई से क्या दुष्परिणाम भुगतने पड़ सकते हैं इसके बारे में आम जनता को बताना जरूरी है। वन धरती का शृंगार है जो विशेष स्थान में स्थित रहकर अपना सकारात्मक प्रभाव प्रकृति पर डालकर उसे प्राणियों के रहने लायक बनाते हैं अतः मनुष्य का भी परमकर्त्तव्य है की वह अपना महत्त्वपूर्ण योगदान वनों का विस्तार करने में दे। प्राणी जगत को वनों से मिलने वाले फायदे सर्वकालिक मिलते रहे इसके लिए हर साल हर व्यक्ति द्वारा वृक्षारोपण किया जाना चाहिए।

(v) आरक्षण-नीति

भारत में आरक्षण एक सरकारी नीति हैं, जो भारतीय संविधान द्वारा समर्थित है। भारत में आरक्षण सरकारी नौकरियों, शैक्षणिक संस्थानों, और यहाँ तक कि आबादी के कुछ वर्गों के लिए सीटों तक पहुँच के बारे में है। भारत में आरक्षण अत्यंत पिछड़ा वर्ग, अनुसूचित जाति, अनुसूचित जनजाति के साथ-साथ अल्पसंख्यकों और सभी वर्गों की महिलाओं को भी प्रदान की जाती है। 2019 से पहले आरक्षण मुख्य रूप से सामाजिक और शैक्षिक पिछड़ेपन के आधार पर प्रदान किया गया था। हालांकि 2019 में 103वें संविधान संशोधन के बाद, आर्थिक पिछड़ेपन पर भी विचार किया गया है। आज सामान्य वर्ग के लिए आर्थिक पिछड़ेपन के आधार पर आरक्षण का प्रावधान है। आरक्षण प्रदान करने का उद्देश्य समुदायों से संबंधित व्यक्तियों को नौकरी देना नहीं है। यह मूल रूप से उन्हें सशक्त बनाने और राज्य की निर्णय लेने की प्रक्रिया में उनकी भागीदारी सुनिश्चित करने के उद्देश्य से है।

(vi) मोबाइल और विद्यार्थी

आज का विद्यार्थी, मोबाइल का उपयोग करता है, और उसकी सहायता से पढ़ाई को और बेहतर बनाने का प्रयास करता है, यदि उसे किसी सवाल का जवाब जानना हो, तो वह ऑनलाइन सर्च करके, जवाब पा सकता है। वह अपने दोस्तों को वीडियो कॉल करके अध्ययन से संबंधित बातचीत कर सकता है।

यदि विद्यार्थी मोबाइल का उचित उपयोग करें, तो मोबाइल उसके जीवन में सकारात्मक प्रभाव डाल सकता है, उसे हर दिन नई जानकारी, नई कल सीखने में मदद कर सकता है।

विद्यार्थियों द्वारा मोबाइल का उचित उपयोग—विद्यार्थी देश के गौरव होते हैं और वे आगे चलकर समाज के विकास में अपना महत्त्वपूर्ण योगदान दे सकते हैं। शिक्षा न केवल मनुष्य को ज्ञान देता है, अपितु जीवन को अनुशासन के साथ जीने का तरीका भी सिखाता है, सभ्य समाज के लिए उचित शिक्षा प्राप्त करना अनिवार्य होता है।

समय के साथ अध्ययन का तरीका भी बदला है, हर जमाने के साथ छात्रों ने भी उसे अपनाया है, और ऑनलाइन क्लास अटेंड किया है। मोबाइल फोन मात्र कम्युनिकेट करने का नहीं बल्कि अब ज्ञान का खजाना बन गया है।

अगर, छात्र उसका सही उपयोग करें, तो बहुत कुछ सीख सकता है। छात्रों को मोबाइल पर महान् व्यक्तियों के बारे में जीवनी पढ़ना चाहिए। इससे हम उनके जीवन से बहुत कुछ प्रेरणा ले सकते हैं। हर सवालों का जवाब वेबसाइटों पर उपलब्ध है, जहाँ पर जाकर आर्टिकल पढ़कर विद्यार्थी, जानकारियाँ प्राप्त कर सकते हैं।

मोबाइल का सदुपयोग करने के लिए, विद्यार्थी इंटरनेट पर वही जानकारी खोजे जो उसके ज्ञान को विकसित कर सकती है, देर तक फोन चलाने से हेल्थ प्रोब्लम हो सकते हैं। सिर दर्द भी हो सकता है, इसलिए छात्रों

को फोन का कम उपयोग करना चाहिए। विद्यार्थियों को हमेशा मोबाइल का सदुपयोग करने की ओर विचार करना चाहिए। एजुकेशनल उद्देश्य से यदि छात्र फोन का इस्तेमाल करेंगे तो वह हर रोज कुछ सीख सकते हैं और उससे भी अपने अध्ययन को और बेहतर तरीके से कर सकते हैं। ऑनलाइन क्लास से जुड़े और शिक्षकों से सवालों का जवाब पाए। अनुपयुक्त चीजों में समय न व्यतीत करें, बल्कि मोबाइल का इस्तेमाल शिक्षात्मक उद्देश्य से करें, जो आपके परीक्षा की तैयारी को और अच्छे से करने में मदद करेगा।

2. (क) प्रस्तुत पंक्ति ''हँसते हुए मेरा अकेलापन'' डायरी से ली गयी है। इस पंक्ति में लेखक मलयज ने यह सिद्ध करने का प्रयास किया है कि व्यक्ति यथार्थ में जीता भी है और यथार्थ को रचता भी है। यथार्थ मनुष्य जीवन का कटु सत्य है। वास्तविकता से परे मनुष्य का जीवन एकांकी एवं व्यर्थ होता है। इस पंक्ति में लेखक ने संकेत दिया है कि उनके बच्चे उनकी रचना है और वे यथार्थ हैं। उनकी चिन्ता उसके स्वयं की है। लेखक पारिवारिक बोझ के बंधन से बंधे हैं जबकि उनका परिवार बंधन एवं चिन्तामुक्त है। यही जीवन का यथार्थ है। अत: व्यक्ति की रचना एवं उसके जीवन का यथार्थ दोनों एक-दूसरे के पूरक हैं।

(ख) प्रस्तुत गद्यांश सुप्रसिद्ध दलित आन्दोलन के नामवर लेखक ओमप्रकाश वाल्मीकि रचित आत्मकथात्मक 'जूठन' शीर्षक से लिया गया है।

प्रस्तुत गद्यांश के माध्यम से लेखक ने समाज की विद्रूपताओं पर कटाक्ष किया है।

लेखक के परिवार द्वारा श्रमसाध्य कर्म किए जाने के बावजूद दो जून की रोटी भी नसीब न होती थी। रोटी की बात कौन कहे जूठन नसीब होना भी कम मुश्किल न था। विद्यालय का हेडमास्टर चूहड़े के बेटे को विद्यालय में पढ़ाना नहीं चाहता है, उसका खानदानी काम ही उसके लिए है। चूहड़े का बेटा है लेखक, इसलिए पत्तलों का जूठन ही उसका निवाला है।

इस समाज में शोषण का तंत्र इतना मजबूत है कि शोषक बिना पैसे का काम करवाता है अर्थात् बेगार लेता है। श्रम साध्य के बदले मिलती हैं गालियाँ। लेखक अपनी आत्मकथा में समाज की क्रूरता को दिखाता है कि लेखक के गाँव में पशु मरता है तो उसे ले जाने का काम चूहड़ों का ही है। ये काम बिना मूल्य के हैं। यह तंत्र का चक्र है जिसमें निर्धनता को बरकरार रखा गया है।

(ग) प्रस्तुत गद्यांश लेखिका सुभद्रा कुमारी चौहान के द्वारा रचित पुत्र-वियोग शीर्षक से लिया गया है। प्रस्तुत गद्यांश के माध्यम से कवयित्री कहना चाहती है उसने अपने बेटे कि देख-भाल तथा उसके लालन-पालन पर अपना पूरा ध्यान केंद्रित कर दिया। अपनी सुविधा असुविधा का कभी विचार नहीं किया। बेटा को ठंढ न लग जाए, बीमार न पड़ जाए इसके लिए सदैव गोदी में रखा। इन सारी सावधानियों तथा मंदिर में पूजा-अर्चना से भी वह अपने बेटे की असमय मृत्यु नहीं टाल सकी। नियति के आगे किसी का वश नहीं चलता।

(घ) आशा से परिपूर्ण लाल-लाल किरणों से अंधकार को चीरता हुआ मित्र का एक स्वर्ग है। वह जन-जन का मित्र है। कवि के कहने का अर्थ यह है कि सूर्य की लाल किरणें अंधकार का नाश करते हुए मित्र के स्वर्ग के समान है। समस्त मानव-समुदाय का वह मित्र है।

विशेष अर्थ यह प्रतीत होता है कि विश्व के तमाम देशों में सघर्षरत जनता जो अपने अधिकारों की प्राप्ति, न्याय, शांति एवं बंधुत्व के लिए प्रयत्नशील है, उसे आशा की मनोहारी किरणें स्वर्ग के आनन्द के समान दृष्टिगोचर हो रही हैं।

3. सेवा में,
प्रधानाचार्य महोदय
वीर कुँवर सिंह महाविद्यालय आरा
विषय : पर्यटन स्थल पर जाने के संबंध में।
महाशय,

सविनय निवेदन है कि मैं राकेश सिंह आपके महाविद्यालय के वर्ग 10+2 के Arts विभाग का छात्र हूँ। मैं और मेरे साथी लोग राजगीर घूमने जाना चाहते हैं, इसके लिए आपके अनुमति की आवश्यकता है।

अत: श्रीमान् से निवेदन है कि हम सब साथी को घूमने जाने की अनुमति दे, इसके लिए हमसब साथी आपका सदा आभारी रहेंगे।

आपका आज्ञाकारी छात्र
राकेश कुमार सिंह
वग-12, क्रमांक-6

अथवा,

सेवा में,
श्रीमान् शाखा प्रबन्धक महोदय
भारतीय स्टेट बैंक, पकड़ी, आरा (बिहार)
विषय : A.T.M. कार्ड निर्गत करवाने हेतु
महाशय,

सविनय निवेदन है कि मैं शान्तनु कुमार दूबे पिता श्री राजेन्द्र दूबे, आपके शाखा का ग्राहक हूँ। मुझे आवश्यक कार्य से A.T.M. की आवश्यकता है।

अत: श्रीमान् से निवेदन है कि मुझे A.T.M. कार्ड निर्गत करने की कृपा करें।

इसके लिए मैं आपका सदा आभारी रहूँगा।

आपका विश्वासी ग्राहक
नाम : शान्तनु दूबे
दिनांक : 04.02.2024 पिता : राजेन्द्र दूबे
खाता नं॰ 0009888488
ग्राम+पो॰ पकड़ी

4. (i) 'सिपाही की माँ' शीर्षक एकांकी में मानक एक फौजी है। वह बर्मा में हिन्दु फौज की ओर से जापानी सेना से युद्ध कर रहा है। मानक और दुश्मन सिपाही एक-दूसरे से लड़ते हुए वहाँ पहुँच जाता है। मानक की माँ मानक को बचाना चाहती है। इसपर दुश्मन सिपाही मानक को बहशी और जानवर पुकारता है। मानक का पौरुष जाग उठता है तो अस्वस्थता में भी वह खड़ा होकर सिपाही को मारने का प्रयास करता है और क्रोध की स्थिति में वह स्वयं को बहशी और जानवर से भी बढ़कर कहता है। मानक का ऐसा कहना अति नहीं है। समय और परिस्थिति के अनुसार उसका यह कहना यथार्थ है।

(ii) मेधा वह शक्ति है जिससे मनुष्य सिद्धांतों की अनुपस्थिति में निर्भयतापूर्वक सोचता है ताकि वह सत्य और यथार्थ को समझ सकें यदि मनुष्य भयभीत रहता है तो कभी मेधावी नहीं हो सकता। किसी भी प्रकार की महत्त्वाकांक्षा चाहे आध्यात्मिक हो या सांसारिक चिन्ता और भय का निर्माण करती है। जबकि निर्भीक वातावरण में मेधा का जन्म होता है। इसलिए जहाँ भय है वहाँ मेधा नहीं हो सकती।

(iii) लेखक कविता के मूड में जब डायरी लिखते हैं तो शब्द और अर्थ के मध्य की दूरी अनिर्धारित हो जाती है। शब्द अर्थ में और अर्थ शब्द में बदलते चले जाते हैं, एक-दूसरे को पकड़ते-छोड़ते हुए। शब्द और अर्थ का जब साथ नहीं होता तो वह आकाश होता है जिसमें रचनाएँ बिजली के फूल की तरह खिल उठती हैं। किन्तु जब इनका साथ होता है तो वह धरती का क्षण होती है और उसमें रचनाएँ जड़ पा लेती हैं। प्रस्फुटन का आदि स्रोत पा जाती हैं। अत: यह कहना उचित है कि शब्द और अर्थ दोनों एक-दूसरे के पूरक हैं।

(iv) प्यार का इशारा और क्रोध का दुधारा से कवि का तात्पर्य यह है कि चाहे वह यानी जनता जिस देश में निवास करती हो, उनके प्यार की इशारा यानी मानवतावादी दृष्टिकोण एक होता है, उसमें किसी प्रकार का बदलाव नहीं होता, ठीक उसी प्रकार जब शोषक वर्ग के खिलाफ क्रोध की धारा उबल पड़ती है तो वह दो नहीं, बल्कि एक समान नजर आती है।

(v) घनघोर कोलाहल, अशांति और कलह के बीच हृदय की बात का कार्य मस्तिष्क को शांति पहुँचाना, उसे आराम देना है। मस्तिष्क जब विचारों के कोलाहल से घिर जाता है तो हृदय की बात उसे आराम देती है। हृदय कोमल भावनाओं का प्रतीक है जो मस्तिष्क को विचारों के कोलाहल से दूर करता है। इस प्रकार कवि को अशांतिपूर्ण वातावरण में भी उज्ज्वल भविष्य सहज ही दृष्टिगोचर होता है।

(vi) तुलसीदास जी ने अपने ग्रंथ 'विनयपत्रिका' में अपने दुर्गुणों का वर्णन किया है। इस ग्रंथ में उन्होंने अपनी विनम्रता और आत्म-निंदा के भाव को प्रकट करते हुए अपने अहंकार, मोह, लोभ और अज्ञानता जैसे दुर्गुणों का उल्लेख किया है। वे इन दुर्गुणों को त्यागने और भगवान की भक्ति में लीन होने की प्रार्थना करते हैं। तुलसीदास जी का आत्म-निरीक्षण और विनम्रता उनकी आध्यात्मिक गहराई और भक्ति को दर्शाता है।

(vii) भगत सिंह के अनुसार कष्ट सहकर एक विशिष्ट और सर्वव्यापी आन्दोलन करना महान कार्य है। विवृत्तियों, दु:खों, कष्टों और चिन्ताओं का सहन करते हुए देश के लिए शहीद हो जाना अर्थात् मृत्यु को वरण करना एक 'सुन्दर मृत्यु' है।

विपत्तियाँ मनुष्य को पूर्ण बनाने वाली होती हैं। उससे विचलित नहीं होना चाहिए। उन्हें धैर्यपूर्वक उस दिन की प्रतीक्षा करनी चाहिए जिस दिन हमारी कुर्बानी फलीभूत होगी। हमें शहादत को गले लगाना चाहिए। वह दिन हमारे लिए अत्यन्त गौरवशाली एवं महत्वपूर्ण होगा जिस दिन हमें मृत्युदण्ड दिया जाएगा। ऐसी 'मृत्यु' सुन्दर होगी।

आत्महत्या पलायनवाद है। यदि हम अपने संकल्प से विचलित हो जाते हैं अपने असफलताओं से निराश हो जाते हैं तथा आत्महत्या कर लेते हैं, तो यह हमारी कायरता कही जाएगी। भगत सिंह सदैव यही समझते थे कि वह बहुत कम समय के भीतर मर जाएँगे, क्योंकि स्वतंत्रता-संग्राम के संघर्ष में उन्होंने अपनी सम्पूर्ण ऊर्जा झोंक दी थी, राष्ट्रभक्ति का जज्बा उनकी रग-रग में व्याप्त था। अत: उनका यह सोचना स्वाभाविक था कि उनकी मृत्यु कम समय में ही हो जायेगी। वे आत्महत्या कायर व्यक्तियों का कार्य मानते रहे। अत: उनके विचार में यदि हम मरने से डरते नहीं तो हँसते-हँसते देश-सेवा में शूली पर चढ़कर मृत्यु का वरण करना चाहिए, यही हमारा आदर्श आत्मोसर्ग होगा। भगत सिंह के शब्दों में—"विपत्तियों से बचने के लिए आत्महत्या कर लेने से जनता का मार्गदर्शन नहीं होगा। वरन् यह तो एक प्रतिक्रियावादी कार्य होगा।"

(viii) कबीर विषयक छप्पय में नाभादास ने कबीर के बारे में कहा कि भक्ति विमुख तथाकथित धर्मों की धज्जी उड़ा दी है। उन्होंने वास्तविक धर्म को स्पष्ट करते हुए योग, यज्ञ, व्रत, दन और भजन के महत्त्व का बार-बार प्रतिपादन किया है। उन्होंने अपनी सबदी साखियों और रैमनी में क्या हिन्दू और क्या तुर्क सबके प्रति आदर भाव व्यक्त किया है। कबीर के वचनों में पक्षपात नहीं है। उनमें लोक मंगल की भावना है। कबीर मुँह देखली बात नहीं करते। उन्होंने वर्णाश्रम के पोषक षट-दर्शनों की दुर्बलताओं को तार-तार करके दिखा दिया है।

(ix) लेखिका के पति अंग्रेजी सरकार द्वारा जब्त 'कुली प्रथा और गुलामी का नशा' नामक नाटकों के लेखक एक प्रसिद्ध पत्रकार, अच्छे स्वतंत्रता सेनानी और कांग्रेस के सक्रिय नेता थे।

(x) 'नदियों की वेदना' जिंदगी की धारा के प्रतीक के रूप में प्रयुक्त हुआ है। नदी की धारा स्वच्छ, निर्मल, कलख करती हुई प्रवाहित होती है, वह अपने साथ नये जीवन संचार को प्रवाहित करती चलती है। लेकिन जन-शोषक अर्थात् पूँजीवादी व्यवस्था के कारण सामान्य जनता में स्वच्छ निर्मल, कोमल जीवन का संचार नहीं हो पा रहा है। जनता इस व्यवस्था से आक्रांत है, त्रस्त है। इस प्रकार कहा जा सकता है कि नदियों की वेदना का कारण सामान्य जनता का दु:ख दर्द एवं संताप है।

5. (i) बेन जॉनसन के अनुसार बोलने से ही मनुष्य के रूप का साक्षात्कार होता है। वास्तव में जबकि मनुष्य बोलता नहीं तबतक उसका गुण-दोष प्रकट नहीं होता।

एडीसन के अनुसार असल बातचीत केवल दो व्यक्तियों में हो सकती है। कहने का तात्पर्य यह है कि जब दो आदमी होते हैं तभी अपना दिल एक-दूसरे के सामने खोलते हैं।

तीसरे व्यक्ति की उपस्थिति मात्र से ही बातचीत की धारा बदल जाती है। जब चार आदमी हुए तो बेतकल्लुफी का स्थान फॉर्मलिटी ले लेती है। अर्थात् बातचीत सारगर्भित न होकर मात्र रस्म अदायगी भर रह जाती है।

(ii) **'सम्पूर्ण क्रांति'** शीर्षक अंश 5 जून 1974 के पटना के गाँधी मैदान में दिये गए जयप्रकाश नारायण के भाषण का एक अंश है। सम्पूर्ण भाषण स्वतंत्र पुस्तिका के रूप में 'जन्ममुक्ति' पटना से प्रकाशित है। इनका भाषण सम्पूर्ण जनता मंत्रमुग्ध होकर सुनती रही। भाषण के बाद लोगों के हृदय में क्रांतिकारी विचार धधक उठे और आंदोलन ने विराट रूप धारण कर लिया। पटना के गाँधी मैदान में फिर न वैसी भीड़ इकट्ठी हुई और न वैसा कोई प्रेरक भाषण हुआ।

अपने भाषण के प्रारम्भ में जयप्रकाश नारायण ने युवाओं को संकेत देते हुए कहा है कि हमें स्वराज तो मिल गया है, लेकिन सुशासन के लिए हमें अभी काफी संघर्ष करने होंगे। भाषण के क्रम में उन्होंने नेहरू जी का उदाहरण दिया। नेहरूजी कहते थे कि सुशासन के लिए देश की जनता को अभी मीलों जाना है। कठिन परिश्रम करने हैं, त्याग करने हैं। जेपी ने कहा कि अभी समाज में भूख, महँगाई, भ्रष्टाचार जैसे दानव वर्तमान हैं। उनसे हमें लड़ना होगा, आन्दोलन करना होगा। इसके लिए जनता को तैयार रहना होगा।

आन्दोलन को सफल बनाने हेतु उन्होंने युवाओं को आगे आकर नेतृत्व करने की सलाह दी। उन्होंने **'यूथ फॉर डेमोक्रेसी'** का आह्वान किया। लोगों के आग्रह पर उन्होंने आन्दोलन के नेतृत्व का दायित्व अपने कंधे पर ले लिया। उन्होंने **जनसंघर्ष समितियों** का गठन किया।

जेपी ने अपने भाषण में अमेरिका प्रवास की बात कही है। अमेरिका में वे मजदूरी करके पढ़ते थे। पढ़ाई के क्रम में वे घोर कम्युनिस्ट बन गये। जमाना लेनिन का था। अत: वे लेनिन के विचारों से प्रभावित थे। लेनिन के मरने के बाद वे घोर मार्क्सवादी बन गये। अमेरिका से लौटकर वे कांग्रेस में दाखिल हो गये। वे कम्युनिस्ट पार्टी में क्यों नहीं गये, इसका कारण उन्होंने देश की गुलामी माना।

भाषण के क्रम में वे बापू एवं जवाहरलाल नेहरू की प्रशंसा करते थे। वे गाँधीजी का विरोध भी करते थे क्योंकि वे घोर कम्यूनिस्ट जो थे। नेहरू जी को वे 'भाई' कहा करते थे। अपने भाषण में वे नेहरू की विदेश नीति के विरोध की चर्चा करते हैं। राष्ट्रीय नीति पर उनका नेहरूजी से कोई मतभेद नहीं था। भाषण के क्रम में उन्होंने दल विहीन लोकतंत्र की चर्चा की है, लेकिन जेपी आन्दोलन में वे दलविहीन लोकतंत्र की घोषणा नहीं करना चाहते थे। वे जनता की भावनाओं के विरूद्ध जाना नहीं चाहते थे। भाषण के क्रम में केवल उन्होंने मार्क्सवाद की चर्चा की है।

अपने ऐतिहासिक भाषण में उन्होंने स्पष्ट कर दिया था कि वे सम्पूर्ण क्रांति चाहते हैं। इस सम्पूर्ण क्रांति को लाने में जनसंघर्ष समितियों की भूमिका की चर्चा उन्होंने अपने भाषण में की है। ये संघर्ष समितियाँ स्थायी रूप से कार्य करेंगी। साथ ही ये समितियाँ केवल लोकतंत्र के लिए ही नहीं बल्कि सामाजिक, आर्थिक एवं नैतिक क्रांति के लिए अथवा सम्पूर्ण क्रांति के लिए कार्य करेगी।

(iii) प्रस्तुत कहानी 'रोज' की मालती मुख्य पात्र तथा नायिका है। बचपन में यह बंधनों से परे उन्मुक्त और स्वच्छंद रहकर चंचल हिरणी के समान फुदकती रहती है। उसका रूप-लावण्य बरबस ही लोगों को आकर्षित करता है। महज चार-पाँच वर्षों के अन्तराल में ही विवाहिता है, एक बच्चे की माँ भी है। उसके जीवन में मूलभूत परिवर्तन सहज ही दृष्टिगोचर होता है। वह वक्त के साथ समझौता करनेवाली कुशल गृहिणी तथा वात्सल्य की वाटिका है। धर्मपरायण नारी के कर्तव्य को निभाते हुए वह पति के खाना खाने के बाद ही खाना खाती है। चार साल पहले मालती उद्धत और चंचल थी। विवाहोपरान्त उसने अपने जीवन को झंझावत बना लिया है। उसका शरीर जीर्ण-शीर्ण होकर कान्तिविहिन हो गया है। यह शांति और सीधी बन गई है। वह अपने जीवन को परिवार की धुरी पर नाचने के लिए छोड़ देती है। मालती भारतीय मध्यवर्गीय समाज की घरेलू स्त्री के जीवन और मनोदशा का सजीव प्रतीक है।

(iv) जागिए, ब्रजराज कुँवर, कँवल-कुसुम फूले।
कुमुद-वृंद संकुचित भए, भृंग लता भूले।
तुमचुर, खग-रोर सुनहु बोलत बनराई।
राँभति गो खरिकनि में बछरा हित धाई।
बिधु-मलीन रवि प्रकास गावत नर-नारी।
सूर-स्याम प्रात उठी, अंबुज-कर-धारी।।

भावार्थ—प्रस्तुत पद हमारी पाठ्य पुस्तक दिगंत-भाग 2 के 'पद' शीर्षक कविता से उद्धृत है। इसके रचयिता वात्सल्य रस के अनन्य कवि सूरदास है। नींद में सोए हुए बालक कृष्ण को जगाए जाने का रोचक वर्णन इस पद में है। उक्त पद में दुलार भरे कोमल-मधुर स्वर में सोए हुए बालक कृष्ण को भोर होने पर जगाया जा रहा है। -हे ब्रजराज् भोर हो रही है, जागिए-कमल के फूल खिल उठे हैं, कुमुद के पुष्पों ने अपनी पँखुड़ियों को समेट लिया है। भौंरे लताओं में छिप से गए हैं। मुर्गों एवं अन्य पक्षियों का कोलाहल सुनाई दे रहा है। वनराज! (वन के वृक्ष) आवाज दे रहे हैं। बाड़ों (गौशालाओं) में गाएँ बोल रही हैं तथा बछड़ों को दूध पिलाने के लिए दौड़ी आ रही है। चन्द्रमा का प्रकाश क्षीण हो चुका है और सूर्य का प्रकाश (किरणें) फैला रहा है। नर और नारी भजन कीर्तन कर रहे हैं। हे कृष्ण! हे श्याम! अब जागिए, सबेरा हो गया है।

इस प्रकार उपर्युक्त 'पद' में कवि बालक कृष्ण को प्रात:काल के समय नींद से जगाने का अत्यंत रोचक वर्णन कर रहे हैं। प्रात:काल की रमणीक स्वाभाविक एवं सजीव वर्णन इन शक्तियों में वर्णित है। भोर हो रही है, कमल के फूल खिल उठे हैं, कुमुद के पुष्पों ने अपनी पंखुड़ियों को समेट लिया है। भौंरे लताओं में छिप से ग हैं, आदि वर्णन बालक कृष्ण को जगाने के क्रम में भक्तिधारा के महान कवि द्वारा अत्यन्त रोचक तथा मनोवैज्ञानिक ढंग से प्रस्तुत किया गया है। प्रकृति का स्वाभाविक तथा युक्तियुक्त चित्रण सराहनीय है। कविता में अलंकारों का पर्याप्त समावेश है।

(v) नई हिन्दी कविता के चर्चित कवि शमशेर बहादुर सिंह रचित एक बहुचर्चित प्राकृतिक सौन्दर्य-परक कविता है। इस कविता में कवि ने सूर्योदय के पूर्व के उषाकालीन आकाशीय स्वरूप और सौन्दर्य का बड़ा ही काव्यात्मक चित्रण विविध उपमानों के माध्यम से क्रिया है।

सूर्योदय के पूर्व का काल उषाकाल कहलाता है। उस समय आकाश बिलकुल नीला और स्वच्छ रहता है। उसकी नीलिमा के बीच आनेवाला उजाला हल्के रूप में झाँकता-सा नजर आता है। प्रात:काल की उस बेला में आकाश नीली राख सा लगता है। इसके अलंकार के आवरण में ढँके रहने के कारण संपूर्ण व्योमपट्ट राख से लीपे हुए गीले चौके के समान है। फिर, धीरे-धीरे बालारुण की हल्की लालिम की झलक उभरने लगती है। तब उसका स्वरूप कुछ बदल-सा जाता है और उस समय आकाश को देखकर ऐसा लगता है कि आकाश वह काली सिल हो जो जरा-सा लाल केसर से धुली हुई हो या वैसी स्लेट हो जिसपर खड़िया चाक मल दी गई हो। कविता में कवि ने उषाकालीन आकाश के प्राकृतिक सौन्दर्य का प्रभावपूर्ण रूप से प्रस्तुत करने के लिए अंतिम उपमान की चर्चा करते हुए कहा है कि इस समय आकाश के वक्ष पर उषाकालीन दृश्य नीले जल में झिलमिलाती गोरी काया के समान लगता है।

इसी परिवेश में सूर्योदय होता है। फिर, सूर्य की प्रकाश-किरणें विकीर्ण होने लगती है और आकाश की गोद में चल रहा उषा का यह जादू और उसका नजारा सब समाप्त हो जाता है।

कवि ने यहाँ प्रकृति-सौन्दर्य के चित्रण के लिए उपमानों का चयन किया है। इससे कवि की भाव-व्यंजना में नवनिखार एवं नवसौंदर्य आ गया है। कवि द्वारा प्रस्तुत यह कृति-सौन्दर्य-चित्र बड़ा ही प्रभावपूर्ण हो गया है।

(vi) 'क्लर्क की मौत' शीर्षक कहानी के रचयिता अंतोन चेखव (1860–1904) है। 'चेखव' एक अतुलनीय कलाकार है। निश्चित रूप से अद्वितीय है। वह जीवन के कलाकार हैं। उनकी रचनाओं का गुण यह है कि वह बोधगम्य और भावनाओं के निकट हैं, न केवल प्रत्येक रूसी के लिए बल्कि प्रत्येक मानव के लिए . ...।' 'क्लर्क की मौत' शीर्षक कहानी में छींक की घटना ने क्लर्क की जान ले ली। वह पश्चाताप के कारण मर गया। क्लर्क जिसका नाम इवान दमित्रिच मात्रिच चेख्यकोव था, एक खेल देख रहा था। वह अपने को सबसे सुखी मनुष्य समझ रहा था।

जिन्दगी अचम्भों से भरी है। उसे एकाएक छींक आ गयी। यूँ तो हर किसी को जहाँ चाहे छींकने का हक हैं हर कोई छींकता है। चेख्यकोव को इससे कोई झेप नहीं लगी, रूमाल से उसने अपनी नाक पोछी और एक शिष्ट व्यक्ति होते हुए अपने चारों तरफ देखा कि कहीं उसकी छींक से किसी को असुविधा तो नहीं हुई? और तभी वह सचमुच झेप गया क्योंकि उसने एक वृद्ध व्यक्ति को पहली पंक्ति में अपने ठीक आगे बैठा हुआ देखा जो अपनी गंजी खोपड़ी और गरदन को दस्ताने से पोंछ रहा था और कुछ बड़बड़ाता जा रहा था। चेख्यकोव ने उस बूढ़े को पहचान लिया कि वह यातायात मंत्रालय के सिविल जनरल ब्रिजालोव है। वह उसके अफसर नहीं है। यह सही है, किन्तु तब भी यह कितना भद्दा है। क्लर्क चेख्यकोव ने सोचा कि उसे माफी माँगनी चाहिए। चेख्यकोव ने ब्रिजालोव से काफी माँगी-'मै। क्षमाप्रार्थी हूँ, महानुभाव, मैं छींका था।'' ब्रिजालोव ने उत्तर दिया-''अजी कोई बात नहीं।'' फिर क्लर्क ने कहा-''कृपया मुझे क्षमा कर दें। मैं जान-बूझकर नहीं छींका।'' ब्रिजलोव कुछ नाराज हुए-''क्या तुम चुप नहीं रह सकते?''

कुछ घबड़ाया हुआ चेख्यकोव झेप में मुस्कुराया और खेल की तरफ मन लगाने की कोशिश की। वह खेल देख रहा था। किंतु उसे आनन्द नहीं आ रहा था। बेचैनी उसका पीछा नहीं छोड़ रही थी। मध्यांतर में वह ब्रिजालोव के पास पहुँचा, थोड़ी देर के लिए उनके आसपास घूमा-फिरा और फिर साहस बटोरकर भिनभिनाया-'हुजूर! मैंने आपके ऊपर छींक दिया। मुझे क्षमा करें।'' जनरल को थोड़ा गुस्सा आया-''अरे बस! मैं तो यह भूल भी गया था, छोड़ो अब इस बात को।''

चेख्यकोव ने जनरल की ओर संदेह की नजरों से देखते हुए सोचा-कहते हैं कि भूल गए हैं, लेकिन आँखों में विद्वेष भरा है और बात नहीं करना चाहते।

घर पहुँचकर क्लर्क चेख्यकोव ने अपनी पत्नी को अपने अभद्र व्यवहार के बारे में बताया। उसने भी इस घटना को गम्भीरता से नहीं लिया।

अगले दिन क्लर्क चेख्यकोव ने नई वर्दी पहनी, बाल कटवाए और जनरल ब्रिजालोव से माफी मांगने गया-''हुजूर, कल रात, ''आर्केडिया'' में मुझे छींक आ गई थी।'' जनरल ने कोई ध्यान नहीं दिया। फिर निजी कमरे में जब जनरल जा रहा था तो क्लर्क न कहा हुजूर मुझे माफ कर दें। हार्दिक पश्चाताप होने के कारण ही मैं आपको कष्ट देने का दुस्साहस कर पा रहा हूँ।''

जनरल ने रूऑंसा चेहरा बनाया, हाथ हिलाया और कहा—''तुम तो मेरा मजाक उड़ा रहे हो, जनाब!''

फिर भेंट होने पर जनरल ने क्लर्क को डाँटा—''निकल जाओ यहाँ से।''

क्लर्क चेख्यकोव को लगा जैसे उसके भीतर कुछ छुट सा गया हो लड़खड़ाते हुए पीछे चलकर वह दरवाजे तक पहुँचा, दरवाजे से बाहर आया और सड़क पर चलने लगा। वह न कुछ देख रहा था, न कुछ सुन रहा था। वह संज्ञाशून्य, यंत्रचालित-सा वह सड़क पर बढ़ता गया। घर पहुँचकर वह बिना वर्दी उतारे, जैसा का तैसा, सोफे पर लेट गया और मर गया। 'क्लर्क की मौत' क्लर्क की मौत के कारण एक अत्यन्त कारुणिक कहानी बन गयी है।

6. (i) शीर्षक : अँग्रेजी पढ़ने का महत्त्व

अंग्रेजी पढ़ना बुरा नहीं है, परन्तु इसके द्वारा अपनी संस्कृति, भाषा और देश को भुला देना गलत है। आलोचना का विषय यह है कि कुछ शिक्षित लोग अपने देश की संस्कृति और परंपराओं को हेय दृष्टि से देखते हैं। विशेषकार, पर्वों और त्योहारों को वे अंधविश्वास और फिजूलखर्जी मानते हैं, जो मानव विकास के लिए बाधक हैं।

मूल शब्द : 112 संक्षेपण : 57

(ii) शीर्षक : चुनाव व्यवसाय और झूठे वादे

आज चुनाव एक व्यापार बन गया है। आज राजनेता विभिन्न आकर्षक और अवास्तविक वादे करते हैं, जैसे कि गरीबी हटाना, बेरोजगारी खत्म करना, सड़कें और स्कूल बनवाना, नौकरियाँ दिलाना और आरक्षण लागू करना, लेकिन अक्सर ये वादे खोखले होते हैं। इन वादों की अवास्तविकता के कारण मतदाताओं की आस्था धीरे-धीरे कम हो रही है।

मूल शब्द : 81 संक्षेपण : 54

❑ ❑ ❑