SUBJECT : PHYSICS	DAY – 2
SESSION : MORNING	TIME : 10.30 A.M. TO 11.50 A.M.

MAXIMUM MARKS	TOTAL DURATION	MAXIMUM TIME FOR ANSWERING
60	80 MINUTES	70 MINUTES

MENTION YOUR CET NUMBER					QUESTION BOOKLET DETAILS	
					VERSION CODE	SERIAL NUMBER
					A - 1	470465

DOs :

1. Check whether the CET No. has been entered and shaded in the respective circles on the OMR answer sheet.
2. This Question Booklet is issued to you by the invigilator after the **2nd Bell i.e., after 10.30 a.m.**
3. The Serial Number of this question booklet should be entered on the OMR answer sheet.
4. The Version Code of this question booklet should be entered on the OMR answer sheet and the respective circles should also be shaded completely.
5. Compulsorily sign at the bottom portion of the OMR answer sheet in the space provided.

DON'TS :

1. **THE TIMING AND MARKS PRINTED ON THE OMR ANSWER SHEET SHOULD NOT BE DAMAGED / MUTILATED / SPOILED.**
2. The **3rd Bell rings at 10.40 a.m., till then:**
   - Do not remove the paper seal present on the right hand side of this question booklet.
   - Do not look inside this question booklet.
   - Do not start answering on the OMR answer sheet.

IMPORTANT INSTRUCTIONS TO CANDIDATES

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3. During the subsequent 70 minutes:
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   - Choose the correct answer from out of the four available distracters (options / choices) given under each question statement.
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5. Use the space provided on each page of the question booklet for Rough Work. Do not use the OMR answer sheet for the same.
6. After the **last bell is rung at 11.50 a.m.,** stop writing on the OMR answer sheet and affix your LEFT HAND THUMB IMPRESSION on the OMR answer sheet as per the instructions.
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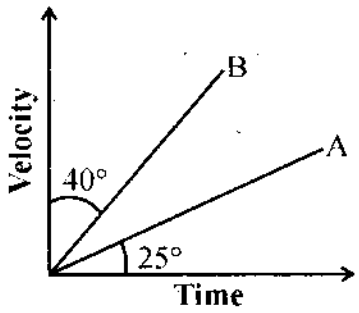
8. After separating the top sheet (Our Copy), the invigilator will return the bottom sheet replica (Candidate's copy) to you to carry home for self-evaluation.
9. Preserve the replica of the OMR answer sheet for a minimum period of ONE year.

1. The ratio of the dimensions of Planck constant and that of moment of inertia has the dimensions of

(1) time (2) frequency

(3) angular momentum (4) velocity

2. The velocity – time graph for two bodies A and B are shown. Then the acceleration of A and B are in the ratio



(1) tan 25° to tan 40° (2) tan 25° to tan 50°

(3) sin 25° to sin 50° (4) cos 25° to cos 50°

3. A particle is projected with a velocity v so that its horizontal range twice the greatest height attained. The horizontal range is

(1) $\frac{v^2}{g}$ (2) $\frac{2v^2}{3g}$

(3) $\frac{4v^2}{5g}$ (4) $\frac{v^2}{2g}$

Space For Rough Work

4. A stone of mass 0.05 kg is thrown vertically upwards. What is the direction and magnitude of net force on the stone during its upward motion ?

(1) 0.49 N vertically upwards

(2) 0.49 N vertically downwards

(3) 0.98 N vertically downwards

(4) 9.8 N vertically downwards

5. The kinetic energy of a body of mass 4 kg and momentum 6 Ns will be

(1) 2.5 J (2) 3.5 J

(3) 4.5 J (4) 5.5 J

6. The ratio of angular speed of a second-hand to the hour-hand of a watch is

(1) 720 : 1 (2) 60 : 1

(3) 3600 : 1 (4) 72 : 1

7. If the mass of a body is M on the surface of the earth, the mass of the same body on the surface of the moon is

(1) M/6 (2) M

(3) 6 M (4) Zero

8. Moment of Inertia of a thin uniform rod rotating about the perpendicular axis passing through its centre is I. If the same rod is bent into a ring and its moment of inertia about its diameter is I', then the ratio $\frac{I}{I'}$ is

(1) $3/2\ \pi^2$ (2) $8/3\ \pi^2$

(3) $2/3\ \pi^2$ (4) $5/3\ \pi^2$

Space For Rough Work

9. The ratio of hydraulic stress to the corresponding strain is known as

(1) Compressibility (2) Bulk modulus

(3) Young's modulus (4) Rigidity modulus

10. The efficiency of a Carnot engine which operates between the two temperatures $T_1 = 500$ K and $T_2 = 300$ K is

(1) 50% (2) 25%

(3) 75% (4) 40%

11. Water is heated from 0 °C to 10 °C, then its volume

(1) decreases

(2) increases

(3) does not change

(4) first decreases and then increases

12. 1 gram of ice is mixed with 1 gram of steam. At thermal equilibrium, the temperature of the mixture is

(1) 0 °C (2) 100 °C

(3) 50 °C (4) 55 °C

13. The ratio of kinetic energy to the potential energy of a particle executing SHM at a distance equal to half its amplitude, the distance being measured from its equilibrium position is

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

(3) 2 : 1 (4) 8 : 1

Space For Rough Work

14. When two tuning forks A and B are sounded together, 4 beats per second are heard. The frequency of the fork B is 384 Hz. When one of the prongs of the fork A is filed and sounded with B, the beat frequency increases, then the frequency of the fork A is

(1) 380 Hz (2) 388 Hz

(3) 379 Hz (4) 389 Hz

15. A stretched string is vibrating in the second overtone, then the number of nodes and antinodes between the ends of the string are respectively

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

(3) 3 and 4 (4) 2 and 3

16. Two spheres carrying charges + 6 μC and + 9 μC, separated by a distance d, experiences a force of repulsion F. When a charge of –3 μC is given to both the sphere and kept at the same distance as before, the new force of repulsion is

(1) F (2) 3F

(3) F/3 (4) F/9

17. Pick out the statement which is incorrect.

(1) The tangent drawn to a line of force represents the direction of electric field.

(2) The electric field lines forms closed loop.

(3) A negative test charge experiences a force opposite to the direction of the field.

(4) Field lines never intersect.

18. The angle between the dipole moment and electric field at any point on the equatorial plane is

(1) 0° (2) 90°

(3) 180° (4) 45°

Space For Rough Work

19. Three point charges 3nC, 6nC and 9nC are placed at the corners of an equilateral triangle of side 0.1 m. The potential energy of the system is

(1) 8910 J (2) 89100 J

(3) 9910 J (4) 99100 J

20. A spherical shell of radius 10 cm is carrying a charge q. If the electric potential at distances 5 cm, 10 cm and 15 cm from the centre of the spherical shell is V_1, V_2 and V_3 respectively, then

(1) $V_1 > V_2 > V_3$ (2) $V_1 < V_2 < V_3$

(3) $V_1 = V_2 > V_3$ (4) $V_1 = V_2 < V_3$

21. A parallel plate capacitor is charged and then isolated. The effect of increasing the plate separation on charge, potential and capacitance respectively are

(1) constant, decreases, decreases

(2) increases, decreases, decreases

(3) constant, decreases, increases

(4) constant, increases, decreases

22. Four identical cells of emf E and internal resistance r are to be connected in series. Suppose if one of the cell is connected wrongly, the equivalent emf and effective internal resistance of the combination is

(1) 4E and 4r (2) 4E and 2r

(3) 2E and 4r (4) 2E and 2r

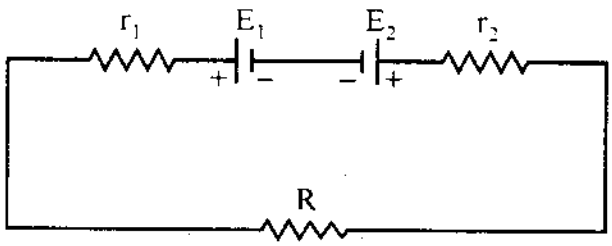
23. Three resistances 2Ω, 3Ω and 4Ω are connected in parallel. The ratio of currents passing through them when a potential difference is applied across its ends will be

(1) 6 : 3 : 2 (2) 6 : 4 : 3

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

Space For Rough Work

24. Two cells of emf E_1 and E_2 are joined in opposition (such that $E_1 > E_2$). If r_1 and r_2 be the internal resistance and R be the external resistance, then the terminal potential difference is



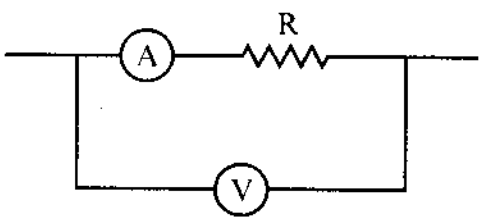
(1) $\frac{E_1 + E_2}{r_1 + r_2} \times R$

(2) $\frac{E_1 + E_2}{r_1 + r_2 + R} \times R$

(3) $\frac{E_1 - E_2}{r_1 + r_2} \times R$

(4) $\frac{E_1 - E_2}{r_1 + r_2 + R} \times R$

25. In the circuit shown below, the ammeter and the voltmeter readings are 3 A and 6 V respectively. Then the value of the resistance R is



(1) $2\ \Omega$

(2) $> 2\ \Omega$

(3) $< 2\ \Omega$

(4) $\geq 2\ \Omega$

Space For Rough Work

26. In Wheatstones network P = 2 Ω, Q = 2 Ω, R = 2 Ω and S = 3 Ω. The resistance with which S is to shunted in order that the bridge may be balanced is

(1) 1 Ω (2) 2 Ω

(3) 4 Ω (4) 6 Ω

27. The resistance of the bulb filament is 100 Ω at a temperature of 100 °C. If its temperature co-efficient of resistance be 0.005 per °C, its resistance will become 200 Ω at a temperature

(1) 300 °C (2) 400 °C

(3) 500 °C (4) 200 °C

28. Two concentric coils each of radius equal to 2 π cm are placed right angles to each other. If 3A and 4A are the currents flowing through the two coils respectively. The magnetic induction (in Wb m^{-2}) at the centre of the coils will be

(1) 12×10^{-5} (2) 10^{-5}

(3) 5×10^{-5} (4) 7×10^{-5}

29. A proton beam enters a magnetic field of 10^{-4} Wb m^{-2} normally. If the specific charge of the proton is 10^{11} C kg^{-1} and its velocity is 10^{9} ms^{-1}, then the radius of the circle described will be

(1) 0.1 m (2) 10 m

(3) 100 m (4) 1 m

Space For Rough Work

30. A cyclotron is used to accelerate

(1) neutron

(2) only positively charged particles

(3) only negatively charged particles

(4) both positively and negatively charged particles

31. A galvanometer of resistance 50 Ω gives a full scale deflection for a current 5×10^{-4} A. The resistance that should be connected in series with the galvanometer to read 3 V is

(1) 595 Ω (2) 5050 Ω

(3) 5059 Ω (4) 5950 Ω

32. Two parallel wires 1 m apart carry currents of 1 A and 3 A respectively in opposite directions. The force per unit length acting between these two wires is

(1) 6×10^{-7} Nm^{-1} repulsive (2) 6×10^{-7} Nm^{-1} attractive

(3) 6×10^{-5} Nm^{-1} repulsive (4) 6×10^{-5} Nm^{-1} attractive

33. If there is no torsion in the suspension thread, then the time period of a magnet executing SHM is

(1) $T = \frac{1}{2\pi}\sqrt{\frac{MB}{I}}$ (2) $T = \frac{1}{2\pi}\sqrt{\frac{I}{MB}}$

(3) $T = 2\pi\sqrt{\frac{I}{MB}}$ (4) $T = 2\pi\sqrt{\frac{MB}{I}}$

34. Core of electromagnets are made of ferromagnetic material which has

(1) high permeability and low retentivity

(2) high permeability and high retentivity

(3) low permeability and high retentivity

(4) low permeability and low retentivity

Space For Rough Work

35. The magnetic susceptibility of a paramagnetic material at –73 °C is 0.0075 and its value at – 173 °C will be

(1) 0.0045 (2) 0.0030

(3) 0.015 (4) 0.0075

36. Two coils have a mutual inductance 0.005 H. The current changes in the first coil according to the equation $i = i_m \sin \omega t$ where $i_m = 10$ A and $\omega = 100\ \pi$ rad s^{-1}. The maximum value of the emf induced in the second coil is

(1) 2π (2) 5π

(3) π (4) 4π

37. An aircraft with a wingspan of 40 m flies with a speed of 1080 km/hr in the eastward direction at a constant altitude in the northern hemisphere, where the vertical component of the earth's magnetic field 1.75×10^{-5} T. Then the emf developed between the tips of the wings is

(1) 0.5 V (2) 0.34 V

(3) 0.21 V (4) 2.1 V

38. In an LCR circuit, at resonance

(1) the current and voltage are in phase

(2) the impedance is maximum

(3) the current is minimum

(4) the current leads the voltage by $\pi/2$

39. A transformer is used to light 100 W – 110 V lamp from 220 V mains. If the main current is 0.5 A, the efficiency of the transformer is

(1) 90% (2) 95%

(3) 96% (4) 99%

Space For Rough Work

40. The average power dissipated in a pure inductor is

(1) $\frac{1}{2}$ VI (2) VI^2

(3) $\frac{VI^2}{4}$ (4) zero

41. If ε_0 and μ_0 are the permittivity and permeability of free space and ε and μ are the corresponding quantities for a medium, then refractive index of the medium is

(1) $\sqrt{\frac{\mu_0\varepsilon_0}{\mu\,\varepsilon}}$ (2) $\sqrt{\frac{\mu\,\varepsilon}{\mu_0\varepsilon_0}}$

(3) 1 (4) Insufficient information

42. A person wants a real image of his own, 3 times enlarged. Where should he stand infront of a concave mirror of radius of curvature 30 cm ?

(1) 10 cm (2) 30 cm

(3) 90 cm (4) 20 cm

43. Calculate the focal length of a reading glass of a person if his distance of distinct vision is 75 cm.

(1) 25.6 cm (2) 37.5 cm

(3) 75.2 cm (4) 100.4 cm

44. In a Young's double slit experiment the slit separation is 0.5 m from the slits. For a monochromatic light of wavelength 500 nm, the distance of 3rd maxima from 2nd minima on the other side is

(1) 2.75 mm (2) 2.5 mm

(3) 22.5 mm (4) 2.25 mm

Space For Rough Work

45. To observe diffraction, the size of the obstacle

(1) has no relation to wavelength.

(2) should be $\lambda/2$, where λ is the wavelength.

(3) should be much larger than the wavelength.

(4) should be of the order of wavelength.

46. The polarizing angle of glass is 57°. A ray of light which is incident at this angle will have an angle of refraction as

(1) 25° (2) 33°

(3) 43° (4) 38°

47. Light of two different frequencies whose photons have energies 1 eV and 2.5 eV respectively, successively illuminate a metallic surface whose work function is 0.5 eV. Ratio of maximum speeds of emitted electrons will be

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

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

48. Find the de-Broglie wavelength of an electron with kinetic energy of 120 eV.

(1) 95 pm (2) 102 pm

(3) 112 pm (4) 124 pm

49. An α-particle of energy 5 MeV is scattered through 180° by gold nucleus. The distance of closest approach is of the order of

(1) 10^{-10} cm (2) 10^{-12} cm

(3) 10^{-14} cm (4) 10^{-16} cm

Space For Rough Work

50. If an electron in hydrogen atom jumps from an orbit of level n = 3 to an orbit of level n = 2, the emitted radiation has a frequency (R = Rydberg constant, C = velocity of light)

(1) $\frac{3RC}{27}$ (2) $\frac{RC}{25}$

(3) $\frac{8RC}{9}$ (4) $\frac{5RC}{36}$

51. What is the wavelength of light for the least energetic photon emitted in the Lyman series of the hydrogen spectrum. (take hc = 1240 eV nm)

(1) 82 nm (2) 102 nm

(3) 122 nm (4) 150 nm

52. A nucleus at rest splits into two nuclear parts having radii in the ratio 1 : 2. Their velocities are in the ratio

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

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

53. The half life of a radioactive substance is 20 minutes. The time taken between 50 % decay and 87.5 % decay of the substance will be

(1) 30 minutes (2) 40 minutes

(3) 25 minutes (4) 10 minutes

54. A radioactive decay can form an isotope of the original nucleus with the emission of particles

(1) one α and four β (2) one α and two β

(3) one α and one β (4) four α and one β

Space For Rough Work

55. An LED is constructed from a pn junction based on a certain semi-conducting material whose energy gap is 1.9 eV. Then the wavelength of the emitted light is

(1) 2.9×10^{-9} m

(2) 1.6×10^{-8} m

(3) 6.5×10^{-7} m

(4) 9.1×10^{-5} m

56. Amplitude modulation has

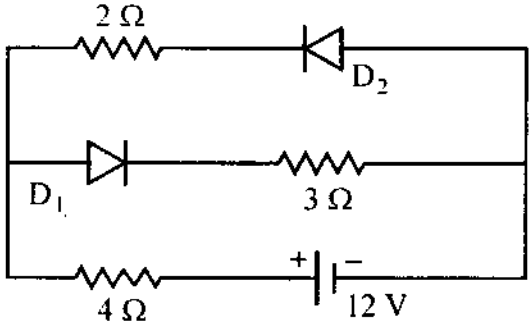
(1) one carrier with two side band frequencies

(2) one carrier

(3) one carrier with infinite frequencies

(4) one carrier with high frequency

57. The circuit has two oppositely connected ideal diodes in parallel. What is the current flowing in the circuit ?



(1) 1.71 A

(2) 2.0 A

(3) 2.31 A

(4) 1.33 A

Space For Rough Work

58. The input characteristics of a transistor in CE mode is the graph obtained by plotting

(1) I_B against V_{BE} at constant V_{CE}

(2) I_B against V_{CE} at constant V_{BE}

(3) I_B against I_C at constant V_{CE}

(4) I_B against I_C at constant V_{BE}

59. The given truth table is for

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

(1) AND gate

(2) OR gate

(3) NAND gate

(4) NOR gate

60. The waves used for line-of-sight (LOS) communication is

(1) ground waves

(2) space waves

(3) sound waves

(4) sky waves

Space For Rough Work

A-1

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MENTION YOUR CET NUMBER	QUESTION BOOKLET DETAILS	
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	A - 1	729873

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C

[Turn Over

1. The unit cell with crystallographic dimensions, $a \neq b \neq c$, $\alpha = \gamma = 90$ and $\beta \neq 90$ is

(1) Triclinic (2) Monoclinic

(3) Orthorhombic (4) Tetragonal

2. While charging the lead storage battery, _____.

(1) $PbSO_4$ on anode is reduced to Pb

(2) $PbSO_4$ on cathode is reduced to Pb

(3) $PbSO_4$ on cathode is oxidized to Pb

(4) $PbSO_4$ on anode is oxidized to PbO_2

3. Adenosine is an example of

(1) Nucleotide (2) Purine base

(3) Pyrimidine base (4) Nucleoside

4. Orlon has monomeric unit

(1) Acrolein (2) Glycol

(3) Vinyl cyanide (4) Isoprene

5. The two electrons have the following set of quantum numbers :

$P = 3, 2, -2, +\frac{1}{2}$

$Q = 3, 0, 0, +\frac{1}{2}$

Which of the following statement is true ?

(1) P and Q have same energy

(2) P has greater energy than Q

(3) P has lesser energy than Q

(4) P and Q represent same electron

Space For Rough Work

6. H_2O_2 cannot oxidise

(1) PbS (2) Na_2SO_3

(3) O_3 (4) KI

7. In the given set of reactions,

$$\text{2-Bromopropane} \xrightarrow[\text{alc./heat}]{\text{AgCN}} X \xrightarrow{LiA/H_4} Y$$

the IUPAC name of product 'Y' is

(1) N-Methylpropanamine (2) N-Isopropylmethanamine

(3) Butan-2-amine (4) N-Methylpropan-2-amine

8. On heating with concentrated NaOH solution in an inert atmosphere of CO_2, white phosphorous gives a gas. Which of the following statement is incorrect about the gas ?

(1) It is less basic than NH_3.

(2) It is more basic than NH_3.

(3) It is highly poisonous and has smell like rotten fish.

(4) It's solution in water decomposes in the presence of light.

9. Sodium metal crystallizes in B.C.C. lattice with edge length of 4.29 Å. The radius of sodium atom is

(1) 2.857 Å (2) 1.601 Å

(3) 2.145 Å (4) 1.857 Å

Space For Rough Work

10. 0.06% (w/v) aqueous solution of urea is isotonic with

(1) 0.06% glucose solution (2) 0.6% glucose solution

(3) 0.01 M glucose solution (4) 0.1 M glucose solution

11. In a first order reaction, the concentration of the reactant is reduced to 12.5% in one hour. When was it half completed ?

(1) 3 hr (2) 20 min

(3) 30 min (4) 15 min

12. The electrolyte having maximum flocculation value for AgI/Ag^+ sol. is

(1) NaCl (2) Na_2S

(3) Na_2SO_4 (4) Na_3PO_4

13. Copper is extracted from Copper pyrites by heating in a Bessemer converter. The method is based on the principle that

(1) Copper has more affinity for oxygen than Sulphur at high temperature.

(2) Iron has less affinity for oxygen than Sulphur at high temperature.

(3) Copper has less affinity for oxygen than Sulphur at high temperature.

(4) Sulphur has less affinity for oxygen at high temperature.

14. Which of the following will be able to show geometrical isomerism ?

(1) MA_3B – Square planar (2) MA_2B_2 – Tetrahedral

(3) MABCD – Square planar (4) MABCD – Tetrahedral

Space For Rough Work

15. The electronic configuration of Gd^{2+} is (at. no. of Gd is 64)

(1) [Xe] $4f^8$ (2) [Xe] $4f^7$

(3) [Xe] $4f^7\ 5d^1\ 6s^2$ (4) [Xe] $4f^7\ 5d^1$

16. $MSO_4 \xrightarrow{NH_4OH} \downarrow \underset{\text{white}}{X} \xrightarrow[\text{excess}]{NH_4OH} Y \xrightarrow{H_2S} \downarrow Z$

Here M and Z are

(1) Cu, ZnS (2) Zn, ZnS

(3) Fe, FeS (4) Al, Al_2S_3

17. The hydrolysis of optically active 2-bromobutane with aqueous NaOH result in the formation of

(1) (+) butan-2-ol (2) (–) butan-2-ol

(3) (±) butan-1-ol (4) (±) butan-2-ol

18. The distinguishing test between methanoic acid and ethanoic acid is

(1) Litmus test (2) Tollen's test

(3) Esterification test (4) Sodium bicarbonate test

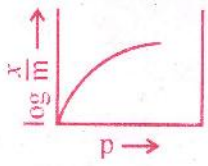
19. In $H_2 - O_2$ fuel cell the reaction occurring at cathode is

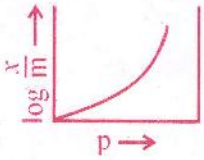
(1) $2H_{2(g)} + O_{2(g)} \longrightarrow 2H_2O_{(l)}$ (2) $O_{2(g)} + 2H_2O_{(l)} + 4e^- \longrightarrow 4\bar{O}H_{(aq)}$

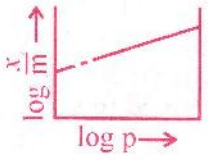
(3) $H^+ + e^- \longrightarrow \frac{1}{2} H_2$ (4) $H^+_{(aq)} + \bar{O}H_{(aq)} \longrightarrow H_2O_{(l)}$

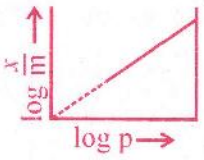
Space For Rough Work

20. Which of the following curve is in accordance with Freundlich adsorption isotherm ?

(1) 

(2) 

(3) 

(4) 

21. How many ions per molecule are produced in the solution when Mohr salt is dissolved in excess of water ?

(1) 4 (2) 5

(3) 6 (4) 10

22. Glycogen is

(1) a polymer of β-D-glucose units

(2) a structural polysaccharide

(3) structurally very much similar to amylopectin

(4) structurally similar to amylopectin but extensively branched

23. Number of possible alkynes with formula C_5H_8 is

(1) 2 (2) 3

(3) 4 (4) 5

Space For Rough Work

24. Which of the following aqueous solution has the highest freezing point ?

(1) 0.1 M Sucrose (2) 0.01 M NaCl

(3) 0.1 M NaCl (4) 0.01 M Na_2SO_4

25. Half life period of a first order reaction is 10 min. Starting with initial concentration 12 M, the rate after 20 min is

(1) 0.0693 M min^{-1} (2) 0.693×3 M min^{-1}

(3) 0.0693×3 M min^{-1} (4) 0.0693×4 M min^{-1}

26. The salt which responds to dilute and concentrated H_2SO_4 is

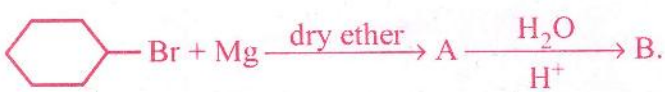
(1) CaF_2 (2) $Ba(NO_3)_2$

(3) Na_2SO_4 (4) Na_3PO_4

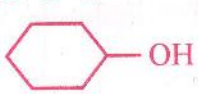
27. On heating potassium permanganate, one of the following compound is not obtained :

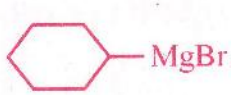
(1) O_2 (2) MnO

(3) MnO_2 (4) K_2MnO_4

28. 

The product 'B' is

(1) 

(2) 

(3) 

(4) 

Space For Rough Work

29. The formation of cyanohydrin from a ketone is an example of

(1) Nucleophilic substitution (2) Nucleophilic addition

(3) Electrophilic addition (4) Electrophilic substitution

30. One of the following is an essential amino acid.

(1) Tyrosine (2) Cysteine

(3) Isoleucine (4) Serine

31. The aqueous solution of following salt will have the lowest pH :

(1) $NaClO_3$ (2) $NaClO$

(3) $NaClO_2$ (4) $NaClO_4$

32. For one of the element various successive ionization enthalpies (in kJ mol^{-1}) are given below :

I.E.	1^{st}	2^{nd}	3^{rd}	4^{th}	5^{th}
	577.5	1810	2750	11,580	14,820

The element is

(1) Si (2) P

(3) Al (4) Mg

33. 0.30 g of an organic compound containing C, H and Oxygen on combustion yields 0.44 g CO_2 and 0.18 g H_2O. If one mol of compound weighs 60, then molecular formula of the compound is

(1) CH_2O (2) C_3H_8O

(3) C_4H_6O (4) $C_2H_4O_2$

Space For Rough Work

34. One of the following amide will not undergo Hoffmann bromamide reaction :

(1) CH_3CONH_2

(2) $CH_3CONHCH_3$

(3) $C_6H_5CONH_2$

(4) $CH_3CH_2CONH_2$

35. Cheilosis and digestive disorders are due to the deficiency of

(1) Thiamine (2) Ascorbic acid

(3) Riboflavin (4) Pyridoxine

36. How many Coulombs of electricity are required for the oxidation of one mol of water to dioxygen ?

(1) 9.65×10^4 C (2) 1.93×10^4 C

(3) 1.93×10^5 C (4) 19.3×10^5 C

37. 100 cm^3 of 1 M CH_3COOH was mixed with 100 cm^3 of 2 M CH_3OH to form an ester. The change in the initial rate if each solution is diluted with equal volume of water would be

(1) 2 times (2) 4 times

(3) 0.5 times (4) 0.25 times

Space For Rough Work

38. Which of the following colloids cannot be easily coagulated ?

(1) Lyophobic colloids

(2) Multimolecular colloids

(3) Macromolecular colloids

(4) Irreversible colloids

39. The complex ion having minimum magnitude of Δ_0(CFSE) is

(1) $[Cr(CN)_6]^{3-}$ (2) $[Co(NH_3)_6]^{3+}$

(3) $[Co(Cl)_6]^{3-}$ (4) $[Cr(H_2O)_6]^{3+}$

40. The arrangement of following compounds :

i. bromomethane

ii. bromoform

iii. chloromethane

iv. dibromomethane

In the increasing order of their boiling point is

(1) iii < i < iv < ii (2) iv < iii < i < ii

(3) ii < iii < i < iv (4) i < ii < iii < iv

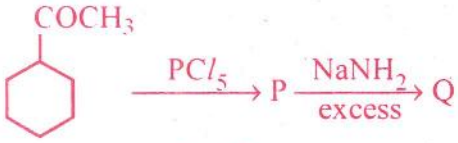
41. Iodoform can be prepared from all, except

(1) propan-2-ol (2) butan-2-one

(3) propan-1-ol (4) acetophenone

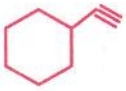
Space For Rough Work

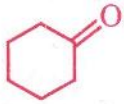
42. Identify 'Q' in the following sequence of reactions :



(1) 

(2) 

(3) 

(4) 

43. Cryolite is

(1) Na_3AlF_6 and is used in the electrolysis of alumina for decreasing electrical conductivity.

(2) Na_3AlF_6 and is used in the electrolysis of alumina for lowering the melting point of alumina only.

(3) Na_3AlF_6 and is used in the electrolysis of alumina for lowering the melting point and increasing the conductivity of alumina.

(4) Na_3AlF_6 and is used in the electrolytic refining of alumina.

44. Which of the following compound of Xenon has pyramidal geometry ?

(1) $XeOF_4$ (2) XeF_2

(3) XeO_3 (4) XeF_4

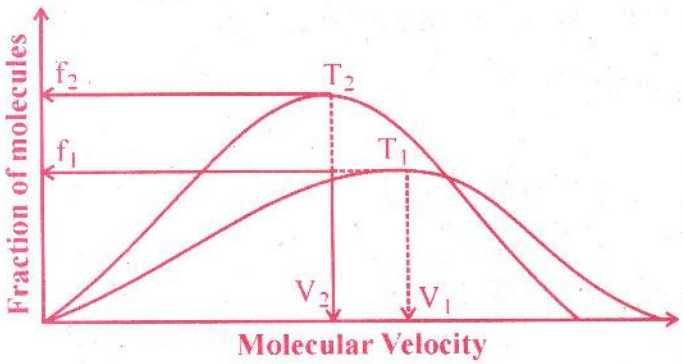
45. After adding non-volatile solute freezing point of water decreases to –0.186 °C. Calculate ΔT_b if $K_f = 1.86$ K kg mol^{-1} and $K_b = 0.521$ K kg mol^{-1}

(1) 0.521 (2) 0.0521

(3) 1.86 (4) 0.0186

Space For Rough Work

46. Plot of Maxwell's distribution of velocities is given below :



Which of the following is correct about this plot ?

(1) $T_1 < T_2$ (2) $f_1 > f_2$

(3) $T_1 > T_2$ (4) $V_1 < V_2$

47. The pair of compound which cannot exist together in solution is

(1) $NaHCO_3$ and NaOH

(2) $NaHCO_3$ and H_2O

(3) $NaHCO_3$ and Na_2CO_3

(4) Na_2CO_3 and NaOH

48. What amount of dioxygen (in gram) contains 1.8×10^{22} molecules ?

(1) 0.0960 (2) 0.960

(3) 9.60 (4) 96.0

Space For Rough Work

49. Using MOT, compare O_2^+ and O_2^- species and choose the incorrect option.

(1) O_2^+ have higher bond order than O_2^-.

(2) O_2^- is less stable.

(3) O_2^+ is diamagnetic while O_2^- is paramagnetic.

(4) Both O_2^+ and O_2^- are paramagnetic.

50. Which of the following is not true ?

(1) Erythromycin is a bacteriostatic antibiotic.

(2) Ampicillin is not a natural antibiotic.

(3) Prontosil is not converted into sulphanilamide in the body.

(4) Vancomycin is a broad spectrum antibiotic.

51. In the reaction

$S + \frac{3}{2} O_2 \longrightarrow SO_3 + 2x$ kJ and $SO_2 + \frac{1}{2} O_2 \longrightarrow SO_3 + y$ kJ

heat of formation of SO_2 is

(1) $x + y$ (2) $x - y$

(3) $2x - y$ (4) $2x + y$

52. Arrange the following compounds in the increasing order of their acidic strength :

i. m-nitrophenol ii. m-cresol

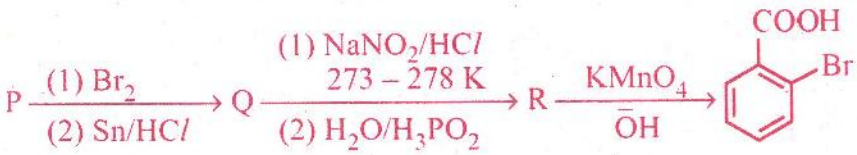
iii. phenol iv. m-chlorophenol

(1) iii < ii < i < iv (2) ii < iv < iii < i

(3) ii < iii < iv < i (4) ii < iii < i < iv

Space For Rough Work

53. In the sequence of following reactions :



the starting compound 'P' is

(1) o-nitro toluene (2) m-nitro toluene

(3) o-bromo toluene (4) p-nitro toluene

54. Acetic acid is treated with $Ca(OH)_2$ and the product so obtained is subjected to dry distillation. The final product is

(1) ethanal (2) propanal

(3) propanone (4) ethanol

55. The correct statement is

(1) BF_3 is the strongest Lewis acid among the other boron halides.

(2) BI_3 is the weakest Lewis acid among the boron halides.

(3) There is maximum $p\pi - p\pi$ back bonding in BF_3.

(4) There is minimum $p\pi - p\pi$ back bonding in BF_3.

56. Which of the following compound possesses the "C – H" bond with the lowest bond dissociation energy ?

(1) Toluene (2) Benzene

(3) n-pentane (4) 2, 2-dimethyl propane

Space For Rough Work

57. In presence of HCl, H_2S results the precipitation of Group-2 elements but not Gp-4 elements during qualitative analysis. It is due to

(1) higher concentration of S^{2-} (2) higher concentration of H^+

(3) lower concentration of S^{2-} (4) lower concentration of H^+

58. One of the following conversion results in the change of hybridization and geometry :

(1) CH_4 to C_2H_6 (2) NH_3 to $\overset{+}{N}H_4$

(3) BF_3 to $B\bar{F}_4$ (4) H_2O to $H_3\overset{+}{O}$

59. Water softening by Clark's process uses

(1) $CaHCO_3$ (2) $NaHCO_3$

(3) Na_2CO_3 (4) $Ca(OH)_2$

60. An alkali metal hydride (NaH) reacts with diborane in 'A' to give a tetrahedral compound 'B' which is extensively used as reducing agent in organic synthesis. The compounds 'A' and 'B' respectively are

(1) C_2H_6 and C_2H_5Na (2) CH_3COCH_3 and $B_3N_3H_6$

(3) C_6H_6 and $NaBH_4$ (4) $(C_2H_5)_2O$ and $NaBH_4$

Space For Rough Work

A-1

SUBJECT : MATHEMATICS	DAY – 1
SESSION : AFTERNOON	TIME : 02.30 P.M. TO 03.50 P.M.

MAXIMUM MARKS	TOTAL DURATION	MAXIMUM TIME FOR ANSWERING
60	80 MINUTES	70 MINUTES

MENTION YOUR CET NUMBER	QUESTION BOOKLET DETAILS	
	VERSION CODE	SERIAL NUMBER
	A - 1	330849

DOs :

1. Check whether the CET No. has been entered and shaded in the respective circles on the OMR answer sheet.
2. This Question Booklet is issued to you by the invigilator after the **2nd Bell i.e., after 2.30 p.m.**
3. The Serial Number of this question booklet should be entered on the OMR answer sheet.
4. The Version Code of this question booklet should be entered on the OMR answer sheet and the respective circles should also be shaded completely.
5. Compulsorily sign at the bottom portion of the OMR answer sheet in the space provided.

DON'TS :

1. **THE TIMING AND MARKS PRINTED ON THE OMR ANSWER SHEET SHOULD NOT BE DAMAGED / MUTILATED / SPOILED.**
2. **The 3rd Bell rings at 2.40 p.m., till then;**
   - Do not remove the paper seal present on the right hand side of this question booklet.
   - Do not look inside this question booklet.
   - Do not start answering on the OMR answer sheet.

IMPORTANT INSTRUCTIONS TO CANDIDATES

1. This question booklet contains 60 questions and each question will have one statement and four distracters. (Four different options / choices.)
2. After the **3rd Bell is rung at 2.40 p.m.,** remove the paper seal on the right hand side of this question booklet and check that this booklet does not have any unprinted or torn or missing pages or items etc., if so, get it replaced by a complete test booklet. Read each item and start answering on the OMR answer sheet.
3. During the subsequent 70 minutes:
   - Read each question carefully.
   - Choose the correct answer from out of the four available distracters (options / choices) given under each question / statement.
   - **Completely darken / shade the relevant circle with a BLUE OR BLACK INK BALL POINT PEN against the question number on the OMR answer sheet.**

Correct Method of shading the circle on the OMR answer sheet is as shown below :

4. Please note that even a minute unintended ink dot on the OMR answer sheet will also be recognised and recorded by the scanner. Therefore, avoid multiple markings of any kind on the OMR answer sheet.
5. Use the space provided on each page of the question booklet for Rough Work. Do not use the OMR answer sheet for the same.
6. After the **last bell is rung at 3.50 p.m.,** stop writing on the OMR answer sheet and affix your LEFT HAND THUMB IMPRESSION on the OMR answer sheet as per the instructions.
7. Hand over the **OMR ANSWER SHEET** to the room invigilator as it is.
8. After separating the top sheet (Our Copy), the invigilator will return the bottom sheet replica (Candidate's copy) to you to carry home for self-evaluation.
9. Preserve the replica of the OMR answer sheet for a minimum period of ONE year.

1. $f(x) = \frac{1}{2} - \tan\left(\frac{\pi x}{2}\right) \quad -1 < x < 1$

and $g(x) = \sqrt{(3 + 4x - 4x^2)}$.

Find domain of $(f + g)$

(1) $\left[\frac{-1}{2}, 1\right)$ (2) $\left(\frac{-1}{2}, 1\right]$

(3) $\left[-\frac{1}{2}, \frac{3}{2}\right]$ (4) $(-1, 1)$

2. Write the set builder form $A = \{-1, 1\}$

(1) $A = \{x : x \text{ is a real number}\}$

(2) $A = \{x : x \text{ is an integer}\}$

(3) $A = \{x : x \text{ is a root of the equation } x^2 = 1\}$

(4) $A = \{x : x \text{ is a root of the equation } x^2 + 1 = 0\}$

3. If the operation $\oplus$ is defined by $a \oplus b = a^2 + b^2$ for all real numbers 'a' and 'b', then $(2 \oplus 3) \oplus 4 =$ _____

(1) 181 (2) 182

(3) 184 (4) 185

4. If $Z = \frac{(\sqrt{3} + i)^3 (3i + 4)^2}{(8 + 6i)^2}$, then $|Z|$ is equal to

(1) 0 (2) 1

(3) 2 (4) 3

Space For Rough Work

5. If α and β are the roots of $x^2 - ax + b^2 = 0$, then $\alpha^2 + \beta^2$ is equal to ____

(1) $a^2 - 2b^2$ (2) $2a^2 - b^2$

(3) $a^2 - b^2$ (4) $a^2 + b^2$

6. If the 2nd and 5th terms of G.P. are 24 and 3 respectively, then the sum of 1st six terms is ____

(1) $\frac{189}{2}$ (2) $\frac{189}{5}$

(3) $\frac{179}{2}$ (4) $\frac{2}{189}$

7. The middle term of expansion of $\left(\frac{10}{x} + \frac{x}{10}\right)^{10}$

(1) ${}^7C_5$ (2) ${}^8C_5$

(3) ${}^9C_5$ (4) ${}^{10}C_5$

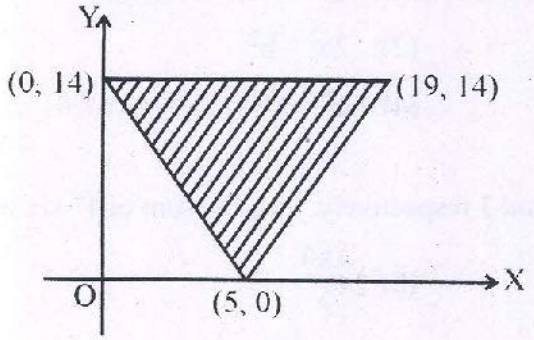
8. If $\begin{vmatrix} 2a & x_1 & y_1 \\ 2b & x_2 & y_2 \\ 2c & x_3 & y_3 \end{vmatrix} = \frac{abc}{2} \neq 0$, then the area of the triangle whose vertices are $\left(\frac{x_1}{a}, \frac{y_1}{a}\right)$, $\left(\frac{x_2}{b}, \frac{y_2}{b}\right)$, $\left(\frac{x_3}{c}, \frac{y_3}{c}\right)$ is

(1) $\frac{1}{4}abc$ (2) $\frac{1}{8}abc$

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

Space For Rough Work

9. The shaded region shown in fig. is given by the inequation



(1) $14x + 5y \geq 70$ $y \leq 14$ and $x - y \leq 5$

(2) $14x + 5y \geq 70$ $y \leq 14$ and $x - y \geq 5$

(3) $14x + 5y \leq 70$ $y \leq 14$ and $x - y \geq 5$

(4) $14x + 5y \geq 70$ $y \geq 14$ and $x - y \geq 5$

10. $\sim [(-p) \wedge q]$ is logically equivalent to

(1) $p \vee (\sim q)$ (2) $p \wedge (\sim q)$

(3) $\sim[p \wedge (\sim q)]$ (4) $\sim (p \vee q)$

11. The value of

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

(1) $\frac{\pi}{6}$ (2) $\frac{\pi}{2}$

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

Space For Rough Work

12. If the eccentricity of the hyperbola

$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1 \text{ is } \frac{5}{4} \text{ and } 2x + 3y - 6 = 0$$

is a focal chord of the hyperbola, then the length of transverse axis is equal to ___

(1) $\frac{12}{5}$ (2) $\frac{24}{5}$

(3) $\frac{6}{5}$ (4) $\frac{5}{24}$

13. If $\vec{a} = i + 2j + 2k$, $|\vec{b}| = 5$ and the angle between $\vec{a}$ and $\vec{b}$ is $\frac{\pi}{6}$, then the area of the triangle formed by these two vectors as two sides is

(1) $\frac{15}{2}$ (2) 15

(3) $\frac{15}{4}$ (4) $\frac{15\sqrt{3}}{2}$

14. Let $\vec{a} = i - 2j + 3k$ if $\vec{b}$ is a vector such that $\vec{a} \cdot \vec{b} = |\vec{b}|^2$ and $|\vec{a} - \vec{b}| = \sqrt{7}$, then $|\vec{b}| =$ ____

(1) 7 (2) 14

(3) $\sqrt{7}$ (4) 21

15. If direction cosines of a vector of magnitude 3 are $\frac{2}{3}, -\frac{9}{3}, \frac{2}{3}$ and $a > 0$, then vector is ____

(1) $2i + j + 2k$ (2) $2i - j + 2k$

(3) $i - 2j + 2k$ (4) $i + 2j + 2k$

Space For Rough Work

16. Equation of line passing through the point (2, 3, 1) and parallel to the line of intersection of the plane $x - 2y - z + 5 = 0$ and $x + y + 3z = 6$ is

(1) $\frac{x-2}{5} = \frac{y-3}{-4} = \frac{z-1}{3}$ (2) $\frac{x-2}{-5} = \frac{y-3}{-4} = \frac{z-1}{3}$

(3) $\frac{x-2}{5} = \frac{y-3}{4} = \frac{z-1}{3}$ (4) $\frac{x-2}{4} = \frac{y-3}{3} = \frac{z-1}{2}$

17. Foot of perpendicular drawn from the origin to the plane $2x - 3y + 4z = 29$ is ____

(1) (5, –1, 4) (2) (2, –3, 4)

(3) (7, –1, 3) (4) (5, –2, 3)

18. If two dice are thrown simultaneously, then the probability that the sum of the numbers which come up on the dice to be more than 5 is _____

(1) $\frac{5}{36}$ (2) $\frac{1}{6}$

(3) $\frac{5}{18}$ (4) $\frac{13}{18}$

19. If $y = f(x^2 + 2)$ and $f'(3) = 5$, then $\frac{dy}{dx}$ at $x = 1$ is _____

(1) 5 (2) 25

(3) 15 (4) 10

20. If $x = a\cos^3\theta$, $y = a\sin^3\theta$, then $1 + \left(\frac{dy}{dx}\right)^2$ is ____

(1) $\tan\theta$ (2) $\tan^2\theta$

(3) $\sec^2\theta$ (4) 1

Space For Rough Work

21. Slope of Normal to the curve

$y = x^2 - \frac{1}{x^2}$ at $(-1, 0)$ is

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

(3) 4 (4) -4

22. $\int \frac{1}{x^2(x^4+1)^{3/4}}\,dx$ is equal to _____

(1) $\frac{-(1+x^4)^{1/4}}{x} + C$ (2) $\frac{-(1+x^4)^{1/4}}{x^2} + C$

(3) $\frac{-(1+x^4)^{1/4}}{2x} + C$ (4) $\frac{-(1+x^4)^{3/4}}{x} + C$

23. If $f : R \to R$ is defined by $f(x) = \frac{x}{x^2+1}$, find $f(f(2))$

(1) $\frac{1}{29}$ (2) $\frac{10}{29}$

(3) $\frac{29}{10}$ (4) 29

24. Evaluate $\begin{vmatrix} \cos 15 & \sin 15 \\ \sin 75 & \cos 75 \end{vmatrix}$

(1) 1 (2) 0

(3) 2 (4) 3

Space For Rough Work

25. A man takes a step forward with probability 0.4 and one step backward with probability 0.6, then the probability that at the end of eleven steps he is one step away from the starting point is

(1) ${}^{11}C_5 \times (0.48)^5$ (2) ${}^{11}C_6 \times (0.24)^5$

(3) ${}^{11}C_5 \times (0.12)^5$ (4) ${}^{11}C_6 \times (0.72)^6$

26. $\int_0^{\pi/4} \log\left(\frac{\sin x + \cos x}{\cos x}\right) dx$

(1) $\frac{\pi}{4}\log 2$ (2) $\frac{\pi}{2}\log 2$

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

27. Area bounded by $y = x^3$, $y = 8$ and $x = 0$ is ____

(1) 2 sq. units (2) 14 sq. units

(3) 12 sq. units (4) 6 sq. units

28. Let $\vec{a} = i + 2j + k$, $\vec{b} = i - j + k$ and $\vec{c} = i + j - k$, a vector in the plane $\vec{a}$ and $\vec{b}$ whose projection on $\vec{c}$ is $\frac{1}{\sqrt{3}}$ is ____

(1) $3i + j - 3k$ (2) $4i + j - 4k$

(3) $i + j - 2k$ (4) $4i - j + 4k$

29. The mean deviation from the data 3, 10, 10, 4, 7, 10, 5 :

(1) 3 (2) 2

(3) 3.75 (4) 2.57

Space For Rough Work

30. The probability distribution of x is

x	0	1	2	3
P(x)	0.2	k	k	2k

find the value of k

(1) 0.2 (2) 0.3

(3) 0.4 (4) 0.1

31. If the function g(x) is defined by

$$g(x) = \frac{x^{200}}{200} + \frac{x^{199}}{199} + \frac{x^{198}}{198} + \text{----} + \frac{x^2}{2} + x + 5, \text{ then } g'(0) = \_\_\_\_$$

(1) 1 (2) 200

(3) 100 (4) 5

32. A box contains 6 red marbles numbers from 1 through 6 and 4 white marbles 12 through 15. Find the probability that a marble drawn 'at random' is white and odd numbered.

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

(3) 6 (4) $\frac{1}{6}$

33. $\lim_{x \to 0} \frac{1 - \cos x}{x^2}$ is _____

(1) 2 (2) 3

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

Space For Rough Work

34. $f(x) = \begin{cases} 3x-8 & \text{if } x \le 5 \\ 2k & \text{if } x > 5 \end{cases}$ is continuous, find k.

(1) $\frac{2}{7}$ (2) $\frac{3}{7}$

(3) $\frac{4}{7}$ (4) $\frac{7}{2}$

35. If $f(x) = 2x^2$, find $\frac{f(3.8) - f(4)}{3.8 - 4}$.

(1) 1.56 (2) 156

(3) 15.6 (4) 0.156

36. If $x = ct$ and $y = \frac{c}{t}$, find $\frac{dy}{dx}$ at $t = 2$.

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

(3) $\frac{-1}{4}$ (4) 0

37. A balloon which always remains spherical is being inflated by pumping in 10 cubic centimeters of gas per second. Find the rate at which the radius of the balloon is increasing when the radius is 15 cms.

(1) $\frac{1}{90\pi}$ cm/sec (2) $\frac{1}{9\pi}$ cm/sec

(3) $\frac{1}{30\pi}$ cm/sec (4) $\frac{1}{\pi}$ cm/sec

Space For Rough Work

38. $\int \frac{\sin^2 x}{1+\cos x}\,dx$

(1) $x + \sin x + C$ (2) $x - \sin x + C$

(3) $\sin x + C$ (4) $\cos x + C$

39. $\int e^x \left(\frac{1+\sin x}{1+\cos x}\right) dx$ is ____

(1) $e^x \tan\left(\frac{x}{2}\right) + C$ (2) $\tan\left(\frac{x}{2}\right) + C$

(3) $e^x + C$ (4) $e^x \sin x + C$

40. If 1, w, w^2 are three cube roots of unity, then $(1 - w + w^2)(1 + w - w^2)$ is ____

(1) 1 (2) 2

(3) 3 (4) 4

41. Solve for x

$\tan^{-1}\left(\frac{1-x}{1+x}\right) = \frac{1}{2}\tan^{-1} x, x > 0$

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

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

42. The system of linear equations $x + y + z = 6$, $x + 2y + 3z = 10$ and $x + 2y + az = b$ has no solutions when ____

(1) $a = 2$ $b \neq 3$ (2) $a = 3$ $b \neq 10$

(3) $b = 2$ $a = 3$ (4) $b = 3$ $a \neq 10$

Space For Rough Work

43. The value of $\tan(1°) + \tan(89°)$ is _____

(1) $\frac{1}{\sin(1°)}$ (2) $\frac{2}{\sin(2°)}$

(3) $\frac{2}{\sin(1°)}$ (4) $\frac{1}{\sin(2°)}$

44. If $\frac{(x+1)^2}{x^3+x} = \frac{A}{x} + \frac{Bx+C}{x^2+1}$, then $\text{cosec}^{-1}\left(\frac{1}{A}\right) + \cot^{-1}\left(\frac{1}{B}\right) + \sec^{-1} C =$ ___

(1) $\frac{5\pi}{6}$ (2) 0

(3) $\frac{\pi}{6}$ (4) $\frac{\pi}{2}$

45. The remainder obtained when $1! + 2! + 3! + \cdots + 11!$ is divided by 12 is ___

(1) 9 (2) 8

(3) 7 (4) 6

46. If $\alpha \leq 2\sin^{-1} x + \cos^{-1} x \leq \beta$, then

(1) $\alpha = \frac{-\pi}{2}$ $\beta = \frac{\pi}{2}$ (2) $\alpha = \frac{-\pi}{2}$ $\beta = \frac{3\pi}{2}$

(3) $\alpha = 0$ $\beta = \pi$ (4) $\alpha = 0$ $\beta = 2\pi$

47. If $A = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$, then A^2 equal to ___

(1) $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ (2) $\begin{bmatrix} 1 & 0 \\ 1 & 0 \end{bmatrix}$

(3) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ (4) $\begin{bmatrix} 0 & 1 \\ 0 & 1 \end{bmatrix}$

Space For Rough Work

48. The function $f(x) = [x]$, where $[x]$ denotes greatest integer function is continuous at ____

(1) 4 (2) -2

(3) 1 (4) 1.5

49. If $y = \log\left(\frac{1-x^2}{1+x^2}\right)$, then $\frac{dy}{dx}$ is equal to ____

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

(3) $\frac{1}{4-x^4}$ (4) $\frac{-4x^3}{1-x^4}$

50. The two curves $x^3 - 3xy^2 + 2 = 0$ and $3x^2y - y^3 = 2$

(1) touch each other (2) cut at right angle

(3) cut at angle $\frac{\pi}{3}$ (4) cut at angle $\frac{\pi}{4}$

51. If x is real, then the minimum value of $x^2 - 8x + 17$ is ____

(1) 1 (2) 2

(3) 3 (4) 4

52. $\int_{-\pi/4}^{\pi/4} \frac{dx}{1+\cos 2x}$ is equal to

(1) 2 (2) 1

(3) 4 (4) 0

Space For Rough Work

53. The order of differential equation of all circles of given radius 'a' is _____

(1) 4 (2) 2

(3) 1 (4) 3

54. The solution of differential equation

$x\frac{dy}{dx} + 2y = x^2$ is ____

(1) $y = \frac{x^2 + C}{4x^2}$ (2) $y = \frac{x^2}{4} + C$

(3) $y = \frac{x^4 + C}{x^2}$ (4) $y = \frac{x^4 + C}{4x^2}$

55. If $\sin x + \sin y = \frac{1}{2}$ and $\cos x + \cos y = 1$, then $\tan(x + y) =$ ____

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

(3) $\frac{-8}{3}$ (4) $\frac{4}{3}$

56. If $A = \begin{bmatrix} \alpha & 2 \\ 2 & \alpha \end{bmatrix}$ and $|A^3| = 27$, then $\alpha =$ ____

(1) ± 1 (2) ± 2

(3) $\pm\sqrt{7}$ (4) $\pm\sqrt{5}$

Space For Rough Work

57. If $P = \begin{vmatrix} x & 1 \\ 1 & x \end{vmatrix}$ and $Q = \begin{vmatrix} x & 1 & 1 \\ 1 & x & 1 \\ 1 & 1 & x \end{vmatrix}$, then $\frac{dQ}{dx} =$ ____

(1) $3P + 1$ (2) $1 - 3P$

(3) $-3P$ (4) $3P$

58. A line passes through (2, 2) and is perpendicular in the line $3x + y = 3$ its y-intercepts is ____

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

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

59. Let $f : R \to R$ be defined by $f(x) = \frac{1}{x}$ $\forall x \in R$, then f is ____

(1) one-one (2) onto

(3) bijective (4) f is not defined

60. The solution set of the inequation $\frac{x^2 + 6x - 7}{|x + 4|} < 0$ is ____

(1) $(-7, 1)$ (2) $(-7, -4)$

(3) $(-7, -4) \cup (-4, 1)$ (4) $(-7, -4) \cup (4, 1)$

Space For Rough Work