COMMON ENTRANCE TEST-2016

DATE	SUBJECT	TIME
DAY-2	PHYSICS	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	570769

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

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 10.40 a.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 recognized 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 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.
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. A body falls freely for 10 sec. Its average velocity during this journey (take $g = 10\ ms^{-2}$)

(1) $100\ ms^{-1}$ (2) $10\ ms^{-1}$

(3) $50\ ms^{-1}$ (4) $5\ ms^{-1}$

2. Three projectiles A, B and C are projected at an angle of 30°, 45°, 60° respectively. If R_A, R_B and R_C are ranges of A, B and C respectively, then (velocity of projection is same for A, B & C)

(1) $R_A = R_B = R_C$ (2) $R_A = R_C > R_B$

(3) $R_A < R_B < R_C$ (4) $R_A = R_C < R_B$

3. The component of a vector $\vec{r}$ along x – axis will have a maximum value if

(1) $\vec{r}$ is along + ve x – axis

(2) $\vec{r}$ is along + ve y – axis

(3) $\vec{r}$ is along – ve y – axis

(4) $\vec{r}$ makes an angle of 45° with the x – axis

4. Maximum acceleration of the train in which a 50 kg box lying on its floor will remain stationary (Given : Co-efficient of static friction between the box and the train's floor is 0.3 and $g = 10\ ms^{-2}$)

(1) $5.0\ ms^{-2}$ (2) $3.0\ ms^{-2}$

(3) $1.5\ ms^{-2}$ (4) $15\ ms^{-2}$

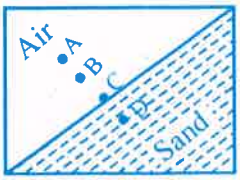
5. A 12 kg bomb at rest explodes into two pieces of 4 kg and 8 kg. If the momentum of 4 kg piece is 20 Ns, the kinetic energy of the 8 kg piece is

(1) 25 J (2) 20 J

(3) 50 J (4) 40 J

Space For Rough Work

6. Which of the points is likely position of the centre of mass of the system shown in the figure ?

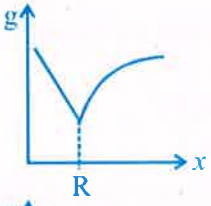


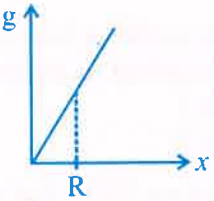
(1) A
(2) D
(3) B
(4) C

7. Three bodies a ring (R), a solid cylinder (C) and a solid sphere (S) having same mass and same radius roll down the inclined plane without slipping. They start from rest, if v_R, v_C and v_S are velocities of respective bodies on reaching the bottom of the plane, then

(1) $v_R = v_C = v_S$
(2) $v_R > v_C > v_S$
(3) $v_R < v_C < v_S$
(4) $v_R = v_C > v_S$

8. Variation of acceleration due to gravity (g) with distance x from the centre of the earth is best represented by (R → Radius of the earth)

(1)


(2)


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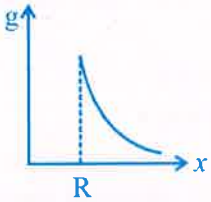
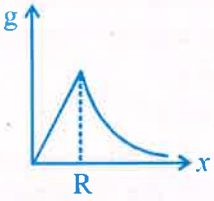


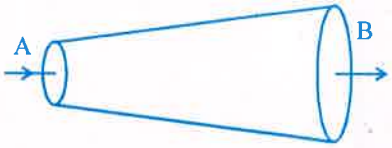
(4)


9. A spring is stretched by applying a load to its free end. The strain produced in the spring is

(1) Volumetric
(2) Shear
(3) Longitudinal & Shear
(4) Longitudinal

Space For Rough Work

10. An ideal fluid flows through a pipe of circular cross section with diameters 5 cm and 10 cm as shown. The ratio of velocities of fluid at A and B is



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

11. A pan filled with hot food cools from 94 °C to 86 °C in 2 minutes. When the room temperature is 20 °C. How long will it cool from 74 °C to 66 °C ?
(1) 2 minutes (2) 2.8 minutes
(3) 2.5 minutes (4) 1.8 minutes

12. Four rods with different radii r and length l are used to connect two heat reservoirs at different temperature. Which one will conduct most heat ?
(1) r = 1 cm, l = 1 m (2) r = 1 cm, $l = \frac{1}{2}$ m
(3) r = 2 cm, l = 2 m (4) r = 2 cm, $l = \frac{1}{2}$ m

13. A Carnot engine working between 300 K and 400 K has 800 J of useful work. The amount of heat energy supplied to the engine from the source is
(1) 2400 J (2) 3200 J
(3) 1200 J (4) 3600 J

14. A particle executing SHM has a maximum speed of 0.5 ms^{-1} and maximum acceleration of 1.0 ms^{-2}. The angular frequency of oscillation is
(1) 2 rad s^{-1} (2) 0.5 rad s^{-1}
(3) 2π rad s^{-1} (4) 0.5π rad s^{-1}

15. A source of sound is moving with a velocity of 50 ms^{-1} towards a stationary observer. The observer measures the frequency of sound as 500 Hz. The apparent frequency of sound as heard by the observer when source is moving away from him with the same speed is (Speed of sound at room temperature 350 ms^{-1})
(1) 400 Hz (2) 666 Hz
(3) 375 Hz (4) 177.5 Hz

Space For Rough Work

16. If there are only one type of charge in the universe, then
($\vec{E}$ → Electric field, $\vec{ds}$ → Area vector)

(1) $\oint \vec{E} \cdot \vec{ds} \neq 0$ on any surface

(2) $\oint \vec{E} \cdot \vec{ds}$ could not be defined

(3) $\oint E \cdot ds = \infty$ if charge is inside

(4) $\oint E \cdot ds = 0$ if charge is outside,

$= \frac{q}{\epsilon_0}$ if charge is inside

17. An electron of mass m, charge e falls through a distance h meter in a uniform electric field E. Then time of fall

(1) $t = \sqrt{\frac{2hm}{eE}}$ (2) $t = \frac{2hm}{eE}$

(3) $t = \sqrt{\frac{2eE}{hm}}$ (4) $t = \frac{2eE}{hm}$

18. If $\vec{E}_{ax}$ and $\vec{E}_{eq}$ represents electric field at a point on the axial and equatorial line of a dipole. If points are at a distance r from the centre of the dipole, for r≫a

(1) $\vec{E}_{ax} = \vec{E}_{eq}$ (2) $\vec{E}_{ax} = -\vec{E}_{eq}$

(3) $\vec{E}_{ax} = -2\vec{E}_{eq}$ (4) $\vec{E}_{eq} = 2\vec{E}_{ax}$

19. Nature of equipotential surface for a point charge is

(1) Ellipsoid with charge at foci.

(2) Sphere with charge at the centre of the sphere.

(3) Sphere with charge on the surface of the sphere.

(4) Plane with charge on the surface.

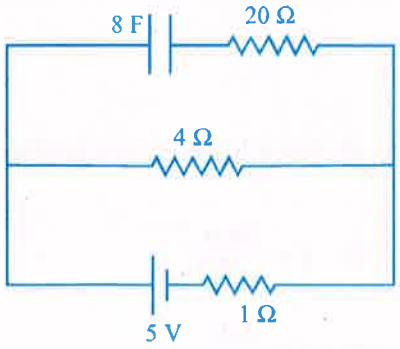
Space For Rough Work

20. A particle of mass 1 gm and charge 1 μC is held at rest on a frictionless horizontal surface at distance 1 m from the fixed charge 2 mC. If the particle is released, it will be repelled. The speed of the particle when it is at a distance of 10 m from the fixed charge

(1) $60\ ms^{-1}$ (2) $100\ ms^{-1}$

(3) $90\ ms^{-1}$ (4) $180\ ms^{-1}$

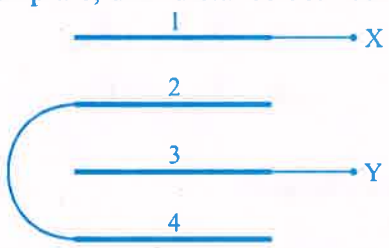
21. A capacitor of 8 F is connected as shown. Charge on the plates of the capacitor



(1) 32 C (2) 40 C

(3) 0 C (4) 80 C

22. Four metal plates are arranged as shown. Capacitance between X and Y
(A → Area of each plate, d → distance between the plates)



(1) $\frac{3}{2}\frac{\epsilon_0 A}{d}$ (2) $\frac{2\epsilon_0 A}{d}$

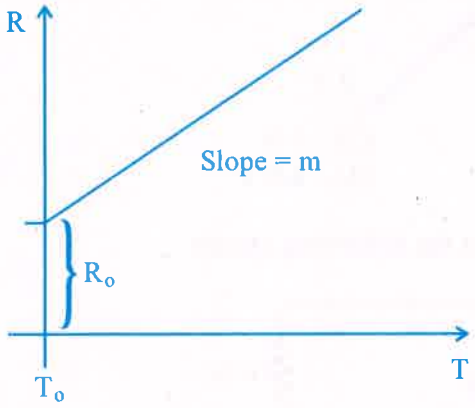
(3) $\frac{2}{3}\frac{\epsilon_0 A}{d}$ (4) $\frac{3\epsilon_0 A}{d}$

Space For Rough Work

23. Mobility of free electrons in a conductor is

(1) directly proportional to electron density.
(2) directly proportional to relaxation time.
(3) inversely proportional to electron density.
(4) inversely proportional to relaxation time.

24. Variation of resistance of the conductor with temperature is as shown

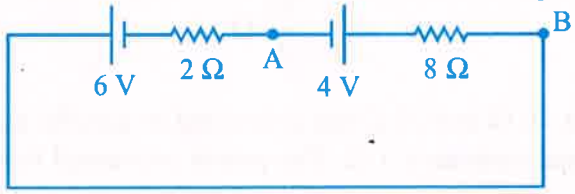


The temperature co-efficient (α) of the conductor is

(1) $\frac{R_o}{m}$ (2) mR_o

(3) m^2R_o (4) $\frac{m}{R_o}$

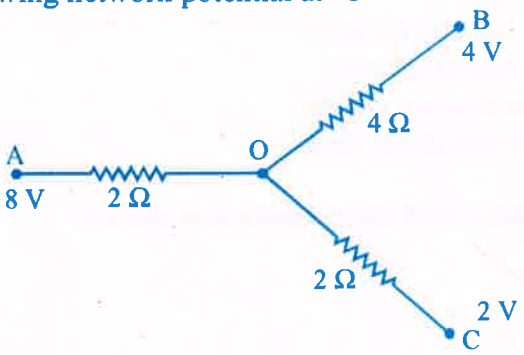
25. Potential difference between A and B in the following circuit



(1) 4 V (2) 5.6 V
(3) 2.8 V (4) 6 V

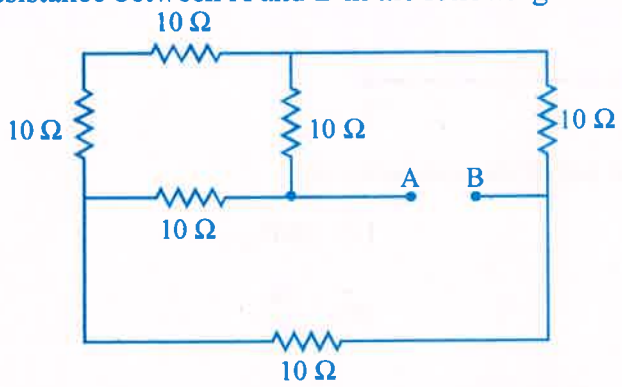
Space For Rough Work

26. In the following network potential at 'O'



(1) 4 V
(2) 3 V
(3) 6 V
(4) 4.8 V

27. Effective resistance between A and B in the following circuit



(1) 10 Ω
(2) 20 Ω
(3) 5 Ω
(4) $\frac{20}{3}$ Ω

28. Two heating coils of resistances 10 Ω and 20 Ω are connected in parallel and connected to a battery of emf 12 V and internal resistance 1 Ω. The power consumed by them are in the ratio

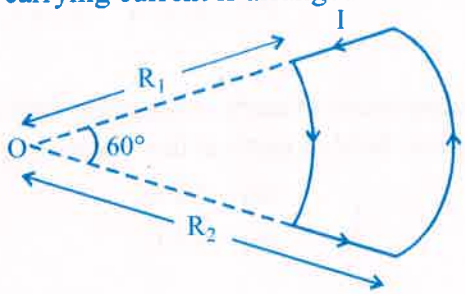
(1) 1 : 4
(2) 1 : 3
(3) 2 : 1
(4) 4 : 1

Space For Rough Work

29. A proton is projected with a uniform velocity 'v' along the axis of a current carrying solenoid, then
(1) the proton will be accelerated along the axis.
(2) the proton path will be circular about the axis.
(3) the proton move along helical path.
(4) the proton will continue to move with velocity 'v' along the axis.

30. In the cyclotron, as radius of the circular path of the charged particle increases (ω = angular velocity, v = linear velocity)
(1) both ω and v increases
(2) ω only increases, v remains constant
(3) v increases, ω remains constant
(4) v increases, ω decreases

31. A conducting wire carrying current is arranged as shown. The magnetic field at 'O'



(1) $\frac{\mu_0 i}{12}\left[\frac{1}{R_1}-\frac{1}{R_2}\right]$
(2) $\frac{\mu_0 i}{12}\left[\frac{1}{R_1}+\frac{1}{R_2}\right]$
(3) $\frac{\mu_0 i}{6}\left[\frac{1}{R_1}-\frac{1}{R_2}\right]$
(4) $\frac{\mu_0 i}{6}\left[\frac{1}{R_1}+\frac{1}{R_2}\right]$

32. The quantity of a charge that will be transferred by a current flow of 20 A over 1 hour 30 minutes period is
(1) 10.8×10^3 C
(2) 10.8×10^4 C
(3) 5.4×10^3 C
(4) 1.8×10^4 C

Space For Rough Work

33. A galvanometer coil has a resistance of 50 Ω and the meter shows full scale deflection for a current of 5 mA. This galvanometer is converted into voltmeter of range 0 – 20 V by connecting

(1) 3950 Ω in series with galvanometer

(2) 4050 Ω in series with galvanometer

(3) 3950 Ω in parallel with galvanometer

(4) 4050 Ω in parallel with galvanometer

34. χ_1 and χ_2 are susceptibility of a paramagnetic material at temperatures T_1K and T_2K respectively, then

(1) $\chi_1 = \chi_2$ (2) $\chi_1 T_1 = \chi_2 T_2$

(3) $\chi_1 T_2 = \chi_2 T_1$ (4) $\chi_1 \sqrt{T_1} = \chi_2 \sqrt{T_2}$

35. At certain place, the horizontal component of earth's magnetic field is 3.0 G and the angle dip at that place is 30°. The magnetic field of earth at that location

(1) 4.5 G (2) 5.1 G

(3) 3.5 G (4) 6.0 G

36. The process of super imposing message signal on high frequency carrier wave is called

(1) Amplification (2) Demodulation

(3) Transmission (4) Modulation

37. A long solenoid with 40 turns per cm carries a current of 1 A. The magnetic energy stored per unit volume is _____ J/m^3.

(1) 3.2 π (2) 32 π

(3) 1.6 π (4) 6.4 π

Space For Rough Work

38. A wheel with 10 spokes each of length 'L' m is rotated with a uniform angular velocity 'ω' in a plane normal to the magnetic field 'B'. The emf induced between the axle and the rim of the wheel.

(1) $\frac{1}{2}N\omega BL^2$ (2) $\frac{1}{2}\omega BL^2$

(3) ωbL^2 (4) $N\omega BL^2$

39. The rms value of current in a 50 Hz AC circuit is 6 A. The average value of AC current over a cycle is

(1) $6\sqrt{2}$ (2) $\frac{3}{\pi\sqrt{2}}$

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

40. A capacitor of capacitance 10 μF is connected to an AC source and an AC Ammeter. If the source voltage varies as $V = 50\sqrt{2}$ sin 100t, the reading of the ammeter is

(1) 50 mA (2) 70.7 mA

(3) 5.0 mA (4) 7.07 mA

41. In a series L.C.R circuit, the potential drop across L, C and R respectively are 40 V, 120 V and 60 V. Then the source voltage is

(1) 220 V (2) 160 V

(3) 180 V (4) 100 V

42. In a series L.C.R. circuit an alternating emf (v) and current (i) are given by the equation $v = v_0 \sin \omega t$, $i = i_0 \sin\left(\omega t + \frac{\pi}{3}\right)$

The average power discipated in the circuit over a cycle of AC is

(1) $\frac{v_0 i_0}{2}$ (2) $\frac{v_0 i_0}{4}$

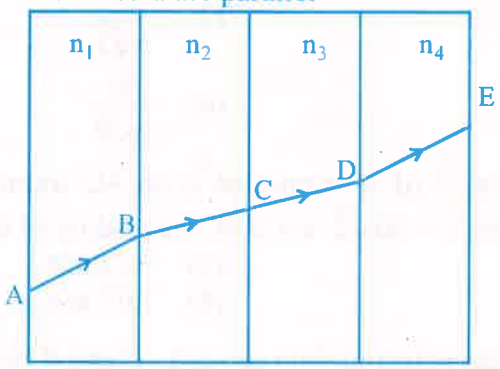
(3) $\frac{\sqrt{3}}{2} v_0 i_0$ (4) Zero

Space For Rough Work

43. Electromagnetic radiation used to sterilise milk is
(1) X-ray (2) γ–ray
(3) UV rays (4) Radiowaves

44. A plane glass plate is placed over a various coloured letters (violet, green, yellow, red). The letter which appears to raised more
(1) Red (2) Yellow
(3) Green (4) Violet

45. A ray of light passes through four transparent media with refractive index n_1, n_2, n_3 and n_4 as shown. The surfaces of all media are parallel



If the emergent ray DE is parallel to incident ray AB, then
(1) $n_1 = n_4$ (2) $n_2 = n_4$
(3) $n_3 = n_4$ (4) $n_1 = \frac{n_2 + n_3 + n_4}{3}$

46. Focal length of a convex lens is 20 cm and its RI is 1.5. It produces an erect, enlarged image if the distance of the object from the lens is
(1) 40 cm (2) 30 cm
(3) 15 cm (4) 20 cm

47. A ray of light suffers a minimum deviation when incident on an equilateral prism of refractive index $\sqrt{2}$. The angle of incidence is
(1) 30° (2) 45°
(3) 60° (4) 50°

Space For Rough Work

48. In Young's double slit experiment the source is white light. One slit is covered with red filter and the other with blue filter. There shall be

(1) Alternate red & blue fringes (2) Alternate dark & pink fringes

(3) Alternate dark & yellow fringes (4) No interference

49. Light of wavelength 600 ηm is incident normally on a slit of width 0.2 mm. The angular width of central maxima in the diffraction pattern is (measured from minimum to minimum)

(1) 6×10^{-3} rad (2) 4×10^{-3} rad

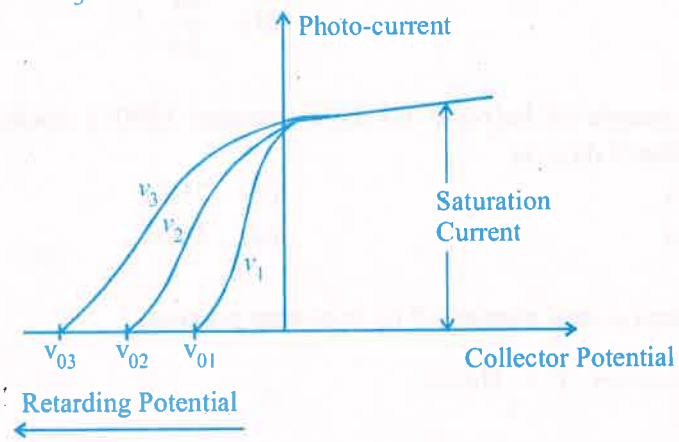
(3) 2.4×10^{-3} rad (4) 4.5×10^{-3} rad

50. For what distance is ray optics is good approximation when the aperture is 4 mm and the wavelength of light is 400 ηm ?

(1) 24 m (2) 40 m

(3) 18 m (4) 30 m

51. The variation of photo-current with collector potential for different frequencies of incident radiation ν_1, ν_2 and ν_3 is as shown in the graph, then



(1) $\nu_1 = \nu_2 = \nu_3$ (2) $\nu_1 > \nu_2 > \nu_3$

(3) $\nu_1 < \nu_2 < \nu_3$ (4) $\nu_3 = \frac{\nu_1 + \nu_2}{2}$

Space For Rough Work

52. The de Broglie wavelength of an electron accelerated to a potential of 400 V is approximately

(1) 0.03 nm (2) 0.04 nm

(3) 0.12 nm (4) 0.06 nm

53. Total energy of electron in an excited state of hydrogen atom is – 3.4 eV. The kinetic and potential energy of electron in this state

(1) K = – 3.4 eV U = – 6.8 eV

(2) K = 3.4 eV U = – 6.8 eV

(3) K = – 6.8 eV U = + 3.4 eV

(4) K = + 10.2 eV U = – 13.6 eV

54. When electron jumps from n = 4 level to n = 1 level, the angular momentum of electron changes by

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

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

55. A radio-active sample of half-life 10 days contains 1000 x nuclei. Number of original nuclei present after 5 days is

(1) 707 x (2) 750 x

(3) 500 x (4) 250 x

56. An element X decays into element Z by two-step process.

$X \longrightarrow Y + {}^{4}_{2}He$

$Y \longrightarrow Z + 2\bar{e}$ then

(1) X & Z are isobars. (2) X & Y are isotopes.

(3) X & Z are isotones. (4) X & Z are isotopes.

Space For Rough Work

57. A nucleus of mass 20 u emits a γ photon of energy 6 MeV. If the emission assume to occur when nucleus is free and rest, then the nucleus will have kinetic energy nearest to (take $1u = 1.6 \times 10^{-27}$ kg)

(1) 10 KeV
(2) 1 KeV
(3) 0.1 KeV
(4) 100 KeV

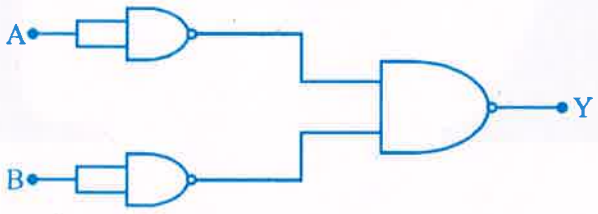
58. Constant DC voltage is required from a variable AC voltage. Which of the following is correct order of operation ?

(1) Regulator, filter, rectifier
(2) Rectifier, regulator, filter
(3) Rectifier, filter, regulator
(4) Filter, regulator, rectifier

59. In a transistor, the collector current varies by 0.49 mA and emitter current varies by 0.50 mA. Current gain β measured is

(1) 49
(2) 150
(3) 99
(4) 100

60. Identify the logic operation carried out by the following circuit.



(1) AND
(2) NAND
(3) NOR
(4) OR

Space For Rough Work

A-1

COMMON ENTRANCE TEST-2016

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[Turn Over

1. The half-life period of a 1st order reaction is 60 minutes. What percentage will be left over after 240 minutes ?

(1) 6.25% (2) 4.25%

(3) 5% (4) 6%

2. Which of the following is not a colligative property ?

(1) Osmotic pressure (2) Optical activity

(3) Depression in Freezing point (4) Elevation in Boiling point

3. The contribution of particle at the edge centre to a particular unit cell is,

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

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

4. When an electrolyte is dissociated in solution, the van't Hoff's factor (i) is,

(1) >1 (2) <1

(3) $= 0$ (4) $= 1$

5. Which of the following is incorrect in a galvanic cell ?

(1) Oxidation occurs at anode.

(2) Reduction occurs at cathode.

(3) The electrode at which electrons are gained is called cathode.

(4) The electrode at which electrons are lost is called cathode.

Space For Rough Work

6. A secondary cell is one

(1) can be recharged.

(2) can be recharged by passing current through it in the same direction.

(3) can be recharged by passing current through it in the opposite direction.

(4) can not recharged.

7. Osmotic pressure of the solution can be increased by,

(1) increasing the temperature of the solution.

(2) decreasing the temperature of the solution.

(3) increasing the volume of the vessel.

(4) diluting the solution.

8. The amount of current in Faraday is required for the reduction of 1 mol of $Cr_2O_7^{--}$ ions to Cr^{3+} is,

(1) 1 F (2) 2 F

(3) 6 F (4) 4 F

9. For a chemical reaction,

$mA \rightarrow xB$, the rate law is $r = k[A]^2$.

If the concentration of A is doubled, the reaction rate will be,

(1) Doubled (2) Quadrupled

(3) Increases by 8 times (4) Unchanged

Space For Rough Work

10. Schottky defect in a crystal is observed when,

(1) Unequal number of cations and anions are missing from the lattice.

(2) Equal number of cations and anions are missing from the lattice.

(3) An ion leaves its normal site and occupies an interstitial site.

(4) No ion is missing from its lattice site

11. $3A \longrightarrow 2B$, rate of reaction $+ \frac{d[B]}{dt}$ is equal to

(1) $-\frac{3}{2}\frac{d[A]}{dt}$

(2) $-\frac{2}{3}\frac{d[A]}{dt}$

(3) $+2\frac{d[A]}{dt}$

(4) $-\frac{1}{3}\frac{d[A]}{dt}$

12. The activation energy of a chemical reaction can be determined by,

(1) evaluating rate constants at two different temperatures.

(2) changing the concentration of reactants.

(3) evaluating the concentration of reactants at two different temperatures.

(4) evaluating rate constant at standard temperature.

13. Which of the following statements is incorrect w.r.t. Physisorption ?

(1) The forces involved are van der Waal's forces.

(2) More easily liquifiable gases are adsorbed easily.

(3) Under high pressure it results into Multi-molecular layer on adsorbent surface.

(4) $\Delta H_{adsorption}$ is low and +Ve.

Space For Rough Work

14. Sulphur sol contains

(1) Discrete S-atoms

(2) Discrete S-molecules

(3) Large aggregates of S-molecules

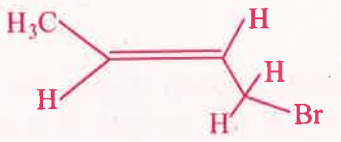
(4) Water dispersed in Solid Sulphur

15. Reactions in Zeolite catalyst depend on,

(1) Pores (2) Apertures

(3) Size of cavity (4) All of these

16. IUPAC name of the compound



is,

(1) 1-Bromo but-2-ene (2) 2-Bromo-2-butene

(3) Bromo butene (4) 1-Bromo but-3-ene

17. Replacement of Cl of Chlorobenzene to give phenol requires drastic conditions, but Cl of 2, 4 – dinitro chlorobenzene is readily replaced. This is because,

(1) $-NO_2$ group makes the ring electron rich at ortho and para positions.

(2) $-NO_2$ group withdraws electrons from meta position.

(3) $-NO_2$ donate electrons at meta position.

(4) $-NO_2$ withdraws electrons from ortho and para positions.

Space For Rough Work

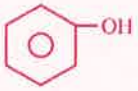
18. In the reaction :

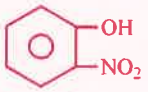
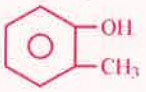
Ethanol $\xrightarrow{PCl_5}$ X $\xrightarrow{\text{alc KOH}}$ Y $\xrightarrow[H_2O,\Delta]{H_2SO_4,\text{ Room temp.}}$ Z, the product Z is,

(1) C_2H_4 (2) $CH_3CH_2OCH_2CH_3$

(3) $CH_3CH_2OSO_3H$ (4) 

19. Which of the following compound is most acidic ?

(1) $Cl - CH_2 - CH_2 - OH$ (2). 

(3)  (4) 

20. Benzene carbaldehyde is reacted with concentrated NaOH solution to give the products A and B. The product A can be used food preservative and the product B is an aromatic hydroxy compound where OH gorup is linked to sp^3 hybridised carbon atom next to Benzene ring. The products A and B are respectively,

(1) Sodium benzoate and phenol

(2) Sodium benzoate and phenyl methanol

(3) Sodium benzoate and cresol

(4) Sodium benzoate and picric acid

21. The reaction which involves dichlorocarbene as an electrophile is,

(1) Reimer-Tiemann reaction (2) Kolbe's reaction

(3) Friedel-Craft's acylation (4) Fittig's reaction.

Space For Rough Work

22. Ethanol is converted into ethoxy ethane,

(1) by heating excess of ethanol with conc. H_2SO_4 at 140 °C.

(2) by heating Ethanol with excess of conc. H_2SO_4 at 443 K.

(3) by treating with conc. H_2SO_4 at room temperature.

(4) by treating with conc. H_2SO_4 at 273 K.

23. An organic compound X is oxidised by using acidified $K_2Cr_2O_7$ solution. The product obtained reacts with phenyl hydrazine but does not answer silver mirror test. The compound X is,

(1) 2–propanol (2) Ethanal

(3) Ethanol (4) $CH_3CH_2CH_3$

24. Predict the product 'C' in the following series of reactions :

$$CH_3 - COOH \xrightarrow{PCl_5} A \xrightarrow[\text{Anhyd } AlCl_3]{C_6H_6} B \xrightarrow{CH_3MgBr} C$$

(1)  (2) $CH_3CH(OH)C_6H_5$

(3) $CH_3CH(OH)C_2H_5$ (4) $(CH_3)_2C(OH)C_6H_5$

25. The number of oxygen atoms in 4.4 gm of CO_2 is,

(1) 1.2×10^{23} (2) 6×10^{22}

(3) 6×10^{23} (4) 12×10^{23}

Space For Rough Work

26. If the bond energies of H–H, Br–Br and H–Br are 433, 192 and 364 kJ mol^{-1} respectively, then $\Delta H°$ for the reaction :

$H_{2(g)} + Br_{2(g)} \rightarrow 2HBr_{(g)}$ is

(1) –261 kJ (2) +103 kJ

(3) +261 kJ (4) – 103 kJ

27. In the reaction; $Fe(OH)_{3(s)} \rightleftharpoons Fe^{3+}_{(aq)} + 3OH^{-}_{(aq)}$, if the concentration of OH^- ions is decreased by $\frac{1}{4}$ times, then the equilibrium concentration of Fe^{3+} will increase by,

(1) 8 times (2) 16 times

(3) 64 times (4) 4 times

28. The correct statement regarding entropy is,

(1) At absolute zero temperature, entropy of a perfectly crystalline solid is zero.

(2) At absolute zero temperature, the entropy of a perfectly crystalline substance is +Ve.

(3) At absolute zero temperature, the entropy of all crystalline substances is zero.

(4) At 0 °C, the entropy of a perfect crystalline solid is zero.

29. Equilibrium constants K_1 and K_2 for the following equilibria

(a) $NO_{(g)} + \frac{1}{2}O_{2(g)} \rightleftharpoons NO_{2(g)}$

(b) $2NO_{2(g)} \rightleftharpoons 2NO_{(g)} + O_{2(g)}$

are related as :

(1) $K_1 = \sqrt{K_2}$ (2) $K_2 = \frac{1}{K_1}$

(3) $K_1 = 2\,K_2$ (4) $K_2 = \frac{1}{K_1^2}$

Space For Rough Work

30. Van-Arkel method of refining Zirconium involves,

(1) removing all oxygen and nitrogen impurities.

(2) removing CO impurity

(3) removing Hydrogen impurity

(4) removing silica impurity

31. The composition of 'copper matte' is,

(1) $Cu_2S + FeS$ (2) $Cu_2S + Cu_2O$

(3) $Cu_2S + FeO$ (4) $Cu_2O + FeS$

32. The complex formed when Al_2O_3 is leached from Bauxite using concentrated NaOH solution is,

(1) $Na[Al(OH)_4]$ (2) $NaAl_2O_4$

(3) $Na_2[Al(OH)_3]$ (4) Na_2AlO_2

33. The property which is **not** true about Fluorine is,

(1) Most of its reactions are exothermic.

(2) It forms only one oxo acid.

(3) Highest electronegativity.

(4) High F-F bond dissociation enthalpy.

Space For Rough Work

34. Which is true regarding nitrogen ?

(1) Less electronegative
(2) Has low ionisation enthalpy
(3) d-orbitals are available
(4) Ability to form $p\pi - p\pi$ bonds with itself

35. The shape of XeF_6 is,

(1) Square planar
(2) Distorted octahedral
(3) Square pyrimidal
(4) Pyramidal

36. The number of isomers possible for the octahedral complex $[CoCl_2(en)(NH_3)_2]^+$ is,

(1) Two
(2) Three
(3) No isomer
(4) Four isomers

37. CO is a stronger ligand than Cl^-, because

(1) CO is a neutral molecule.
(2) CO has π-bonds.
(3) CO is poisonous.
(4) CO is more reactive.

38. The bivalent metal ion having maximum paramagnetic behaviour among the first transition series elements is,

(1) Mn^{2+}
(2) Cu^{2+}
(3) Sc^{2+}
(4) Cu^+

Space For Rough Work

39. When a brown compound of Mn (A) is treated with HCl, it gives a gas (B). The gas (B) taken in excess reacts with NH_3 to give an explosive compound (C).

The compounds A, B and C are;

(1) $A = MnO_2$, $B = Cl_2$, $C = NCl_3$

(2) $A = MnO$, $B = Cl_2$, $C = NH_4Cl$

(3) $A = Mn_3O_4$, $B = Cl_2$, $C = NCl_3$

(4) $A = MnO_3$, $B = Cl_2$, $C = NCl_2$

40. Mn^{2+} compounds are more stable than Fe^{2+} compounds towards oxidation to their +3 state, because

(1) Mn^{2+} is more stable with high 3rd Ionisation energy.

(2) Mn^{2+} is bigger in size.

(3) Mn^{2+} has completely filled d-orbitals.

(4) Mn^{2+} does not exist.

41. Which of the following sequence is correct regarding field strength of ligands as per spectrochemical series ?

(1) $SCN^- < F^- < CN^- < CO$ (2) $F^- < SCN^- < CN^- < CO$

(3) $CN^- < F^- < CO < SCN^-$ (4) $SCN^- < CO < F^- < CN^-$

42. As per IUPAC norms, the name of the complex $[Co(en)_2(ONO)Cl]Cl$ is

(1) Chlorido bis(ethane-1, 2 – diamine) nitro-o-cobalt (III) chloride.

(2) Chloro bis(ethylene diamine) nitro-o-cobalt (III) chloride.

(3) Chlorido di(ethylene diamine) nitro cobalt (III) chloride.

(4) Chloro ethylene diamine nitro-o-cobalt (III) chloride.

Space For Rough Work

43. In the following sequence of reactions ;

$$A \xrightarrow{\text{Reduction}} B \xrightarrow{HNO_2} CH_3CH_2OH$$

The compound A is

(1) Propane nitrile (2) Ethane nitrile

(3) CH_3NO_2 (4) CH_3NC

44. An organic compound A on reduction gives compound B, which on reaction with trichloro methane and caustic potash forms C. The compound 'C' on catalytic reduction gives N–methyl benzenamine, the compound 'A' is,

(1) Nitrobenzene (2) Nitromethane

(3) Methanamine (4) Benzenamine

45. Which of the following gives positive Fehling's solution test ?

(1) Sucrose (2) Glucose

(3) Fats (4) Protein

46. A liquid can exist only,

(1) Between triple point and critical point.

(2) At any temperature above melting point.

(3) Between melting point and critical point.

(4) Between boiling and melting points.

Space For Rough Work

47. The energy of electron in the n^{th} Bohr orbit of H-atom is

(1) $\frac{-13.6}{n^2}$eV (2) $\frac{-13.6}{n}$eV

(3) $\frac{-13.6}{n^4}$eV (4) $\frac{-13.6}{n^3}$eV

48. Consider the following sets of quantum numbers :

Which of the below setting is not permissible arrangement of electrons in an atom ?

	n	l	m	s
(1)	4	0	0	$-\frac{1}{2}$
(2)	5	3	0	$+\frac{1}{2}$
(3)	3	2	–2	$-\frac{1}{2}$
(4)	3	2	–3	$+\frac{1}{2}$

49. The increasing order of bond order of O_2, O_2^+, O_2^- and O_2^{--} is

(1) $O_2^+, O_2, O_2^-, O_2^{--}$ (2) $O_2^{--}, O_2^-, O_2^+, O_2$

(3) $O_2, O_2^+, O_2^-, O_2^{--}$ (4) $O_2^{2-}, O_2^-, O_2, O_2^+$

50. HC*l* gas is covalent and NaC*l* is an ionic compound. This is because

(1) Sodium is highly electro +Ve.

(2) Hydrogen is a non-metal.

(3) HC*l* is a gas.

(4) Electronegativity difference between H and C*l* is less than 2.1.

Space For Rough Work

51. Which of the following is not true ?

(1) In vulcanisation the rubber becomes harder and stronger.

(2) Natural rubber has 'trans' configuration at every double bond.

(3) Buna-S is a co-polymer of Butene and styrene.

(4) Natural rubber is 1, 4-polymer of isoprene.

52. Which of the following is a polyamide ?

(1) Nylon-6, 6 (2) Terylene

(3) Polythene (4) Buna-S

53. Which of the following is correct about H-bonding in DNA ?

(1) A – T, G – C (2) A – G, T – C

(3) G – T, A – C (4) A – A, T – T

54. Which of the following is employed as Tranquilizer ?

(1) Equanil (2) Naproxen

(3) Tetracyclin (4) Dettol

55. Reactivity of order of halides for dehydrohalogenation is

(1) R – F > R – Cl > R – Br > R – I

(2) R – I > R – Br > R – Cl > R – F

(3) R – I > R – Cl > R – Br > R – F

(4) R – F > R – I > R – Br > R – Cl

Space For Rough Work

56. Main axis of diatomic molecule is Z. The orbitals P_x and P_y overlap to form

(1) π - molecular orbital (2) σ - molecular orbital

(3) δ - molecular orbital (4) No bond is formed.

57. The hybridisation of C in diamond, graphite and ethyne is in the order

(1) sp^3, sp, sp^2 (2) sp^3, sp^2, sp

(3) sp, sp^2, sp^3 (4) sp^2, sp^3, sp

58. A miscible mixture of C_6H_6 + $CHCl_3$ can be separated by

(1) Sublimation (2) Distillation

(3) Filtration (4) Crystallisation

59. An organic compound contains C = 40%, H = 13.33% and N = 46.67%. Its emperical formula is

(1) C_2H_2N (2) C_3H_7N

(3) CH_4N (4) CHN

60. Electrophile that participates in nitration of benzene is

(1) NO^+ (2) NO_2^+

(3) NO (4) NO_3^-

Space For Rough Work

A-1

COMMON ENTRANCE TEST-2016

DATE	SUBJECT	TIME
DAY-1	MATHEMATICS	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	381617

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.
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1. The Set A has 4 elements and the Set B has 5 elements then the number of injective mappings that can be defined from A to B is

(1) 144 (2) 72

(3) 60 (4) 120

2. Let $f : R \to R$ be defined by $f(x) = 2x + 6$ which is a bijective mapping then $f^{-1}(x)$ is given by

(1) $\frac{x}{2} - 3$ (2) $2x + 6$

(3) $x - 3$ (4) $6x + 2$

3. Let $*$ be a binary operation defined on R by $a * b = \frac{a+b}{4} \forall a, b \in R$ then the operation $*$ is

(1) Commutative and Associative

(2) Commutative but not Associative

(3) Associative but not Commutative

(4) Neither Associative nor Commutative

4. The value of $\sin^{-1}\left(\cos\frac{53\pi}{5}\right)$ is

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

(3) $\frac{\pi}{10}$ (4) $\frac{-\pi}{10}$

Space For Rough Work

5. If $3\tan^{-1}x + \cot^{-1}x = \pi$ then x equal to

(1) 0 (2) 1

(3) -1 (4) 1/2

6. The simplified form of $\tan^{-1}\left(\frac{x}{y}\right) - \tan^{-1}\left(\frac{x-y}{x+y}\right)$ is equal to

(1) 0 (2) $\frac{\pi}{4}$

(3) $\frac{\pi}{2}$ (4) π

7. If x y z are all different and not equal to zero and $\begin{vmatrix} 1+x & 1 & 1 \\ 1 & 1+y & 1 \\ 1 & 1 & 1+z \end{vmatrix} = 0$

then the value of $x^{-1} + y^{-1} + z^{-1}$ is equal to

(1) xyz (2) $x^{-1}\, y^{-1}\, z^{-1}$

(3) $-x - y - z$ (4) -1

8. If A is any square matrix of order 3×3 then $|3A|$ is equal to

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

(3) $27|A|$ (4) $9|A|$

Space For Rough Work

9. If $y = e^{\sin^{-1}(t^2-1)}$ & $x = e^{\sec^{-1}\left(\frac{1}{t^2-1}\right)}$ then $\frac{dy}{dx}$ is equal to

(1) $\frac{x}{y}$ (2) $\frac{-y}{x}$

(3) $\frac{y}{x}$ (4) $\frac{-x}{y}$

10. If $A = \frac{1}{\pi}\begin{bmatrix} \sin^{-1}(\pi x) & \tan^{-1}(\frac{x}{\pi}) \\ \sin^{-1}(\frac{x}{\pi}) & \cot^{-1}(\pi x) \end{bmatrix}$, $B = \frac{1}{\pi}\begin{bmatrix} -\cos^{-1}(\pi x) & \tan^{-1}(\frac{x}{\pi}) \\ \sin^{-1}(\frac{x}{\pi}) & -\tan^{-1}(\pi x) \end{bmatrix}$ then A – B is equal to

(1) I (2) 0

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

11. If $x^y = e^{x-y}$ then $\frac{dy}{dx}$ is equal to

(1) $\frac{\log x}{\log(x-y)}$ (2) $\frac{e^x}{x^{x-y}}$

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

12. If A is a matrix of order m × n and B is a matrix such that AB' and B'A are both defined, the order of the matrix B is

(1) m × m (2) n × n

(3) n × m (4) m × n

Space For Rough Work

13. The value of $\int \frac{e^x(1+x)dx}{\cos^2(e^x.x)}$ is equal to

(1) $-\cot(e\,x^x)+c$ (2) $\tan(e^x.x)+c$

(3) $\tan(e^x)+c$ (4) $\cot(e^x)+c$

14. If x y z are not equal and $\neq 0, \neq 1$ the value of $\begin{vmatrix} \log x & \log y & \log z \\ \log 2x & \log 2y & \log 2z \\ \log 3x & \log 3y & \log 3z \end{vmatrix}$ is equal to

(1) $\log(x\,y\,z)$ (2) $\log(6\,x\,y\,z)$

(3) 0 (4) $\log(x+y+z)$

15. The function $f(x) = [x]$ where $[x]$ the greatest integer function is continuous at

(1) 1.5 (2) 4

(3) 1 (4) -2

16. The value of $\int \frac{e^x(x^2\tan^{-1}x+\tan^{-1}x+1)}{x^2+1}dx$ is equal to

(1) $e^x\tan^{-1}x+c$ (2) $\tan^{-1}(e^x)+c$

(3) $\tan^{-1}(x^e)+c$ (4) $e^{\tan^{-1}x}+c$

Space For Rough Work

17. If $2\vec{a}.\vec{b} = |\vec{a}|.|\vec{b}|$ then the angle between $\vec{a}$ & $\vec{b}$ is

(1) 30° (2) 0°

(3) 90° (4) 60°

18. If $x^m y^n = (x+y)^{m+n}$ then $\frac{dy}{dx}$ is equal to

(1) $\frac{x+y}{xy}$ (2) xy

(3) 0 (4) $\frac{y}{x}$

19. The general solution of $\cot\theta + \tan\theta = 2$ is

(1) $\theta = \frac{n\pi}{2} + (-1)^n \pi/8$ (2) $\frac{n\pi}{2} + (-1)^n \pi/4$

(3) $\theta = \frac{n\pi}{2} + (-1)^n \pi/6$ (4) $\theta = n\pi + (-1)^n \pi/8$

20. The value of $\int_{-\pi/4}^{\pi/4} \sin^{103}x.\cos^{101}x\,dx$ is

(1) $(\pi/4)^{103}$ (2) $\left(\frac{\pi}{4}\right)^{101}$

(3) 2 (4) 0

Space For Rough Work

21. The length of latus rectum of the parabola $4y^2 + 3x + 3y + 1 = 0$ is

(1) $4/3$ (2) 7

(3) 12 (4) $3/4$

22. The value of $\int \frac{e^{6\log x} - e^{5\log x}}{e^{4\log x} - e^{3\log x}} dx$ is equal to

(1) 0 (2) $\frac{x^3}{3}$

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

23. The differential coefficient of $\log_{10} x$ with respect to $\log_x 10$ is

(1) 1 (2) $-(\log_{10} x)^2$

(3) $(\log_x 10)^2$ (4) $\frac{x^2}{100}$

24. The slope of the tangent to the curve $x = t^2 + 3t - 8$, $y = 2t^2 - 2t - 5$ at the point $(2, -1)$ is

(1) $\frac{22}{7}$ (2) $\frac{6}{7}$

(3) $\frac{7}{6}$ (4) $\frac{-6}{7}$

Space For Rough Work

25. The real part of $(1 - \cos\theta + i \sin\theta)^{-1}$ is

(1) $\frac{1}{2}$ (2) $\frac{1}{1+\cos\theta}$

(3) $\tan\frac{\theta}{2}$ (4) $\cot\frac{\theta}{2}$

26. $\int_0^{\pi/2} \frac{\sin^{1000} x \, dx}{\sin^{1000} x + \cos^{1000} x}$ is equal to

(1) 1000 (2) 1

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

27. If $1 + \sin\theta + \sin^2\theta + \ldots$ upto $\infty = 2\sqrt{3} + 4$, then $\theta =$ _____

(1) $\pi/6$ (2) $\pi/4$

(3) $\pi/3$ (4) $3\pi/4$

28. $\lim_{x \to 0} \frac{xe^x - \sin x}{x}$ is equal to

(1) 3 (2) 1

(3) 0 (4) 2

Space For Rough Work

29. If $\tan^{-1}(x^2 + y^2) = \alpha$ then $\frac{dy}{dx}$ is equal to

(1) $\frac{-x}{y}$ (2) xy

(3) $\frac{x}{y}$ (4) $-xy$

30. The simplified form of $i^n + i^{n+1} + i^{n+2} + i^{n+3}$ is

(1) 0 (2) 1

(3) -1 (4) i

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

(1) Touch each other

(2) Cut each other at right angle

(3) Cut at an angle $\pi/3$

(4) Cut at an angle $\pi/4$

32. The equation of the normal to the curve $y(1 + x^2) = 2 - x$ where the tangent crosses x-axis is

(1) $5x - y - 10 = 0$ (2) $x - 5y - 10 = 0$

(3) $5x + y + 10 = 0$ (4) $x + 5y + 10 = 0$

Space For Rough Work

33. The maximum value of $\left(\frac{1}{x}\right)^x$ is

(1) e (2) e^e

(3) $e^{1/e}$ (4) $\left(\frac{1}{e}\right)^e$

34. The solution for the differential equation $\frac{dy}{y}+\frac{dx}{x}=0$ is

(1) $\frac{1}{y}+\frac{1}{x}=c$ (2) $\log x \cdot \log y = c$

(3) $xy=c$ (4) $x+y=c$

35. The order and degree of the differential equation $\left[1+\left(\frac{dy}{dx}\right)^2+\sin\left(\frac{dy}{dx}\right)\right]^{3/4}=\frac{d^2y}{dx^2}$

(1) order = 2, degree = 3 (2) order = 2, degree = 4

(3) order = 2, degree = $\frac{3}{4}$ (4) order = 2, degree = not defined

36. If $\vec{a}$ and $\vec{b}$ are unit vectors then what is the angle between $\vec{a}$ and $\vec{b}$ for $\sqrt{3}\,\vec{a}-\vec{b}$ to be unit vector ?

(1) 30° (2) 45°

(3) 60° (4) 90°

Space For Rough Work

37. The sum of 1st n terms of the series

$$\frac{1^2}{1}+\frac{1^2+2^2}{1+2}+\frac{1^2+2^2+3^2}{1+2+3}+\ldots$$

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

(3) $\frac{n(n-2)}{3}$ (4) $\frac{n(n-2)}{6}$

38. The 11^{th} term in the expansion of $\left(x+\frac{1}{\sqrt{x}}\right)^{14}$ is

(1) $\frac{999}{x}$ (2) $\frac{1001}{x}$

(3) i (4) $\frac{x}{1001}$

39. Suppose $\vec{a}+\vec{b}+\vec{c}=0$, $|\vec{a}|=3$, $|\vec{b}|=5$, $|\vec{c}|=7$, then the angle between $\vec{a}$ & $\vec{b}$ is

(1) π (2) $\pi/2$

(3) $\pi/3$ (4) $\pi/4$

40. If a = 3, b = 4, c = 5 each one of $\vec{a},\vec{b}$ & $\vec{c}$ is perpendicular to the sum of the remaining then $|\vec{a}+\vec{b}+\vec{c}|$ is equal to

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

(3) $5\sqrt{2}$ (4) $\sqrt{5}$

Space For Rough Work

41. If the straight lines $2x + 3y - 3 = 0$ and $x + ky + 7 = 0$ are perpendicular, then the value of k is

(1) $^2/_3$ (2) $^3/_2$

(3) $^{-2}/_3$ (4) $^{-3}/_2$

42. The rate of change of area of a circle with respect to its radius at r = 2 cms is

(1) 4 (2) 2π

(3) 2 (4) 4π

43. The value of $\tan\frac{\pi}{8}$ is equal to

(1) $\frac{1}{2}$ (2) $\sqrt{2}+1$

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

44. Area lying between the curves $y^2 = 2x$ and $y = x$ is

(1) $\frac{2}{3}$ sq. units (2) $\frac{1}{3}$ sq. units

(3) $\frac{1}{4}$ sq. units (4) $\frac{3}{4}$ sq. units

45. If $P(A \cap B) = {}^7/_{10}$ and $P(B) = {}^{17}/_{20}$, where P stands for probability then P(A|B) is equal to

(1) $^7/_8$ (2) $^{17}/_{20}$

(3) $^{14}/_{17}$ (4) $^1/_8$

Space For Rough Work

46. The coefficient of variation of two distributions are 60 and 70. The standard deviation are 21 and 16 respectively, then their mean is

(1) 35 (2) 23

(3) 28.25 (4) 22.85

47. Two cards are drawn at random from a pack of 52 cards. The probability of these two being "Aces" is

(1) $\frac{1}{26}$ (2) $\frac{1}{221}$

(3) $\frac{1}{2}$ (4) $\frac{1}{13}$

48. If $\sin^{-1}x + \sin^{-1}y = \frac{\pi}{2}$, then x^2 is equal to

(1) $1 - y^2$ (2) y^2

(3) 0 (4) $\sqrt{1-y}$

49. The value of $\int_2^8 \frac{\sqrt{10-x}}{\sqrt{x}+\sqrt{10-x}} dx$ is

(1) 10 (2) 0

(3) 8 (4) 3

50. The contrapositive of the converse of the statement "If x is a prime number then x is odd" is

(1) If x is not a prime number then x is odd.

(2) If x is not an odd number then x is not a prime number.

(3) If x is a prime number then it is not odd.

(4) If x is not a prime number then x is not an odd.

Space For Rough Work

51. Two dice are thrown simultaneously, the probability of obtaining a total score of 5 is

(1) $\frac{1}{18}$ (2) $\frac{1}{12}$

(3) $\frac{1}{9}$ (4) $\frac{1}{6}$

52. If $A = \begin{bmatrix} \cos 2\theta & -\sin 2\theta \\ \sin 2\theta & \cos 2\theta \end{bmatrix}$ and $A + A^T = I$,

where I is the unit matrix of 2×2 & A^T is the transpose of A, then the value of θ is equal to

(1) $\pi/6$ (2) $\pi/3$

(3) π (4) $3\pi/2$

53. If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ then $A^2 - 5A$ is equal to

(1) I (2) $-I$

(3) $7I$ (4) $-7I$

54. The value of x if $x(\hat{i} + \hat{j} + \hat{k})$ is a unit vector is

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

(3) ± 3 (4) $\pm\frac{1}{3}$

55. If $x = 2 + 3\cos\theta$ and $y = 1 - 3\sin\theta$ represent a circle then the centre and radius is

(1) (2, 1), 9 (2) (2, 1), 3

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

Space For Rough Work

56. The vector equation of the plane which is at a distance of $3/\sqrt{14}$ from the origin and the normal from the origin is $2\hat{i}-3\hat{j}+\hat{k}$ is

(1) $\vec{r}.(2\hat{i}-3\hat{j}+\hat{k})=3$ (2) $\vec{r}.(\hat{i}+\hat{j}+\hat{k})=9$

(3) $\vec{r}.(\hat{i}+2\hat{j})=3$ (4) $\vec{r}.(2\hat{i}+\hat{k})=3$

57. Find the co-ordinates of the foot of the perpendicular drawn from the origin to the plane $5y+8=0$:

(1) $\left(0,-\frac{18}{5},2\right)$ (2) $\left(0,\frac{8}{5},0\right)$

(3) $\left(\frac{8}{25},0,0\right)$ (4) $\left(0,-\frac{8}{5},0\right)$

58. If $\cos\alpha$, $\cos\beta$, $\cos\gamma$ are the direction cosines of a vector $\vec{a}$, then $\cos 2\alpha+\cos 2\beta+\cos 2\gamma$ is equal to

(1) 2 (2) 3

(3) -1 (4) 0

59. The value of the $\sin 1^\circ+\sin 2^\circ+\ldots..+\sin 359^\circ$ is equal to

(1) 0 (2) 1

(3) -1 (4) 180

60. Integrating factor of $x\frac{dy}{dx}-y=x^4-3x$ is

(1) x (2) $\log x$

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

Space For Rough Work

A-1