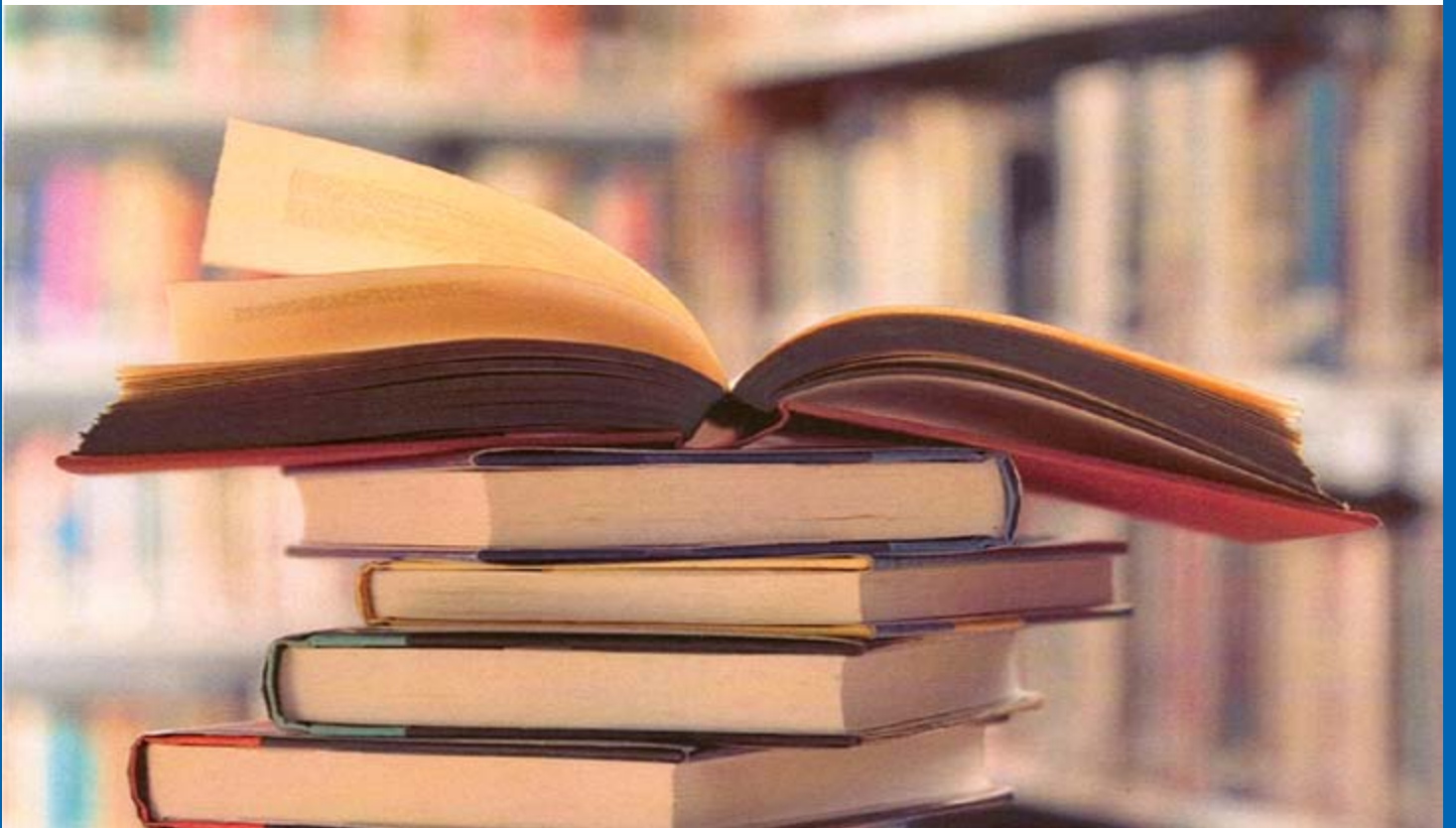


# KCET

# Question Papers

# 2016



## 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 2<sup>nd</sup> 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 3<sup>rd</sup> 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.
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P



[Turn Over

1. A body falls freely for 10 sec. Its average velocity during this journey (take  $g = 10 \text{ ms}^{-2}$ )
- (1)  $100 \text{ ms}^{-1}$  (2)  $10 \text{ ms}^{-1}$   
(3)  $50 \text{ ms}^{-1}$  (4)  $5 \text{ ms}^{-1}$
2. Three projectiles A, B and C are projected at an angle of  $30^\circ$ ,  $45^\circ$ ,  $60^\circ$  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  $45^\circ$  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  $g = 10 \text{ ms}^{-2}$ )
- (1)  $5.0 \text{ ms}^{-2}$  (2)  $3.0 \text{ ms}^{-2}$   
(3)  $1.5 \text{ ms}^{-2}$  (4)  $15 \text{ ms}^{-2}$
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

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Space For Rough Work





16. If there are only one type of charge in the universe, then

( $\vec{E}$   $\rightarrow$  Electric field,  $\vec{ds}$   $\rightarrow$  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)  $\oint \vec{E} \cdot \vec{ds} = \infty$  if charge is inside
- (4)  $\oint \vec{E} \cdot \vec{ds} = 0$  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  $r \gg a$

- (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

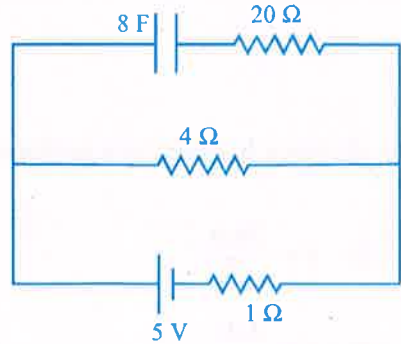
- (1) Ellipsoid with charge at foci.
- (2) Sphere with charge at the centre of the sphere.
- (3) Sphere with charge on the surface of the sphere.
- (4) Plane with charge on the surface.

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Space For Rough Work

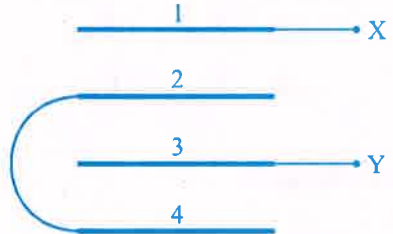
20. A particle of mass 1 gm and charge  $1 \mu\text{C}$  is held at rest on a frictionless horizontal surface at distance 1 m from the fixed charge 2 mC. If the particle is released, it will be repelled. The speed of the particle when it is at a distance of 10 m from the fixed charge
- (1)  $60 \text{ ms}^{-1}$  (2)  $100 \text{ ms}^{-1}$   
 (3)  $90 \text{ ms}^{-1}$  (4)  $180 \text{ ms}^{-1}$

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)



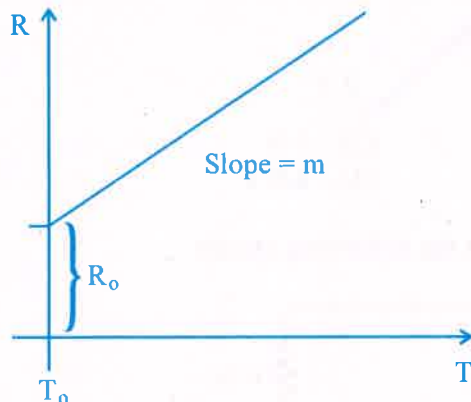
- (1)  $\frac{3}{2} \frac{\epsilon_0 A}{d}$  (2)  $\frac{2\epsilon_0 A}{d}$   
 (3)  $\frac{2}{3} \frac{\epsilon_0 A}{d}$  (4)  $\frac{3\epsilon_0 A}{d}$

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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.

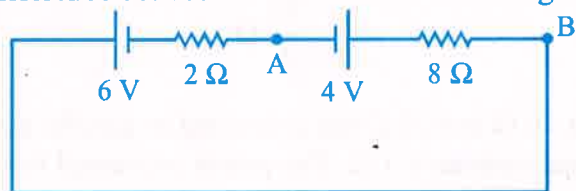
24. Variation of resistance of the conductor with temperature is as shown



The temperature co-efficient ( $\alpha$ ) of the conductor is

- (1)  $\frac{R_0}{m}$
- (2)  $mR_0$
- (3)  $m^2R_0$
- (4)  $\frac{m}{R_0}$

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

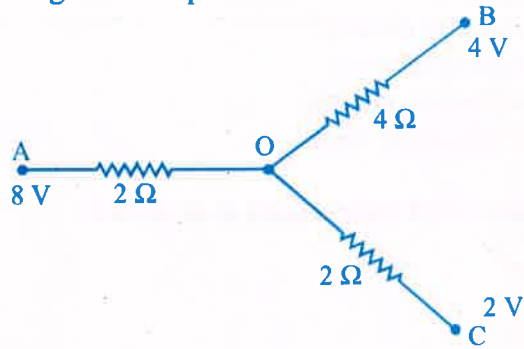


- (1) 4 V
- (2) 5.6 V
- (3) 2.8 V
- (4) 6 V

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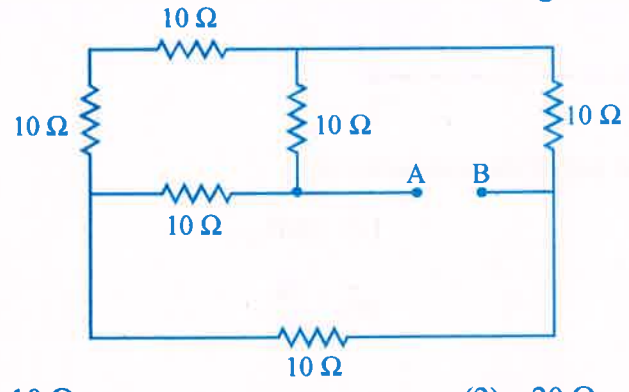
**Space For Rough Work**

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

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Space For Rough Work

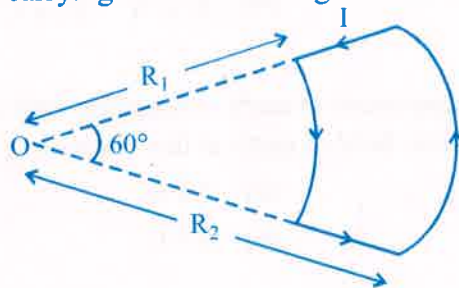
29. A proton is projected with a uniform velocity 'v' along the axis of a current carrying solenoid, then

- (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 ( $\omega$  = angular velocity,  $v$  = linear velocity)

- (1) both  $\omega$  and  $v$  increases
- (2)  $\omega$  only increases,  $v$  remains constant
- (3)  $v$  increases,  $\omega$  remains constant
- (4)  $v$  increases,  $\omega$  decreases

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



$$(1) \frac{\mu_0 i}{12} \left[ \frac{1}{R_1} - \frac{1}{R_2} \right]$$

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

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

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

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)  $10.8 \times 10^3$  C
- (2)  $10.8 \times 10^4$  C
- (3)  $5.4 \times 10^3$  C
- (4)  $1.8 \times 10^4$  C

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Space For Rough Work

33. A galvanometer coil has a resistance of  $50 \Omega$  and the meter shows full scale deflection for a current of  $5 \text{ mA}$ . This galvanometer is converted into voltmeter of range  $0 - 20 \text{ V}$  by connecting
- (1)  $3950 \Omega$  in series with galvanometer
  - (2)  $4050 \Omega$  in series with galvanometer
  - (3)  $3950 \Omega$  in parallel with galvanometer
  - (4)  $4050 \Omega$  in parallel with galvanometer
34.  $\chi_1$  and  $\chi_2$  are susceptibility of a paramagnetic material at temperatures  $T_1 \text{ K}$  and  $T_2 \text{ K}$  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  $3.0 \text{ G}$  and the angle dip at that place is  $30^\circ$ . The magnetic field of earth at that location
- (1)  $4.5 \text{ G}$
  - (2)  $5.1 \text{ G}$
  - (3)  $3.5 \text{ G}$
  - (4)  $6.0 \text{ G}$
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  $\text{cm}$  carries a current of  $1 \text{ A}$ . The magnetic energy stored per unit volume is \_\_\_\_\_  $\text{J/m}^3$ .
- (1)  $3.2 \pi$
  - (2)  $32 \pi$
  - (3)  $1.6 \pi$
  - (4)  $6.4 \pi$

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**Space For Rough Work**

38. A wheel with 10 spokes each of length 'L' m is rotated with a uniform angular velocity ' $\omega$ ' 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)  $\omega bL^2$  (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  $\mu\text{F}$  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  $v = v_0 \sin \omega t$ ,  $i = i_0 \sin \left( \omega t + \frac{\pi}{3} \right)$

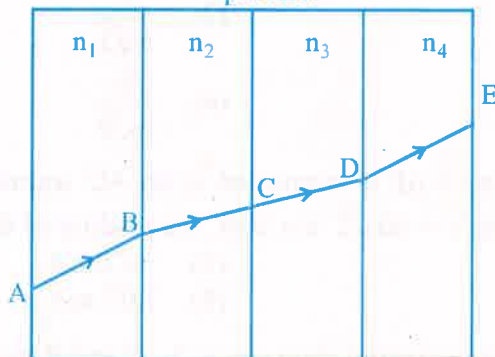
The average power dissipated in the circuit over a cycle of AC is

- (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

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**Space For Rough Work**

43. Electromagnetic radiation used to sterilise milk is  
 (1) X-ray (2)  $\gamma$ -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



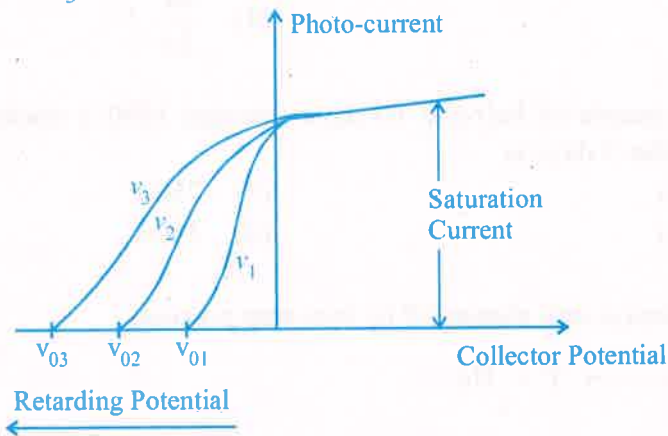
If the emergent ray DE is parallel to incident ray AB, then

- (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)  $30^\circ$  (2)  $45^\circ$   
 (3)  $60^\circ$  (4)  $50^\circ$

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**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  $600 \text{ nm}$  is incident normally on a slit of width  $0.2 \text{ mm}$ . The angular width of central maxima in the diffraction pattern is (measured from minimum to minimum)
- (1)  $6 \times 10^{-3} \text{ rad}$
  - (2)  $4 \times 10^{-3} \text{ rad}$
  - (3)  $2.4 \times 10^{-3} \text{ rad}$
  - (4)  $4.5 \times 10^{-3} \text{ rad}$
50. For what distance is ray optics is good approximation when the aperture is  $4 \text{ mm}$  and the wavelength of light is  $400 \text{ nm}$  ?
- (1)  $24 \text{ m}$
  - (2)  $40 \text{ m}$
  - (3)  $18 \text{ m}$
  - (4)  $30 \text{ m}$
51. The variation of photo-current with collector potential for different frequencies of incident radiation  $\nu_1, \nu_2$  and  $\nu_3$  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)  $\nu_3 = \frac{\nu_1 + \nu_2}{2}$

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Space For Rough Work



57. A nucleus of mass 20 u emits a  $\gamma$  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

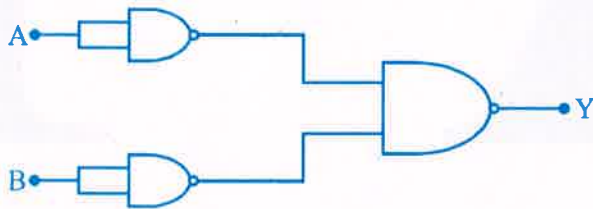
58. Constant DC voltage is required from a variable AC voltage. Which of the following is correct order of operation ?

- (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  $\beta$  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

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Space For Rough Work



A-1

## COMMON ENTRANCE TEST-2016

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MAXIMUM MARKS	TOTAL DURATION	MAXIMUM TIME FOR ANSWERING
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MENTION YOUR CET NUMBER		QUESTION BOOKLET DETAILS
		VERSION CODE      SERIAL NUMBER
		<b>A - 1</b> <b>782417</b>

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C



[Turn Over

1. The half-life period of a 1<sup>st</sup> 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.

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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  $\text{Cr}_2\text{O}_7^{--}$  ions to  $\text{Cr}^{3+}$  is,

- (1) 1 F
- (2) 2 F
- (3) 6 F
- (4) 4 F

9. For a chemical reaction,

$m\text{A} \rightarrow x\text{B}$ , the rate law is  $r = k[\text{A}]^2$ .

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

- (1) Doubled
- (2) Quadrupled
- (3) Increases by 8 times
- (4) Unchanged

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

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**Space For Rough Work**

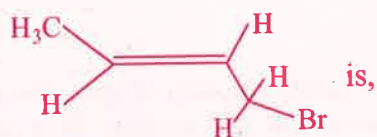
14. Sulphur sol contains

- (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



- |                       |                       |
|-----------------------|-----------------------|
| (1) 1-Bromo but-2-ene | (2) 2-Bromo-2-butene  |
| (3) Bromo butene      | (4) 1-Bromo but-3-ene |

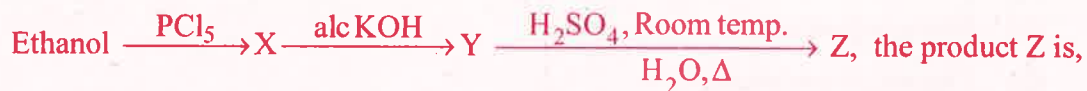
17. Replacement of Cl of Chlorobenzene to give phenol requires drastic conditions, but Cl of 2, 4 - dinitro chlorobenzene is readily replaced. This is because,


- (1)  $-\text{NO}_2$  group makes the ring electron rich at ortho and para positions.
- (2)  $-\text{NO}_2$  group withdraws electrons from meta position.
- (3)  $-\text{NO}_2$  donate electrons at meta position.
- (4)  $-\text{NO}_2$  withdraws electrons from ortho and para positions.

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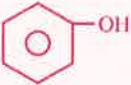
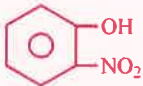
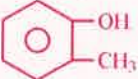
**Space For Rough Work**

18. In the reaction :



- (1)  $\text{C}_2\text{H}_4$  (2)  $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$   
(3)  $\text{CH}_3\text{CH}_2\text{OSO}_3\text{H}$  (4) 

19. Which of the following compound is most acidic ?

- (1)  $\text{Cl}-\text{CH}_2-\text{CH}_2-\text{OH}$  (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 group is linked to  $\text{sp}^3$  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.

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Space For Rough Work

22. Ethanol is converted into ethoxy ethane,

- (1) by heating excess of ethanol with conc.  $\text{H}_2\text{SO}_4$  at  $140^\circ\text{C}$ .
- (2) by heating Ethanol with excess of conc.  $\text{H}_2\text{SO}_4$  at  $443\text{ K}$ .
- (3) by treating with conc.  $\text{H}_2\text{SO}_4$  at room temperature.
- (4) by treating with conc.  $\text{H}_2\text{SO}_4$  at  $273\text{ K}$ .

23. An organic compound X is oxidised by using acidified  $\text{K}_2\text{Cr}_2\text{O}_7$  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) $\text{CH}_3\text{CH}_2\text{CH}_3$ |

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



25. The number of oxygen atoms in  $4.4\text{ gm}$  of  $\text{CO}_2$  is,

- |                          |                         |
|--------------------------|-------------------------|
| (1) $1.2 \times 10^{23}$ | (2) $6 \times 10^{22}$  |
| (3) $6 \times 10^{23}$   | (4) $12 \times 10^{23}$ |

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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)  $\text{Cu}_2\text{S} + \text{FeS}$
  - (2)  $\text{Cu}_2\text{S} + \text{Cu}_2\text{O}$
  - (3)  $\text{Cu}_2\text{S} + \text{FeO}$
  - (4)  $\text{Cu}_2\text{O} + \text{FeS}$
32. The complex formed when  $\text{Al}_2\text{O}_3$  is leached from Bauxite using concentrated NaOH solution is,
- (1)  $\text{Na}[\text{Al}(\text{OH})_4]$
  - (2)  $\text{NaAl}_2\text{O}_4$
  - (3)  $\text{Na}_2[\text{Al}(\text{OH})_3]$
  - (4)  $\text{Na}_2\text{AlO}_2$
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.

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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  $\text{XeF}_6$  is,

- (1) Square planar                              (2) Distorted octahedral  
(3) Square pyramidal                        (4) Pyramidal

36. The number of isomers possible for the octahedral complex  $[\text{CoCl}_2(\text{en})(\text{NH}_3)_2]^+$  is,

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

37. CO is a stronger ligand than  $\text{Cl}^-$ , because

- (1) CO is a neutral molecule.              (2) CO has  $\pi$ -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)  $\text{Mn}^{2+}$                                         (2)  $\text{Cu}^{2+}$   
(3)  $\text{Sc}^{2+}$                                         (4)  $\text{Cu}^+$

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**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  $\text{NH}_3$  to give an explosive compound (C).

The compounds A, B and C are;

- (1)  $\text{A} = \text{MnO}_2$ ,  $\text{B} = \text{Cl}_2$ ,  $\text{C} = \text{NCl}_3$
- (2)  $\text{A} = \text{MnO}$ ,  $\text{B} = \text{Cl}_2$ ,  $\text{C} = \text{NH}_4\text{Cl}$
- (3)  $\text{A} = \text{Mn}_3\text{O}_4$ ,  $\text{B} = \text{Cl}_2$ ,  $\text{C} = \text{NCl}_3$
- (4)  $\text{A} = \text{MnO}_3$ ,  $\text{B} = \text{Cl}_2$ ,  $\text{C} = \text{NCl}_2$

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

- (1)  $\text{Mn}^{2+}$  is more stable with high 3<sup>rd</sup> Ionisation energy.
- (2)  $\text{Mn}^{2+}$  is bigger in size.
- (3)  $\text{Mn}^{2+}$  has completely filled d-orbitals.
- (4)  $\text{Mn}^{2+}$  does not exist.

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

- (1)  $\text{SCN}^- < \text{F}^- < \text{CN}^- < \text{CO}$
- (2)  $\text{F}^- < \text{SCN}^- < \text{CN}^- < \text{CO}$
- (3)  $\text{CN}^- < \text{F}^- < \text{CO} < \text{SCN}^-$
- (4)  $\text{SCN}^- < \text{CO} < \text{F}^- < \text{CN}^-$

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

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**Space For Rough Work**

43. In the following sequence of reactions ;



The compound A is

- (1) Propane nitrile                      (2) Ethane nitrile  
(3)  $\text{CH}_3\text{NO}_2$                               (4)  $\text{CH}_3\text{NC}$
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.

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**Space For Rough Work**

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

- (1)  $\frac{-13.6}{n^2} \text{eV}$                       (2)  $\frac{-13.6}{n} \text{eV}$   
(3)  $\frac{-13.6}{n^4} \text{eV}$                       (4)  $\frac{-13.6}{n^3} \text{eV}$

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  $\text{O}_2$ ,  $\text{O}_2^+$ ,  $\text{O}_2^-$  and  $\text{O}_2^{2-}$  is

- (1)  $\text{O}_2^+, \text{O}_2, \text{O}_2^-, \text{O}_2^{2-}$                       (2)  $\text{O}_2^{2-}, \text{O}_2^-, \text{O}_2^+, \text{O}_2$   
(3)  $\text{O}_2, \text{O}_2^+, \text{O}_2^-, \text{O}_2^{2-}$                       (4)  $\text{O}_2^{2-}, \text{O}_2^-, \text{O}_2, \text{O}_2^+$

50.  $\text{HCl}$  gas is covalent and  $\text{NaCl}$  is an ionic compound. This is because

- (1) Sodium is highly electro +Ve.  
(2) Hydrogen is a non-metal.  
(3)  $\text{HCl}$  is a gas.  
(4) Electronegativity difference between H and Cl is less than 2.1.

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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)  $R - F > R - I > R - Br > R - Cl$

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Space For Rough Work

56. Main axis of diatomic molecule is Z. The orbitals  $P_x$  and  $P_y$  overlap to form
- (1)  $\pi$  - molecular orbital      (2)  $\sigma$  - molecular orbital  
(3)  $\delta$  - 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 empirical 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)  $NO_3^-$

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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 2<sup>nd</sup> 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 3<sup>rd</sup> 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 3<sup>rd</sup> 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 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 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.

M



[Turn Over

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  $f: \mathbb{R} \rightarrow \mathbb{R}$  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  $\mathbb{R}$  by  $a * b = \frac{a+b}{4} \forall a, b \in \mathbb{R}$  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)  $\frac{-\pi}{10}$

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**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)  $\pi$

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  $3 \times 3$  then  $|3A|$  is equal to

- (1)  $3|A|$  (2)  $\frac{1}{3}|A|$   
(3)  $27|A|$  (4)  $9|A|$

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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  $A = \frac{1}{\pi} \begin{bmatrix} \sin^{-1}(\pi x) & \tan^{-1}\left(\frac{x}{\pi}\right) \\ \sin^{-1}\left(\frac{x}{\pi}\right) & \cot^{-1}(\pi x) \end{bmatrix}$ ,  $B = \frac{1}{\pi} \begin{bmatrix} -\cos^{-1}(\pi x) & \tan^{-1}\left(\frac{x}{\pi}\right) \\ \sin^{-1}\left(\frac{x}{\pi}\right) & -\tan^{-1}(\pi x) \end{bmatrix}$  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  $m \times n$  and  $B$  is a matrix such that  $AB'$  and  $B'A$  are both defined, the order of the matrix  $B$  is

(1)  $m \times m$

(2)  $n \times n$

(3)  $n \times m$

(4)  $m \times n$

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Space For Rough Work

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

- (1)  $-\cot(e^x) + c$                       (2)  $\tan(e^x \cdot x) + c$   
(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)  $\log(xyz)$                       (2)  $\log(6xyz)$   
(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)  $e^{\tan^{-1} x} + c$

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Space For Rough Work

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

- (1)  $30^\circ$  (2)  $0^\circ$   
(3)  $90^\circ$  (4)  $60^\circ$

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  $\int_{-\pi/4}^{\pi/4} \sin^{103} x \cdot \cos^{101} x \, dx$  is

- (1)  $(\pi/4)^{103}$  (2)  $(\frac{\pi}{4})^{101}$   
(3)  $2$  (4)  $0$

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Space For Rough Work

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

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

(2) 7

(3) 12

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

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)  $\frac{-6}{7}$

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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  $1 + \sin \theta + \sin^2 \theta + \dots$  upto  $\infty = 2\sqrt{3} + 4$ , then  $\theta =$  \_\_\_\_\_

(1)  $\pi/6$

(2)  $\pi/4$

(3)  $\pi/3$

(4)  $3\pi/4$

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

(1) 3

(2) 1

(3) 0

(4) 2

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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)  $x + 5y + 10 = 0$

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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)  $30^\circ$

(2)  $45^\circ$

(3)  $60^\circ$

(4)  $90^\circ$

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Space For Rough Work

37. The sum of  $1^{\text{st}}$   $n$  terms of the series

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

(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<sup>th</sup> 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)  $\pi$

(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)  $\sqrt{5}$

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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)  $\frac{2}{3}$  (2)  $\frac{3}{2}$   
(3)  $-\frac{2}{3}$  (4)  $-\frac{3}{2}$
42. The rate of change of area of a circle with respect to its radius at  $r = 2$  cms is
- (1) 4 (2)  $2\pi$   
(3) 2 (4)  $4\pi$
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  $P(A \cap B) = \frac{7}{10}$  and  $P(B) = \frac{17}{20}$ , where  $P$  stands for probability then  $P(A|B)$  is equal to
- (1)  $\frac{7}{8}$  (2)  $\frac{17}{20}$   
(3)  $\frac{14}{17}$  (4)  $\frac{1}{8}$

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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.

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**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  $2 \times 2$  &  $A^T$  is the transpose of  $A$ , then the value of  $\theta$  is equal to

(1)  $\pi/6$

(2)  $\pi/3$

(3)  $\pi$

(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)  $\pm 3$

(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)  $(-2, -1), 3$

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Space For Rough Work

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

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

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

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  $\sin 1^\circ + \sin 2^\circ + \dots + \sin 359^\circ$  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)  $-x$

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**Space For Rough Work**



**A-1**