

**DEEPER<sup>®</sup>**  
**JEE-MAIN - 2014**  
**ON LINE TEST NO. - 2**  
**PHYSICS, CHEMISTRY & MATHEMATICS**  
This test contains **18** printed pages.

NO. :

Online Test Code



**Day and Date:**  
**Sunday, 23th March, 2014**

**Duration : 10.00 am to 1.00 pm**  
**Total Marks : 360**

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***Important Instructions :***

1. The test is of 3 hours duration.
2. The Test consists of **90** questions. The maximum marks are **360**.
3. There are three parts in the question paper subjectwise distribution of marks in each part is as under.  
**Part A - PHYSICS (120 marks)** - Question No. 1 to 30 **FOUR (4)** marks each.  
**Part B - CHEMISTRY (120 marks)** - Question No. 31 to 60 **FOUR (4)** marks each.  
**Part C - MATHS (120 marks)** - Question No.61 to 90 **FOUR (4)** marks each.
4. There are 90 questions. Each correct answer carries 4 marks and for each incorrect answer one mark will be deducted. For every Question there are four choices. Out of these choices only one choice is correct.
5. No candidate is allowed to carry any textual material, printed or written, bits of papers, pager, mobile phone, any electronic device, etc., except the Admit Card inside the examination hall/room.

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**Name of the Candidate** (in Capital letters) : \_\_\_\_\_

**Roll Number** : in figures

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: in words \_\_\_\_\_

**Examination Centre Number :**

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**Name of Examination Centre** (in Capital letters) : \_\_\_\_\_

**PART - A : PHYSICS**

- Q.1** A car is moving on the road and rain is falling vertically downwards. Choose the correct answer\_\_
- 1) The rain drops will strike on the behind screen.
  - 2) The rain drops will strike on the front screen.
  - 3) The rain drops will strike on both the screens.
  - 4) None of these.
- Q.2** If  $\vec{A} = 4\hat{i} + 8\hat{j} + 6\hat{k}$  and  $\vec{B} = 2\hat{i} + 4\hat{j} + b\hat{k}$  are parallel to each other, then the value of b is \_\_\_\_\_
- 1) 3
  - 2)  $-20/3$
  - 3) -3
  - 4) 6
- Q.3** A lift is moving downwards with an acceleration equal to 'g'. A body of mass 'm' kept on the floor of the lift is pulled horizontally. If the coefficient of friction is  $\mu$ , then the frictional force is \_\_\_\_\_
- 1) Zero
  - 2)  $\mu mg$
  - 3)  $mg$
  - 4)  $2\mu mg$
- Q.4** A bullet fired at a target with a speed of  $100 \text{ ms}^{-1}$  penetrates one metre into it. If the bullet is fired with the same system at a target of thickness 0.5 m, then it will emerge from it with a velocity of \_\_\_\_\_
- 1)  $50\sqrt{2} \text{ ms}^{-1}$
  - 2)  $\frac{50}{\sqrt{2}} \text{ ms}^{-1}$
  - 3)  $50 \text{ ms}^{-1}$
  - 4)  $10 \text{ ms}^{-1}$
- Q.5** Four similar point masses (m each) are symmetrically placed on the circumference of a disc of mass M and radius R. Then, moment of inertia of the system about an axis passing through centre O and perpendicular to the plane of the disc will be \_\_\_\_\_
- 1)  $MR^2 + 4m R^2$
  - 2)  $MR^2 + \frac{8}{5} mR^2$
  - 3)  $mR^2 + 4 MR^2$
  - 4)  $\frac{MR^2}{2} + 4mR^2$

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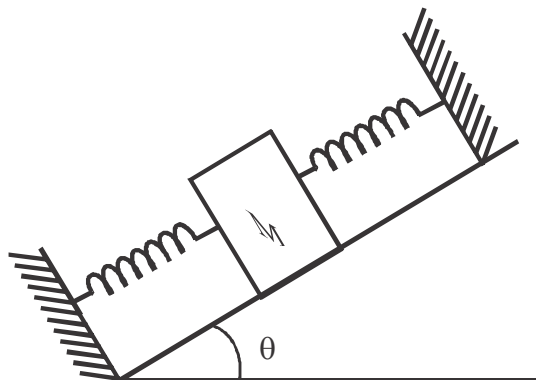
SPACE FOR ROUGH WORK



**Q.12** A steel wire 70 cm long has a mass of 7.0 mg. If the wire is under a tension of 100 N, then the speed of transverse wave in the wire is \_\_\_\_\_

- |                          |                           |
|--------------------------|---------------------------|
| 1) $1 \text{ ms}^{-1}$   | 2) $10 \text{ ms}^{-1}$   |
| 3) $100 \text{ ms}^{-1}$ | 4) $0.01 \text{ ms}^{-1}$ |

**Q.13** On a smooth inclined plane, a body of mass  $M$  is attached between two springs. The outer ends of the springs are fixed to firm supports. If each spring has force constant  $k$ , the period of oscillation of the body (assuming the springs as massless) is \_\_\_\_\_



- |   |  |
|---|--|
| 1) $2\pi \left( \frac{M}{2k} \right)^{\frac{1}{2}}$ | 2) $2\pi \left( \frac{2M}{k} \right)^{\frac{1}{2}}$  |
| 3) $2\pi \left( Mg \sin \frac{\theta}{2k} \right)$  | 4) $2\pi \left( \frac{2Mg}{k} \right)^{\frac{1}{2}}$ |

**Q.14** Three charges, each equal to  $q \mu C$ , are placed at three corners of an equilateral triangle. If the force acting between any two is  $F$ , then the net force acting on each will be \_\_\_\_\_

- |                |                 |
|----------------|-----------------|
| 1) $\sqrt{3}F$ | 2) $2\sqrt{2}F$ |
| 3) $3 F$       | 4) $2\sqrt{3}F$ |

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**Q.15** In an electron gun, the electrons are accelerated through a potential difference of  $V$  volt. Taking electronic charge and mass to be ' $e$ ' and ' $m$ ' respectively, the maximum velocity attained by them is \_\_\_\_\_

1)  $\frac{2eV}{m}$

2)  $\sqrt{\frac{2eV}{m}}$

3)  $\frac{2m}{eV}$

4)  $\frac{V^2}{2em}$

**Q.16** ' $N$ ' drops of energy of equal radii and possessing equal charges combine to form a big spherical drop. Then potential of the big drop compared to the individual droplet is \_\_\_\_\_

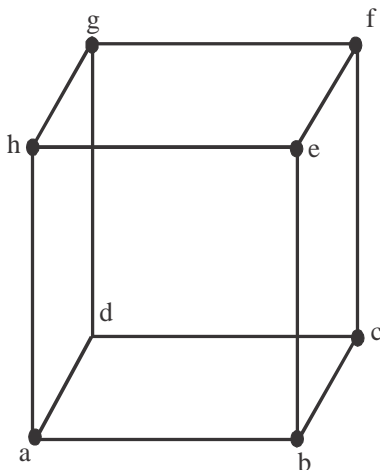
1)  $N$  times

2)  $N^{2/3}$  times

3)  $N^{1/3}$  times

4)  $N^{5/3}$  times

**Q.17** The resistance of each edge of a wire frame shaped as a cube is ' $r$ '. What is the resistance of the wire frame when the same is measured between  $a$  and  $f$  ?



1)  $\frac{6}{5}r$

2)  $\frac{5}{6}r$

3)  $\frac{7}{12}r$

4)  $\frac{5}{3}r$

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- Q.18** The temperature coefficient of resistance of wire is  $0.00125 \text{ per } ^\circ\text{C}$ . At  $300 \text{ } ^\circ\text{K}$  its resistance is one ohm. The resistance of the wire will be 2 ohm at \_\_\_\_
- |                           |                           |
|---------------------------|---------------------------|
| 1) $1154^\circ \text{ K}$ | 2) $1154^\circ \text{ K}$ |
| 3) $1400^\circ \text{ K}$ | 4) $1127^\circ \text{ K}$ |
- Q.19** The radius of curvature of the path of a charged particle in a uniform magnetic field is directly proportional to \_\_\_\_
- |                               |                                 |
|-------------------------------|---------------------------------|
| 1) the charge on the particle | 2) the momentum of the particle |
| 3) the energy of the particle | 4) the intensity of the field   |
- Q.20** A bar magnet is suspended freely, its neutral points shall lie \_\_\_\_
- |                           |                               |
|---------------------------|-------------------------------|
| 1) on the axial line      | 2) inside its magnet          |
| 3) on the equatorial line | 4) anywhere around the magnet |
- Q.21** 1 Weber is equal to \_\_\_\_
- |                    |                   |
|--------------------|-------------------|
| 1) $10^{-4}$ Tesla | 2) $10^4$ Gauss   |
| 3) $10^4$ Maxwell  | 4) $10^8$ Maxwell |
- Q.22** A 220V, 1000 watt bulb is connected across a 110V mains supply. The power consumed will be \_\_\_\_
- |          |          |
|----------|----------|
| 1) 250 W | 2) 750 W |
| 3) 500 W | 4) 250 W |
- Q.23** Which of the following phenomena is NOT common to sound and light waves ?
- |                 |                 |
|-----------------|-----------------|
| 1) Interference | 2) Diffraction  |
| 3) Coherence    | 4) Polarization |
- Q.24** If yellow light emitted by sodium lamp in Young's double slit experiment is replaced by monochromatic blue light of the same intensity then \_\_\_\_
- |                                       |                                     |
|---------------------------------------|-------------------------------------|
| 1) fringe width will decrease         | 2) fringe width will increase       |
| 3) fringe width will remain unchanged | 4) fringes will become less intense |

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- Q.25** The diameter of a plano convex lens is 6 cm and thickness at the centre is 3 mm. The speed of light in the material of the lens is  $2 \times 10^8 \text{ ms}^{-1}$ . Focal length of the lens is \_\_\_\_\_
- 1) 10 cm
  - 2) 20 cm
  - 3) 15 cm
  - 4) 30 cm
- Q.26** Sodium and copper have work function 2.3 eV and 4.5 eV respectively. The ratio of their wavelengths is approximately \_\_\_\_\_
- 1) 4 : 1
  - 2) 1 : 4
  - 3) 1 : 2
  - 4) 2 : 1
- Q.27** The binding energy of electron in H-atom is 13.6 eV. The energy required to remove the electron from the 1<sup>st</sup> excited state of  $\text{Li}^{++}$  is \_\_\_\_\_
- 1) 3.4 eV
  - 2) 30.6 eV
  - 3) 122.4 eV
  - 4) 13.6 eV
- Q.28** When donor impurity is added to a semiconductor at room temperature, then \_\_\_\_
- 1) number of electrons decreases, number of holes increases.
  - 2) number of electrons remains unaltered, number of holes increases.
  - 3) number of electrons increases, number of holes remains unaltered.
  - 4) number of electrons increases, number of holes decreases.
- Q.29** An accelerating proton produce \_\_\_\_\_
- 1)  $\alpha$ -rays
  - 2)  $\gamma$ -rays
  - 3)  $\beta$ -rays
  - 4) E.M.-rays
- Q.30** Speed of electromagnetic wave is the same \_\_\_\_\_
- 1) for all wavelengths
  - 2) for all frequencies
  - 3) in all media
  - 4) for all intensities

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**PART - B : CHEMISTRY**

- Q.31** The number of atoms in 100 g of fcc crystal with density  $10 \text{ gm}^3$  and edge length 200 pm is equal to \_\_\_\_\_
- 1)  $3 \times 10^{25}$
  - 2)  $5 \times 10^{25}$
  - 3)  $1 \times 10^{25}$
  - 4)  $2 \times 10^{25}$
- Q.32** Which of the following salts will have the same value of Van't Hoff factor as that of  $\text{K}_4[\text{Fe}(\text{CN})_6]$ ?
- 1)  $\text{Al}_2(\text{SO}_4)_3$
  - 2)  $\text{NaCl}$
  - 3)  $\text{Al}(\text{NO}_3)_3$
  - 4)  $\text{Na}_2\text{SO}_4$
- Q.33** The molar conductivity of 0.03M HCl solution is  $603.7 \text{ } \Omega^{-1}\text{cm}^2 \text{ mol}^{-1}$  at  $25^\circ\text{C}$ . What is the conductivity of solution ?
- 1)  $0.0018 \text{ } \Omega^{-1}\text{cm}^{-1}$
  - 2)  $0.018 \text{ } \Omega^{-1}\text{cm}^{-1}$
  - 3)  $0.18 \text{ } \Omega^{-1}\text{cm}^{-1}$
  - 4)  $5.5 \text{ } \Omega^{-1}\text{cm}^{-1}$
- Q.34** For a reaction,  $\Delta H = + 265 \text{ kJ}$  and  $\Delta S = + 271.3 \text{ J/K}$ . At what temperature will  $\Delta G = 0.00$  ?
- 1) 630 K
  - 2) 359 K
  - 3) 719 K
  - 4) 977 K
- Q.35** The rate of a first order reaction is  $0.6932 \times 10^{-2} \text{ mol}^{-1} \text{ min}^{-1}$  and the initial concentration of the reactant is 1M. Then Half life of the reaction is \_\_\_\_\_
- 1) 100 min
  - 2) 6.932 min
  - 3)  $0.6932 \times 10^{-2} \text{ min}$
  - 4)  $0.6932 \times 10^{-3} \text{ min}$
- Q.36** Which of the following statements is true ?
- 1) The process of obtaining aluminium by electrolysis of a mixture of aluminium oxide and cryolite is called Haber's process.
  - 2) Cryolite is added during metallurgy of aluminium to reduce alumina.
  - 3) Bauxite is purified by leaching with a hot concentrated solution of NaOH.
  - 4) Bauxite is purified by zone refining.

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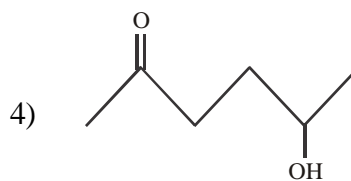
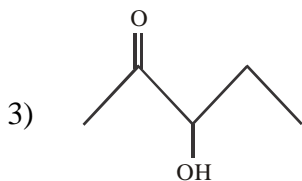
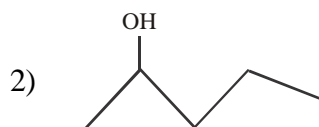
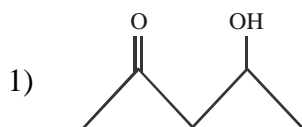
- Q.37** The number of nitrogen-nitrogen and boron-boron bonds in inorganic benzene are respectively
- |         |         |
|---------|---------|
| 1) 0, 0 | 2) 0, 3 |
| 3) 3, 0 | 4) 3, 3 |

- Q.38** The observed electronic configuration of Terbium is \_\_\_\_\_
- |  |   |
|--|---|
| 1) [xe]4f <sup>8</sup> , 5d <sup>1</sup> , 6s <sup>2</sup> | 2) [xe]4f <sup>9</sup> , 5d <sup>0</sup> , 6s <sup>2</sup>  |
| 3) [xe]4f <sup>7</sup> , 5d <sup>2</sup> , 6s <sup>2</sup> | 4) [xe]4f <sup>10</sup> , 5d <sup>0</sup> , 6s <sup>1</sup> |

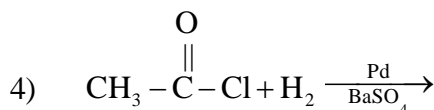
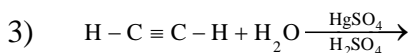
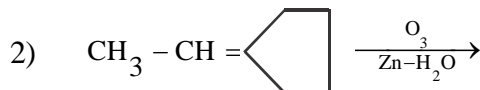
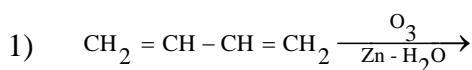
- Q.39** The complex used as an anticancer agent is \_\_\_\_\_
- |  |   |
|--|---|
| 1) mer-{Co(NH <sub>3</sub> ) <sub>3</sub> Cl <sub>3</sub> }  | 2) Cis [PtCl <sub>2</sub> (NH <sub>3</sub> ) <sub>2</sub> ] |
| 3) Cis - K <sub>2</sub> [PtCl <sub>2</sub> Br <sub>2</sub> ] | 4) Na <sub>2</sub> CoCl <sub>4</sub>                        |

- Q.40** The chlorination of Toulene in presence of light and heat followed by treatment with aqueous caustic soda solution gives \_\_\_\_\_
- |                            |                 |
|----------------------------|-----------------|
| 1) o - cresol              | 2) p - cresol   |
| 3) 2, 4 - Dihydroxytoulene | 4) Benzoic acid |

- Q.41** Which of the following compound will be most readily dehydrated in acidic conditions ?

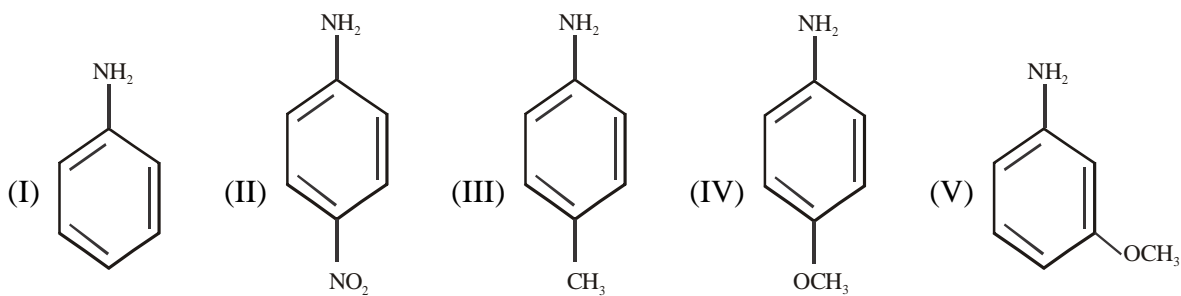


- Q.42** In which of the following reaction, acetaldehyde is NOT obtained as a product ?



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**Q.43** The correct order of basic nature of the following compounds is \_\_\_\_\_



- 1) II < V < I < III < IV                      2) V < II < I < III < IV  
 3) I < III < V < II < IV                        4) II < IV < V < I < III

**Q.44** Consider the reagents -

- I) Bromine water  
 II) Tollen's reagent  
 III) Fehling's solution,

Which can be used to distinguish between an aldose and ketose ?

- 1) I, II, and III                                      2) II and III  
 3) I only    4) II only

**Q.45** Which of the following is NOT an addition polymer ?

- 1) Neoprene    2) polystyrene  
 3) Terylene    4) polyethylene

**Q.46** The sulphadruugs are derivatives of \_\_\_\_\_

- 1) benzene sulphonic acid                      2) sulphanilic acid  
 3) sulphanilamide                                4) p-aminobenzoic acid

**Q.47** The osmotic pressure of a solution is 0.0821 atm. at 300 K. The concentration of the same solution in mole/litre will be \_\_\_\_\_

- 1) 3.3    2) 3  
 3) 0.066    4)  $0.33 \times 10^{-2}$

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- Q.54** The edge length of unit cell of fcc Xe crystal is 620 pm. The radius of Xe atom is \_\_\_\_
- 1) 189.37 pm
  - 2) 209.87 pm
  - 3) 219.25 pm
  - 4) 235.16 pm
- Q.55** Two gram of caustic soda is dissolved in one liter of water. The  $P^H$  of the resulting solution is \_\_\_\_\_
- 1) 12.699
  - 2) 10.251
  - 3) 8.567
  - 4) 6.654
- Q.56** The oxidation number of sulphur in  $Na_2S_4O_6$  is \_\_\_\_\_
- 1) 2.5 for each S atom
  - 2) + 2 and + 3 (Two 'S' have +2 and other two 'S' have +3)
  - 3) + 3 and + 2 (One 'S' has +3 and three 'S' have +2)
  - 4) + 5 and 0 (Two 'S' have + 5 and other two 'S' have 0)
- Q.57** The first dissociation of  $X(OH)_3$  is centpercent where as second dissociation is 50% and third dissociation is negligible. Then the  $P^H$  of  $4 \times 10^{-3}$  M  $X(OH)_3$  is \_\_\_\_\_
- 1) 7.59
  - 2) 9.54
  - 3) 11.78
  - 4) 13.25
- Q.58** Which of the following is most effective in the coagulation of gold sol ?
- 1)  $NaNO_3$
  - 2)  $MgCl_2$
  - 3)  $Na_3PO_4$
  - 4)  $K_4[Fe(CN)_6]$
- Q.59** For the reaction,  $2A + B \rightarrow$  Products. The active mass of B is kept constant and A is doubled- The rate of reduction will be then \_\_\_\_\_
- 1)  $\downarrow$  4 times
  - 2)  $\downarrow$  2 times
  - 3)  $\uparrow$  4 times
  - 4)  $\uparrow$  2 times
- Q.60** Van-Arkel method of purification of metals involves converting the metal to a \_\_\_\_\_
- 1) Volatile stable compound
  - 2) Non-volatile stable compound
  - 3) Volatile unstable compound
  - 4) Non volatile unstable compound

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**PART - C : MATHEMATICS**

**Q.61** If  $f(n+2) = f(n+1) + f(n)$ ,  $f(1) = 0$ ,  $f(2) = 1$  then value of  $f(7)$  is \_\_\_\_\_

- 1) 8  
2) 13  
3) 21  
4) 24

**Q.62**  $\lim_{x \rightarrow 0} (\cos x + a \sin bx)^{1/x}$  is \_\_\_\_\_

- 1)  $e^{a/b}$   
2)  $e^{b/a}$   
3)  $e^{ab}$   
4) not existing

**Q.63** If  $y = \sin^{-1} \left( \frac{2x}{1+x^2} \right) + \sec^{-1} \left( \frac{1+x^2}{1-x^2} \right)$  then  $\frac{dy}{dx}$  is \_\_\_\_\_

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

**Q.64** Maximum value of  $\frac{\log|x|}{|x|}$  is \_\_\_\_\_

- 1) e  
2) 2e  
3)  $\frac{1}{e}$   
4)  $\frac{2}{e}$

**Q.65** A ladder rests against a wall at an angle  $\alpha$  to the horizontal. If foot is pulled away through a distance  $a$ , so that it slides a distance  $b$  down the wall, finally making an angle  $\beta$  with the horizontal then

$\tan \frac{\alpha + \beta}{2}$  is \_\_\_\_\_

- 1)  $\frac{b}{a}$   
2)  $\frac{a}{b}$   
3)  $a-b$   
4)  $a+b$

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**Q.66** The equation of circle is  $x^2 + y^2 - 2x - 2y = 0$ . The point which does NOT lie within the circle is \_\_\_\_\_

- 1)  $\left(\frac{15}{8}, \frac{15}{8}\right)$                       2)  $\left(2, \frac{15}{8}\right)$   
3)  $\left(-\frac{1}{2}, 1\right)$                       4)  $\left(1, \frac{12}{5}\right)$

**Q.67** The value of  $\sin^{-1} \left\{ \cot \left[ \sin^{-1} \sqrt{\frac{2-\sqrt{3}}{4}} + \cos^{-1} \frac{\sqrt{12}}{4} + \sec^{-1} \sqrt{2} \right] \right\}$  is \_\_\_\_\_

- 1) 0                                      2)  $\frac{\pi}{4}$   
3)  $\frac{\pi}{6}$                                       4)  $\frac{\pi}{2}$

**Q.68** If  $5 \sin \alpha = 3 \sin (\alpha + 2\beta) \neq 0$ , then  $\tan (\alpha + \beta)$  is \_\_\_\_\_

- 1)  $2 \tan \beta$                               2)  $3 \tan \beta$   
3)  $4 \tan \beta$                               4)  $6 \tan \beta$

**Q.69** One vertex of equilateral triangle with centroid at the origin and one side as  $x + y - 2 = 0$  is \_\_\_\_\_

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

**Q.70** The equation of pair of lines perpendicular to each other is \_\_\_\_\_

- 1)  $2x^2 = y(x + 2y)$                       2)  $(x + y)^2 = x(y + 3x)$   
3)  $2y(x + y) = xy$                       4)  $y = \pm 2x$

**Q.71** Locus of the middle points of all chords of the parabola  $y^2 = -4x$  which are drawn through the vertex is \_\_\_\_\_

- 1)  $y^2 = -8x$                               2)  $y^2 = -2x$   
3)  $x^2 + 4y^2 = 16$                       4)  $x^2 = -2y$

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- Q.72** If in a  $\Delta ABC$ ,  $\sin A = \sin^2 B$  and  $2\cos^2 A = 3\cos^2 B$  then the triangle is \_\_\_\_\_
- 1) right angled
  - 2) obtuse angled
  - 3) isosceles
  - 4) equilateral
- Q.73** The numbers of the values of  $c$  such that line  $y = 4x + c$  touches the curve  $\frac{x^2}{4} + y^2 = 1$  is \_\_\_\_\_
- 1) 0
  - 2) 1
  - 3) 2
  - 4) infinite
- Q.74** The line  $x \cos \theta + y \sin \theta = k$  is tangent to  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ , if \_\_\_\_\_
- 1)  $a^2 \cos^2 \theta - b^2 \sin^2 \theta = k^2$
  - 2)  $a^2 \cos^2 \theta - b^2 \sin^2 \theta = k$
  - 3)  $a^2 \cos^2 \theta + b^2 \sin^2 \theta = k^2$
  - 4)  $a^2 \cos^2 \theta + b^2 \sin^2 \theta = k$
- Q.75** Let  $\bar{a} = 2\hat{i} - \hat{j} + \hat{k}$ ,  $\bar{b} = \hat{i} + 2\hat{j} - \hat{k}$  and  $\bar{c} = \hat{i} + \hat{j} - 2\hat{k}$  be three vectors. A vector in the plane of  $\bar{b}$  and  $\bar{c}$  whose projection on  $\bar{a}$  is of magnitude  $\sqrt{\frac{2}{3}}$  is \_\_\_\_\_
- 1)  $2\hat{i} + 3\hat{j} - 3\hat{k}$
  - 2)  $2\hat{i} + 3\hat{j} + 3\hat{k}$
  - 3)  $-2\hat{i} - \hat{j} + 5\hat{k}$
  - 4)  $2\hat{i} + \hat{j} + 5\hat{k}$
- Q.76** A plane meets the co-ordinate axes in A,B,C and  $(\alpha, \beta, \gamma)$  is the centroid of the  $\Delta ABC$ . then the equation of the plane is \_\_\_\_\_
- 1)  $\frac{x}{\alpha} + \frac{y}{\beta} + \frac{z}{\gamma} = 3$
  - 2)  $\frac{x}{\alpha} + \frac{y}{\beta} + \frac{z}{\gamma} = 1$
  - 3)  $\frac{3x}{\alpha} + \frac{3y}{\beta} + \frac{3z}{\gamma} = 1$
  - 4)  $\alpha x + \beta y + \gamma z = 1$
- Q.77** The set of real values of  $x$  which satisfy  $x^2 - 3x + 2 > 0$  and  $x^2 - 3x - 4 \leq 0$  is \_\_\_\_\_
- 1)  $1 \leq x < 2$  or  $2 < x \leq 4$
  - 2)  $-1 \leq x < 1$  or  $2 < x \leq 4$
  - 3)  $-1 < x < 2$  or  $3 < x < 4$
  - 4)  $1 < x < 2$  or  $2 < x < 3$

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SPACE FOR ROUGH WORK

**Q.78** Real part of  $\frac{1}{1 - \cos \theta + 2i \sin \theta}$  is \_\_\_\_\_

- 1)  $\frac{1}{3 + 5 \cos \theta}$                       2)  $\frac{1}{5 - 3 \cos \theta}$   
3)  $\frac{1}{3 - 5 \cos \theta}$                       4)  $\frac{1}{5 + 3 \cos \theta}$

**Q.79** The smallest positive integer n, for which  $\left(\frac{1+i}{1-i}\right)^{n-2}$  is real, is \_\_\_\_\_

- 1) 4    2) 2  
3) 0    4) 6

**Q.80** The number of arrangements of the letters of the word 'ALLOY' in which the two L's do not appear adjacently is \_\_\_\_\_

- 1)  $4^2$     2)  $5^2$   
3)  $6^2$     4)  $8^2$

**Q.81** If  $A = \begin{bmatrix} -1 & -2 & -2 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{bmatrix}$  then Adj A is \_\_\_\_\_

- 1) A    2) A'  
3) 3A    4) 3A'

**Q.82**  $(p \rightarrow q) \vee (q \rightarrow p)$  is \_\_\_\_\_

- 1) contradiction                              2) tautology  
3) neither a tautology nor a contradiction      4) equivalent to  $p \rightarrow q$

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SPACE FOR ROUGH WORK





**Q.88** Statement I : If  $0 < x < 1$ ;

$$\sin^{-1} x + \cos^{-1} x = \frac{\pi}{2}$$

Statement II : For one particular value of  $x$ ;  $\sin x + \cos x = \frac{\pi}{2}$

- 1) Statement I is true, Statement II is true;  
Statement II is a correct explanation for statement I
- 2) Statement I is true, Statement II is true;  
Statement II is not a correct explanation for statement I
- 3) Statement I is true, Statement II is false
- 4) Statement I is false, Statement II is true

**Q.89**  $\vec{a}$ ,  $\vec{b}$  and  $\vec{c}$  are unit vectors

Statement I : If  $\vec{a} \cdot \vec{b} = \vec{b} \cdot \vec{c} = \vec{c} \cdot \vec{a}$  then  $\vec{a}$ ,  $\vec{b}$  and  $\vec{c}$  are perpendicular to each other

Statement II : If  $\vec{a}$  is perpendicular to  $\vec{b}$  then  $\vec{a} \cdot \vec{b} = 0$

- 1) Statement I is true, Statement II is true;  
Statement II is a correct explanation for statement I
- 2) Statement I is true, Statement II is true;  
Statement II is not a correct explanation for statement I
- 3) Statement I is true, Statement II is false
- 4) Statement I is false, Statement II is true

**Q.90** Statement I : The equation  $4\sin^{-1}x + \cos^{-1}x = 0$  is possible only if  $x$  is negative

Statement II : If  $\cos^{-1}x = \theta$ , the angle  $\theta$  is never negative. While if  $\sin^{-1}x = \theta$ , the angle  $\theta$  is negative if  $x$  is negative.

- 1) Statement I is true, Statement II is true;  
Statement II is a correct explanation for statement I
- 2) Statement I is true, Statement II is true;  
Statement II is not a correct explanation for statement I
- 3) Statement I is true, Statement II is false
- 4) Statement I is false, Statement II is true

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