Corporate Office: Aakash Tower, 8, Pusa Road, New Delhi-110005, Phone : 011-47623456

MM : 300

JEE 350 – MOCK TEST for JEE 2022

Time : 3 Hrs.

Mock Test - Complete Syllabus

Instructions:

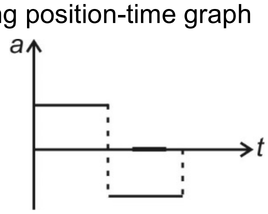
1. Duration of Test is 3 hrs.
2. The Test booklet consists of 90 questions. The maximum marks are 300.
3. There are **three** parts in the question paper A, B, C consisting of **Physics**, **Chemistry** and **Mathematics** having 30 questions in each part of equal weightage. Each part has two sections.
   (i) **Section-I :** This section contains 20 multiple choice questions which have only one correct answer. Each question carries **4 marks** for correct answer and **–1 mark** for wrong answer.
   (ii) **Section-II :** This section contains 10 questions. In Section II, attempt any **five questions out of 10**. The answer to each of the questions is a numerical value. Each question carries **4 marks** for correct answer and there is no negative marking for wrong answer.

[PART – A : PHYSICS]

SECTION - I

Multiple Choice Questions: This section contains 20 multiple choice questions. Each question has 4 choices (1), (2), (3) and (4), out of which **ONLY ONE** is correct.

1. Figure shows the acceleration time graph of a particle moving in a straight line. Which of the following options best represents the corresponding position-time graph



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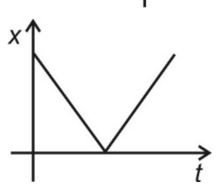

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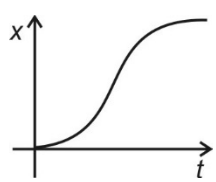

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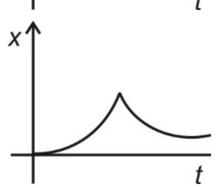

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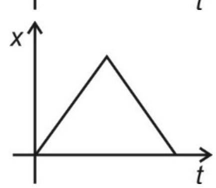
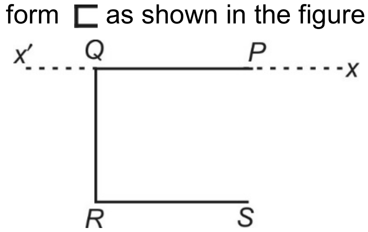


2. A particle has initial velocity $\vec{u} = (4\hat{i} - 5\hat{j})$ m/s and it is moving with acceleration $\vec{a} = \left(\frac{1}{4}\hat{i} + \frac{1}{5}\hat{j}\right)$ m/s^2. Velocity of the particle at $t = 2$ second is

(1) $(6\hat{i} - 4\hat{j})$ m/s
(2) $(4.5\hat{i} - 4.6\hat{j})$ m/s
(3) $(4.5\hat{i} - 4.1\hat{j})$ m/s
(4) $(6\hat{i} - 4.6\hat{j})$ m/s

3. Three thin rods each of mass m and length L are joined to form ⊏ as shown in the figure



Moment of inertia of the system about an axis xx' passing through rod PQ is

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

4. When an elastic material with young's modulus Y is subjected to a stretching stress 'S'. Elastic energy stored per unit volume of the material is

(1) $\frac{S}{2Y}$ (2) $\frac{S^2}{2Y}$

(3) $\frac{S^2Y}{2}$ (4) $\frac{Y^2S}{2}$

5. A large tank filled with water to a height of h is to be emptied through a small hole at the bottom. The ratio of time taken for the level of water to fall down from h to $\frac{h}{2}$ and from $\frac{h}{2}$ to zero is

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

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

6. A spherical body of emissivity e = 0.7 and surface area A is Placed inside a perfect black body maintained at temperature T, then energy radiated per second by black body will be

(1) $E = 0.3\ \sigma AT^4$ (2) $E = 0.7\ \sigma AT^4$

(3) $E = 0.5\ \sigma AT^4$ (4) $E = \sigma AT^4$

7. An ideal gas is allowed to expands from volume V to $2V$ according to the law VP^2 = Constant. If initial temperature of the gas is 'T' then its final temperature will be

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

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

8. The ratio of velocity of sound in oxygen to that in Argon at the same temperature is

(1) $\sqrt{\frac{21}{20}}$ (2) $\sqrt{\frac{20}{21}}$

(3) $\sqrt{\frac{21}{25}}$ (4) $\sqrt{\frac{25}{21}}$

9. A simple pendulum performs SHM about x = 0 with an amplitude A and time period T. The speed of the pendulum at $x = \frac{3A}{4}$ will be

(1) $\frac{A\pi\sqrt{7}}{2T}$ (2) $\frac{\sqrt{3}\pi A}{T}$

(3) $\frac{\pi A\sqrt{5}}{2T}$ (4) $\frac{\pi A\sqrt{7}}{4T}$

10. A circular beam of light having a diameter 4 cm falls on a plane glass slab at angle of incidence 60°. If refractive index of the material of slab is $\mu = \frac{3}{2}$, then diameter of the refracted beam is

(1) $10\sqrt{\frac{2}{3}}$ cm (2) 2 cm

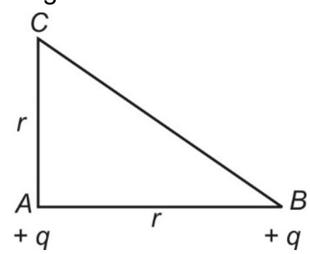
(3) $8\sqrt{\frac{2}{3}}$ cm (4) $4\sqrt{\frac{3}{2}}$ cm

11. In young's double slit experiment, if the separation between the slits is halved and the distance between the slits and screen is doubled, then fringe width becomes

(1) Doubled (2) Quadrupled

(3) Halved (4) Remains same

12. Two charges each $+q$ are placed at the vertices of a right angled triangle (isosceles triangle) as shown in the figure.

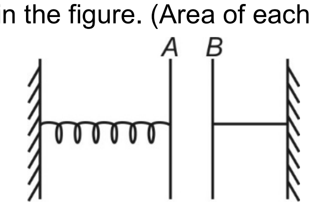


Charge that should be placed on vertex C, so that net electrostatic energy of the configuration is zero, is

(1) $\frac{-q.2}{1+\sqrt{2}}$ (2) $\frac{-q}{\sqrt{2}-1}$

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

13. Plate A of a parallel plate air filled capacitor is connected to a spring having force constant K and Plate B is fixed. They rest on a smooth table as shown in the figure. (Area of each plate is A)



It a charge $+q$ is given to plate A and $-q$ is given to plate B. Extension of the spring in equilibrium situation

(1) $\frac{q^2}{KA\varepsilon_0}$ (2) $\frac{q^2}{2KA\varepsilon_0}$

(3) $\frac{2q^2}{K\varepsilon_0 A}$ (4) No extension

14. Soft iron is used in many parts of electrical machines because it exihit

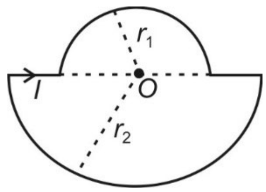
(1) Low permeability and low hysteresis loss

(2) Low permeability and high hysteresis loss

(3) High permeability and high hysteresis loss

(4) High permeability and low hysteresis loss

15. The wire loop carries a current I as shown in the figure. The magnetic field at the centre 'O' will be



(1) $\frac{\mu_0 I}{4}\left(\frac{1}{r_1}+\frac{1}{r_2}\right)$ (2) $\frac{\mu_0 I}{4}\left(\frac{1}{r_1}-\frac{1}{r_2}\right)$

(3) $\frac{\mu_0 I}{2}(r_1 - r_2)$ (4) Zero

16. A charged particle is projected in to a region where there may have an electric filed $\vec{E}$ and/or magnetic field $\vec{B}$. If the charged particle goes un-accelerated, then it is not possible that

(1) $\vec{E}=0, \vec{B}=0$

(2) $\vec{E}\neq 0, \vec{B}=0$

(3) $\vec{E}=0, \vec{B}\neq 0$

(4) $\vec{E}\neq 0, \vec{B}\neq 0$

17. The Maxwell

$\oint \vec{B}.d\vec{l} = \mu_0\left(I + \varepsilon_0 \frac{d\phi_E}{dt}\right)$ is a statement of

(1) Faradey's law of EMI

(2) Modified Ampere's law

(3) Gauss' law of electrostatic

(4) Gauss' law of magnetism

18. The ratio of the de-Broglie wavelength of an α-particle and a proton of same kinetic energy is

(1) 1 : 2 (2) 1 : 1

(3) $\sqrt{2}:1$ (4) 4 : 1

19. For the stability of any nucleus

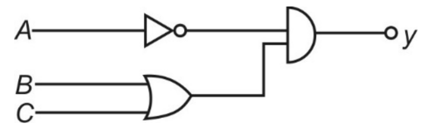
(1) Binding energy per nucleon should be more

(2) Binding energy per nucleon should be less

(3) Number of protons inside the nucleus should be more

(4) Number of neutrons inside the nucleus should be more

20. The Boolean equation for the circuit given in figure is



(1) $y=\overline{A}.B+C$

(2) $y=\overline{A}.(\overline{B}+\overline{C})$

(3) $y=\overline{A}.(B+\overline{C})$

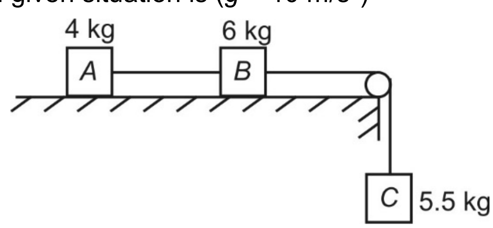
(4) $y=\overline{A}.(B+C)$

SECTION - II

Numerical Value Type Questions: This section contains 10 questions. In Section II, attempt any **five questions out of 10**. The answer to each question is a NUMERICAL VALUE. For each question, enter the correct numerical value (in decimal notation, truncated/rounded-off to the second decimal place; e.g. 06.25, 07.00, –00.33, –00.30, 30.27, –27.30) using the mouse and the on-screen virtual numeric keypad in the place designated to enter the answer.

21. In an experiment four quantities a, b, c and d are measured with percentage error 2%, 3% 1% and 0.5% respectively. A quantity Q is defined as Q $Q=\frac{a\sqrt{b}}{c^{3/2}d^4}$. Maximum percentage error in the calculation of Q will be __________ %

22. Three blocks A, B and C are placed on a rough horizontal surface. Friction coefficient between blocks and surface is 0.6. Acceleration of the block C in given situation is (g = 10 m/s^2)



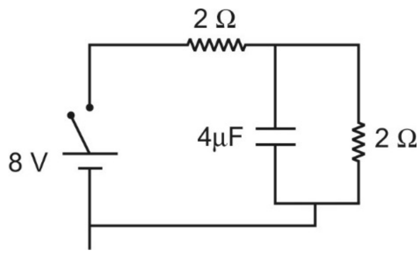
23. Two satellites are in the parking orbits around the earth. Mass of one is 10 times that of the other. The ratio of their periods of revolution is :

24. Specific heat S of container of mass 1 kg varies with temperature T according to the empirical relation $S = A + BT$. Where A = 100 cal kg^{-1} K^{-1} and B = 2 × 10^{-2} cal kg^{-1} K^{-2}. If container was heated from 27°C to 227°C then heat required to do so is _________ cal

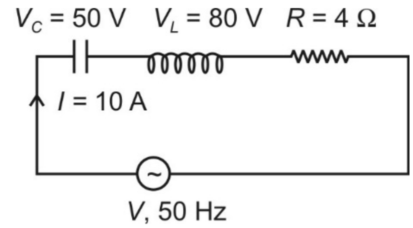
25. A compound microscope has a magnifying power 30. Focal length of its eye piece is 5 cm. If the final image formed at least distance of distinct vision then magnification produced by the objective is

26. A beam of light is incident on a glass plate at an angle of incidence 60°. The reflected ray is completely polarized. Refractive index of the glass plate is

27. When the key is pressed at time $t = 0$, then charge on the capacitor after a very long time in given figure will be __________ μ C



28. Find the power factor of the A.C. circuit as shown in the figure.



29. If 10% of a material decays in 5 days, then the amount of original material left after 20 days is approximately ___________ %.

30. A beam of light converges towards a point O, 10 cm behind a concave mirror of focal length 20 cm. Magnification produced by the mirror is

[PART – B : CHEMISTRY]

SECTION - I

Multiple Choice Questions : This section contains 20 multiple choice questions. Each question has 4 choices (1), (2), (3) and (4), out of which **ONLY ONE** is correct.

31. Cation X, Y and Z do not give precipitates with hydrochloric acid but form precipitate with hydrogen sulphide in dilute mineral acid medium. While sulphide of X, Y are insoluble in ammonium polysulphide, the sulphide of Z is soluble. Then out of the following X, Y and Z are respectively.

    (1) $Hg_2^{2+}, Cu^{2+}, As^{3+}$

    (2) $Hg^{2+}, Cu^{2+}, As^{+3}$

    (3) Ag^+, Cu^{2+}, Hg^{2+}

    (4) Ag^+, Cu^{2+}, Pb^{2+}

32. Iron(II) sulphate in acidic medium reduces permanganate to Mn^{+x}. The solution becomes yellow because of the formation of A. The yellow colour disappears if potassium fluoride is added because they form colourless complex with A.

    The correct statement about A in above reaction is

    (1) In this reaction, Mn^{+7} is converted to Mn^{+4}

    (2) A is Fe^{3+}

    (3) A is Mn^{2+}

    (4) In this reaction Mn^{+7} convert to Mn^{+6}

33. The reduction of metal oxide is easier if metal formed is in liquid state at the temperature of reduction because

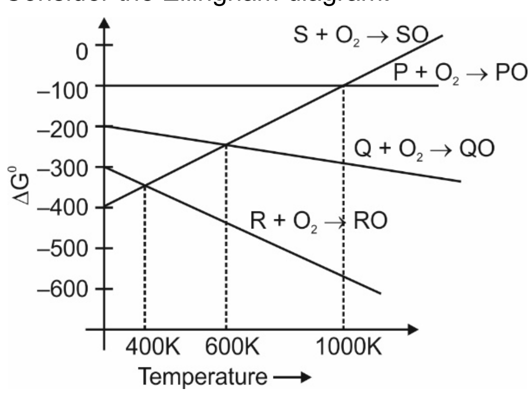
    (1) ΔS of process is more negative that favour the reduction

    (2) ΔS of process is more positive so favour reduction

    (3) ΔH of process is more positive so favour reduction

    (4) ΔG of process is more positive so favour reduction

34. Consider the Ellingham diagram.



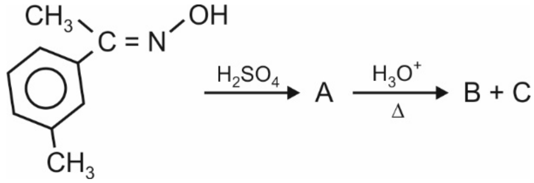
At 800 K, oxide of Q can be reduced spontaneously by

(1) Only R

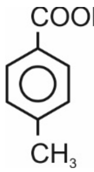
(2) Both S and P

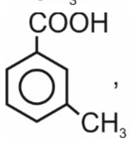
(3) Only S

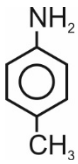
(4) Only P

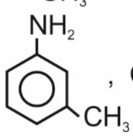
35. 

Product B and C can be

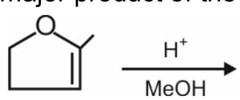
(1)  , CH_3NH_2

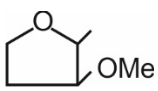
(2)  , CH_3NH_2

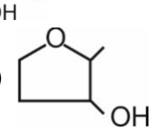
(3)  , CH_3COOH

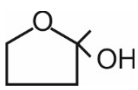
(4)  , CH_3COOH

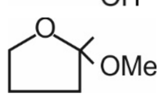
36. What is the major product of the reaction?



(1) 

(2) 

(3) 

(4) 

37. What is the correct order of K_a value of following compound?

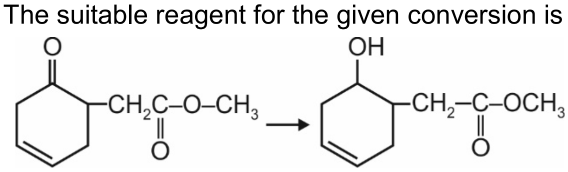
$\underset{\text{(I)}}{\text{2-chloroethanol}}$, $\underset{\text{(II)}}{\text{isopropyl alcohol}}$,

$\underset{\text{(III)}}{\text{2,2,2-trichloroethanol}}$

(1) I > III > II (2) III > I > II

(3) III > II > I (4) I > II > III

38. The suitable reagent for the given conversion is



(1) (i) $LiAlH_4$/ether, (ii) H_3O^+

(2) $NaBH_4/C_2H_5OH$

(3) H_2/Ni

(4) Zn-Hg/HCl

39. 8 g of $Na_2CO_3.xH_2O$ are present in 500 mL of solution. This solution is diluted by water such that volume of solution becomes 1 L. 100 mL of dilute solution is completely neutralised by 10 mL of 1 M HCl. The value of x is

(1) 1 (2) 2

(3) 3 (4) 4

40. Which of the following is correct combination?

Atomic Number	Name	Symbol
(1) 105	Unnilpentium	Unp
(2) 107	Ununheptium	Uuh
(3) 109	Unnilennium	Unn
(4) 111	Unnilunium	Uuu

41. The correct order of atomic radius is

(1) Mn < Fe < Co

(2) Sc < Ti < V

(3) Fe < Co < Zn

(4) Zn > Cu > Ni

42. Hybridisation of central atom of PCl_6^- and PO_4^{3-} are respectively

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

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

43. Among the following, strength of H-bonding is maximum in

(1) F—H····O

(2) O—H····O

(3) N—H····O

(4) N—H····N

44. In which of the following process, magnetic nature of species does not change?

(1) $O_2^+ \longrightarrow O_2^{+2}$

(2) $CN^- \longrightarrow CN$

(3) $F_2 \longrightarrow F_2^+$

(4) $B_2 \longrightarrow B_2^+$

45. Select the correct statement.

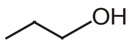
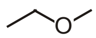
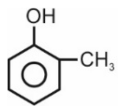
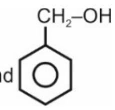
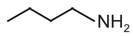
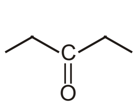
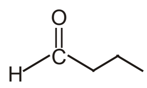
(1) Photochemical smog occurs in cool humid climate

(2) Photochemical smog is called as oxidising smog

(3) It is mixture of smoke and SO_2

(4) Ozone is not a component of photochemical smog

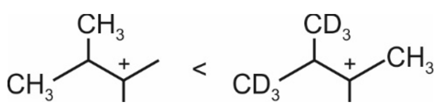
46. Few compounds and their relationship is described below. Select the correct combination of true (T) and false (F).

Compounds		**Isomerism**
(a)	 and 	Chain isomerism
(b)	 and 	Position isomerism
(c)	 and 	Functional isomers
(d)	 and 	Functional isomers

(1) FFTF
(2) FTTT
(3) TTFF
(4) TFTT

47. Select incorrect order of stabilities of various intermediates.

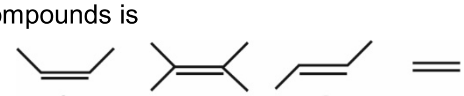
(1) $CH_3-\dot{C}H-CH_3 < CH_3\dot{C}H_2$

(2) 

(3) $CH_3O-\overset{+}{C}H-CH_3 > CH_3-\overset{+}{C}H-CH_3$

(4) $CN-CH_2^{\ominus} > NH_2-CH_2^{\ominus}$

48. The decreasing order of stability in the following compounds is



A B C D

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

49. Which of the following statement is true?
(1) All alcohols react with NaOH to give salt and water
(2) Alcohol reacts with Na metal and produce H_2
(3) Phenol do not react with NaOH
(4) Phenol produces CO_2 on reaction with $NaHCO_3$

50. $CH_3-CH_2Br \xrightarrow{LiAlH_4} Q + R$

If R contains aluminium metal, then Q can also be formed by the
(1) Reaction of CH_3MgBr with C_2H_5OH
(2) Reaction of C_2H_5MgBr with C_2H_5OH
(3) Reaction of CH_3CH_2Br with aq. KOH
(4) Dehydration of ethanol

SECTION - II

Numerical Value Type Questions: This section contains 10 questions. In Section II, attempt any **five questions out of 10**. The answer to each question is a NUMERICAL VALUE. For each question, enter the correct numerical value (in decimal notation, truncated/rounded-off to the second decimal place; e.g. 06.25, 07.00, –00.33, –00.30, 30.27, –27.30) using the mouse and the on-screen virtual numeric keypad in the place designated to enter the answer.

51. The rms speed of NO gas at 27°C is half of the rms speed of gas X at 287°C. The molar mass of gas X (in g/mol) is ___.

52. If standard heat of formation of CO_2 is – 400 kJ/mol. The amount of $C_{(graphite)}$ required, if 10 kJ heat is released during the combustion, is ____ g.

53. A 2 L vessel contains 4 g of Helium and 4 g of H_2 gas at 27°C. After sometime, 50% of the gas having higher average speed is removed. The percentage reduction in total pressure if temperature remains constant is equal to ____

54. Consider the reaction

$$BrO_3^- + Br^- + H^+ \rightarrow Br_2 + H_2O$$

100 ml of 0.1 M BrO_3^- solution react with 250 ml of 0.15 M Br^- in acidic medium according to above reaction. The mass of Br_2 formed is ____g. (molar mass of Br_2 = 160 g/mol)

55. Maximum number of electrons having n = 3 and $m_s = -\frac{1}{2}$ will be __________.

56. Out of Li_2, Be_2, B_2, C_2 __________ is/are paramagnetic.

57. The value of C_V for N_2 is __________ R.

58. __________ type/s of functional group is/are present in fumaric acid.

59. __________ th/st/rd element of 3d series has least value of radius.

60. Number of stereo isomers of possible for $C_2FClBrI$ is/are __________.

[PART – C : MATHEMATICS]

SECTION - I

Multiple Choice Questions : This section contains 20 multiple choice questions. Each question has 4 choices (1), (2), (3) and (4), out of which **ONLY ONE** is correct.

61. The greatest term in the expansion of $(3 + 5x)^{15}$ when $x = \frac{9}{25}$, is
(1) T_6 only (2) T_7 only
(3) Both T_6 and T_7 (4) Both T_5 and T_6

62. Let ω be the 7th root of unity. Then $\log_3\left|1+\omega+\omega^2+\omega^3+\omega^4+\omega^5-\frac{8}{\omega}\right|$ is equal to
(1) 0 (2) 1
(3) 2 (4) 3

63. If α, β, γ are the roots of $x^3 + 3x^2 - 1 = 0$, then $\frac{1}{\alpha(\beta+\gamma)}+\frac{1}{\beta(\gamma+\alpha)}+\frac{1}{\gamma(\alpha+\beta)}$ is equal to
(1) 0 (2) –3
(3) 3 (4) –1

64. If $|z-4|<|z-2|$, its solution is given by
(1) $\text{Re}(z)>0$ (2) $\text{Re}(z)<0$
(3) $\text{Re}(z)>3$ (4) $\text{Re}(z)>2$

65. Let $A = \left\{x \in R : \frac{x-1}{x} > 1\right\}$ and
$B = \left\{x \in R : \ln\left(x^2-4x+4\right) \geq 0\right\}$,
then $A \cap B$ equals
(1) $(-\infty, 0)$ (2) $(0, \infty)$
(3) $(-3, 0)$ (4) $(1, \infty)$

66. If it is possible to draw a line which belongs to all the given family of lines
$y - 2x + 1 + \lambda_1(2y - x - 1) = 0,$
$(3y - x - 6) + \lambda_2 (y - 3x + 6) = 0,$
$ax + y - 2 + \lambda_3 (6x + ay - a) = 0,$
then
(1) $a = 3$ (2) $a = 2$
(3) $a = -2$ (4) $a = 4$

67. The co-ordinates of the point on the parabola $y = x^2 + 7x + 2$ which is nearest to the straight line $y = 3x - 3$ are
(1) (–2, –8) (2) (1, 10)
(3) (2, 20) (4) (–1, –4)

68. $\lim_{x\to 0}\frac{e^{x^2}-\cos x}{\sin^2 x}$ is equal to:
(1) 2 (2) 3
(3) $\frac{3}{2}$ (4) $\frac{5}{4}$

69. The sum of all the real values of x satisfying the equation $2^{(x-1)(x^2+5x-50)} = 1$ is
(1) 16 (2) 14
(3) –4 (4) –5

70. If g is the inverse of a function f and $f'(x) = \frac{1}{1+x^5}$, then $g'(x)$ is equal to
(1) $\frac{1}{1+\{g(x)\}^5}$ (2) $1+\{g(x)\}^5$
(3) $1+x^5$ (4) $5x^4$

71. Shortest distance between the lines
$\frac{x-1}{1}=\frac{y-1}{1}=\frac{z-1}{1}$
and $\frac{x-2}{1}=\frac{y-3}{1}=\frac{z-4}{1}$ is equal to
(1) $\sqrt{14}$ (2) $\sqrt{7}$
(3) $\sqrt{2}$ (4) $\sqrt{3}$

72. Let L denotes the set of straight lines in a plane. Let a relation R be defined by $\alpha R \beta \Leftrightarrow \alpha \perp \beta; \alpha, \beta \in L$. Then R is
(1) Reflexive (2) Symmetric
(3) Transitive (4) Equivalence

73. Two vertices of an equilateral triangle are (–1, 0) and (1, 0) and the third vertex lies above the x-axis. the equation of circumcircle is
(1) $x^2+y^2+\frac{2y}{\sqrt{3}}-2=0$
(2) $x^2+y^2-\frac{2y}{\sqrt{3}}-1=0$
(3) $x^2+y^2-\frac{y}{\sqrt{3}}=0$
(4) $x^2+y^2-\frac{2y}{\sqrt{3}}-2=0$

74. The number of values of x in the interval $[0, 3\pi]$ satisfying the equation $2\sin^2 x+5\sin x-3=0$ is
(1) 4 (2) 6
(3) 1 (4) 2

75. If $2\int_0^1 \tan^{-1} x\,dx = \int_0^1 \cot^{-1}(1-x+x^2)dx$, then $\int_0^1 \tan^{-1}(1-x+x^2)dx$ is equal to:

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

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

76. If the eccentricity of the hyperbola $x^2 - y^2 \sec^2 \alpha = 15$ is $\sqrt{7}$ times the eccentricity of the ellipse $x^2 \sec^2 \alpha + y^2 = 50$, then the value of α is

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

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

77. Let $f: R \to R$ be a function defined by $f(x) = \min\{x+1, |x|+1\}$, then which of the following is true?

(1) $f(x)$ is differentiable everywhere

(2) $f(x)$ is not differentiable at $x = 0$

(3) $f(x) \geq 1$ for all $x \in R$

(4) $f(x)$ is not differentiable at $x = 1$

78. Let $A = \begin{bmatrix} x & y & -z \\ 1 & 2 & 3 \\ 1 & 1 & 2 \end{bmatrix}$ where $x, y, z \in N$

If $|\text{adj}(\text{adj}(\text{adj}(\text{adj}A)))| = 4^8.5^{16}$, then number of such matrix is

(1) 60 (2) 28

(3) 36 (4) 45

79. If $1^2 + 2^2 + 3^2 + ... + 2014^2 = x$ and $1.2014 + 2.2013 + ... + 2014.1 = y$, then x is equal to

(1) $2015.1007^2 - y$ (2) $1007 \times 2015^2 - y$

(3) $1007 \times 2015^2 + y$ (4) $2015.1007^2 + y$

80. The area of the region bounded by the curves $y = |x-1|$ and $y = 3-|x|$ is

(1) 6 sq. units (2) 2 sq. units

(3) 3 sq. units (4) 4 sq. units

SECTION - II

Numerical Value Type Questions: This section contains 10 questions. In Section II, attempt any **five questions out of 10**. The answer to each question is a NUMERICAL VALUE. For each question, enter the correct numerical value (in decimal notation, truncated/rounded-off to the second decimal place; e.g. 06.25, 07.00, –00.33, –00.30, 30.27, –27.30) using the mouse and the on-screen virtual numeric keypad in the place designated to enter the answer

81. The distance of the point (3, 8, 2) from the line $\frac{x-1}{2} = \frac{y-3}{4} = \frac{z-2}{3}$ measured parallel to the plane $3x + 2y - 2z + 15 = 0$

82. If $\vec{\alpha}, \vec{\beta}, \vec{\gamma}$ are unit vectors satisfying $|\vec{\alpha}-\vec{\beta}|^2 + |\vec{\beta}-\vec{\gamma}|^2 + |\vec{\gamma}-\vec{\alpha}|^2 = 9$, then $|3\vec{\alpha}+8\vec{\beta}+8\vec{\gamma}|$ equals

83. If $y_1, y_2, y_3......y_{18}$ are the observations such that $\sum_{j=1}^{18}(y_j - 8) = 9$ and $\sum_{j=1}^{18}(y_j-8)^2 = 45$, then the standard deviation of these observations is

84. The graph of $y = f(x)$, where $f(x) \geq 0$, meets x-axis in two points (0, 0) and (2, 0) and encloses an area of $\frac{3}{4}$ square units with the axes. Then the value of $\int_0^2 xf'(x)dx$, equal to

85. $\sin^{-1}\left(\frac{x}{5}\right) + \operatorname{cosec}^{-1}\left(\frac{5}{4}\right) = \frac{\pi}{2}$, then values of x is __________.

86. The number of real values of λ for which the system of linear equations

$$2x + 4y - \lambda z = 0$$
$$4x + \lambda y + 2z = 0$$
$$\lambda x + 2y + 2z = 0$$

has infinitely many solutions is __________.

87. Let $g(x) = f^{-1}(x)$ where, $f(x) = 1 + x + \frac{x^2}{2} + \frac{x^3}{3} - 4e^{\frac{(1-x)}{2}}$ then $g'\left(\frac{-7}{6}\right) =$ __________.

88. Let $y = f(x)$ satisfies the differential equation $xy(1+y)dx = dy$. If $f(0) = 1$ and $f(2) = \frac{e^2}{\lambda - e^2}$, then $\lambda =$ __________.

89. The number of solution of $\tan x + \sec x = 2\cos x$ in $[0, 2\pi)$ is __________.

90. The minimum value of the sum of real numbers $a^{-5}, a^{-4}, 3a^{-3}, 1, a^8$ and a^{10} with a^{70} is __________.

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