JEE Mock Test
Class- 11th
(September- 2022)

Time: 3Hrs. **M. Marks. 300**

General Instruction:

- Each Subject of Question Papers will have 30 questions.
- 20 MCQs will be asked in Section A and all questions must be answered.
- Section B will have 10 questions in each Subject, out of which, only 5 must be attempted.

Mathematics

1. Which of the following is correct?
(a) $1 + i > 2 - i$ (b) $2 + i > 1 + i$
(c) $2 - i > 1 + i$ (d) none of these

2. If $a = \sqrt{2\,i}$, then which of the following is correct?
(a) $a = 1 + i$ (b) $a = 1 - i$
(c) $a = -(\sqrt{2})\,i$ (d) none of these

3. Let z_1, z_2 be two complex numbers such that $z_1 + z_2$ and $z_1 z_2$ both are real, then
(a) $z_1 = -z_2$ (b) $z_1 = \bar{z}_2$ (c) $z_1 = -\bar{z}_2$ (d) $z_1 = z_2$

4. If the complex numbers z_1, z_2, z_3 are in AP, then they lie on a
(a) circle (b) parabola (c) line (d) ellipse

5. The smallest positive integer n for which $\left(\frac{1+i}{1-i}\right)^n = 1$ is
(a) 3 (b) 2 (c) 4 (d) none of these

6. The locus of the point z satisfying $\arg\left(\frac{z-1}{z+1}\right) = k$, where k is non-zero real, is
(a) a circle with centre on y-axis
(b) a circle with centre on x-axis
(c) a straight line parallel to x-axis
(d) a straight line making an angle of 60° with the x-axis.

7. If $\sqrt{x+iy} = \pm(a+ib)$, then $\sqrt{-x-iy}$ is equal to
(a) $\pm(b + ia)$ (b) $\pm(a - ib)$
(c) $\pm(b - ia)$ (d) none of these

8. The locus of the points z satisfying the condition $\arg\left(\frac{z-1}{z+1}\right) = \frac{\pi}{3}$ is a
(a) parabola (b) circle
(c) pair of staight lines (d) none of these

9. If $(\sqrt{3}+i)^{10} = a + ib$, then a and b are respectively
(a) 128 & $128\sqrt{3}$ (b) 64 & $-64\sqrt{3}$
(c) 512 & $-512\sqrt{3}$ (d) none of these

10. If $\mathrm{Re}\left(\frac{z-8i}{z+6}\right) = 0$, then z lies on the curve
(a) $x^2 + y^2 + 6x - 8y = 0$ (b) $4x - 3y + 24 = 0$
(c) $x^2 + y^2 - 8 = 0$ (d) none of these

11. If $z = \left(\frac{\sqrt{3}}{2} + \frac{i}{2}\right)^5 + \left(\frac{\sqrt{3}}{2} - \frac{i}{2}\right)^5$, then
(a) $\mathrm{Re}(z) = 0$ (b) $\mathrm{Im}(z) = 0$
(c) $\mathrm{Re}(z) > 0$, $\mathrm{Im}(z) > 0$ (d) $\mathrm{Re}(z) > 0$, $\mathrm{Im}(z) < 0$

12. If $z = x + iy$ and $w = \frac{1 - iz}{z - i}$, then $|w| = 1$ implies that in the complex plane
(a) z lies on imaginary axis (b) z lies on real axis
(c) z lies on unit circle (d) none of these

13. Let $3 - i$ and $2 + i$ be affixes of two points A and B in the argand plane and P represents the complex number $z = x + iy$. Then, the locus of P if $|z - 3 + i| = |z - 2 - i|$ is
(a) circle on AB as diameter
(b) the line AB
(c) the perpendicular bisector of AB
(d) none of these

14. POQ is a straight line through the origin O. P and Q represent the complex numbers $a + ib$ and $c + id$ respectively and $OP = OQ$. Then, which one of the following is not true?
(a) $|a + ib| = |c + id|$ (b) $a + b = c + d$
(c) $\arg(a + ib) = \arg(c + id)$ (d) none of these

15. If $z_1 = a + ib$ and $z_2 = c + id$ are complex numbers such that $|z_1| = |z_2| = 1$ and $\mathrm{Re}(z_1 \bar{z}_2) = 0$, then the pair of complex numbers $w_1 = a + ic$ and $w_2 = b + id$ satisfy
(a) $|w_1| = 1$ (b) $|w_2| = 1$
(c) $\mathrm{Re}(w_1 \bar{w}_2) = 0$ (d) all of these

16. Let z_1 and z_2 be two complex numbers such that z z_2 and $|z_1| = |z_2|$. If z_1 has positive real part and z_2 negative imaginary part, then $\frac{z_1 + z_2}{z_1 - z_2}$
(a) cannot be zero (b) is real and itive
(c) is real and negative (d) is purely i ginary

17. The value of $\sum_{k=1}^{6}\left(\sin\frac{2\pi k}{7} - i\cos\frac{2\pi k}{7}\right)$, is
(a) -1 (b) 0 (c) $-i$ (d) i

18. The equation $\bar{b}\,z + b\,\bar{z} = c$, where b is a non-zero complex constant and c is a real number, represents
(a) a circle (b) a straight line
(c) a pair of straight lines (d) none of these

19. If $|a_i| < 1$, $\lambda_i \geq 0$ for $i = 1, 2, \ldots, n$ and $\lambda_1 + \lambda_2 + \ldots + \lambda_n = 1$, then the value of $|\lambda_1 a_1 + \lambda_2 a_2 + \ldots + \lambda_n a_n|$ is
(a) equal to 1 (b) less than 1
(c) greater than 1 (d) none of these

20. For any two complex numbers z_1, z_2 and any two real numbers a and b, $|a z_1 - b z_2|^2 + |b z_1 + a z_2|^2 =$
(a) $(a + b)(|z_1|^2 + |z_2|^2)$
(b) $(a^2 + b^2)(|z_1|^2 + |z_2|^2)$
(c) $(a^2 + b^2)(|z_1| + |z_2|)$
(d) none of these

21. Common roots of the equations $z^3 + 2z^2 + 2z + 1 = 0$ and $z^{1985} + z^{100} + 1 = 0$ are
(a) w, w^2 (b) $1, w, w^2$ (c) $-1, w, w^2$ (d) $-w, -w^2$

22. If z_1 and z_2 are two complex numbers such that $\left|\frac{z_1 - z_2}{1 - \bar{z}_1 z_2}\right| = 1$, then which one of the following is not true?
(a) $|z_1| = 1, |z_2| = 1$ (b) $z_1 = e^{i\theta}, \theta \in R$
(c) $z_2 = e^{i\theta}, \theta \in R$ (d) all of these

23. The points representing cube roots of unity
(a) are collinear
(b) lie on a circle of radius $\sqrt{3}$
(c) from an equilateral triangle
(d) none of these

24. If z_1 and z_2 are two complex numbers such that $\left|\frac{z_1 - z_2}{z_1 + z_2}\right| = 1$, then

(a) $z_1 = k z_2,\ k \in R$ (b) $z_1 = i k z_2,\ k \in R$

(c) $z_1 = z_2$ (d) none of these

25. If z_1, z_2 are two complex numbers such that $\left|\frac{z_1 - z_2}{z_1 + z_2}\right| = 1$ and $i z_1 = k z_2$ where $k \in R$, then the angle between $z_1 - z_2$ and $z_1 + z_2$ is

(a) $\tan^{-1}\left(\frac{2k}{k^2+1}\right)$ (b) $\tan^{-1}\left(\frac{2k}{1-k^2}\right)$

(c) $-2\tan^{-1} k$ (d) $2\tan^{-1} k$

26. If n is a positive integer greater than unity and z is a complex number satisfying the equation $z^n = (z+1)^n$, then

(a) Re $(z) < 0$ (b) Re $(z) > 0$

(c) Re $(z) = 0$ (d) none of these

27. If n is a positive integer greater than unity and z is a complex number satisfying the equation $z^n = (z+1)^n$, then

(a) Im $(z) < 0$ (b) Im $(z) > 0$

(c) Im $(z) = 0$ (d) none of these

28. If at least one value of the complex number $z = x + iy$ satisfy the condition $|z + \sqrt{2}| = \sqrt{a^2 - 3a + 2}$ and the inequality $|z + i\sqrt{2}| < a$, then

(a) $a > 2$ (b) $a = 2$ (c) $a < 2$ (d) none of these

29. Given z is a complex number with modulus 1. Then, the equation $\left(\frac{1+ia}{1-ia}\right)^4 = z$ has

(a) all roots, real and distinct

(b) two real and two imaginary

(c) three roots real and one imaginary

(d) one root real and three imaginary

30. The centre of a regular polygon of n sides is located at the point $z = 0$, and one of its vertex z_1 is known. If z_2 be the vertex adjacent to z_1, then z_2 is equal to

(a) $z_1\left(\cos\frac{2\pi}{n} \pm i\sin\frac{2\pi}{n}\right)$ (b) $z_1\left(\cos\frac{\pi}{n} \pm i\sin\frac{\pi}{n}\right)$

(c) $z_1\left(\cos\frac{\pi}{2n} \pm i\sin\frac{\pi}{2n}\right)$ (d) none of these

Physics

31. with an acceleration of $5\,ms^{-2}$. Taking g to be $10\,ms^{-2}$, then the tension in the cable is

(a) 6000 N (b) 9000 N

(c) 60000 N (d) 90000 N

32. A ball of mass 0.2 *kg* moves with a velocity of 20 *m/sec* and it stops in 0.1 *sec*; then the force on the ball is

(a) 40 N (b) 20 N

(c) 4 N (d) 2 N

33. A vehicle of 100 *kg* is moving with a velocity of 5 *m/sec*. To stop it in $\frac{1}{10}$ sec, the required force in opposite direction is

(a) 5000 N (b) 500 N (c) 50 N (d) 1000 N

34. A boy having a mass equal to 40 *kilograms* is standing in an elevator. The force felt by the feet of the boy will be greatest when the elevator

$(g = 9.8\ metres/\sec^2)$

(a) Stands still

(b) Moves downward at a constant velocity of 4 *metres/sec*

(c) Accelerates downward with an acceleration equal to $4\ metres/\sec^2$

(d) Accelerates upward with an acceleration equal to $4\ metres/\sec^2$

35. A rocket has an initial mass of $20 \times 10^3\,kg$. If it is to blast off with an initial acceleration of $4\,ms^{-2}$, the initial thrust needed is $(g \cong 10\,ms^{-2})$

(a) $6 \times 10^4\ N$ (b) $28 \times 10^4\ N$ (c) $20 \times 10^4\ N$ (d) $12 \times 10^4\ N$

36. The ratio of the weight of a man in a stationary lift and when it is moving downward with uniform acceleration 'a' is 3 : 2. The value of 'a' is (g-Acceleration due to gravity of the earth)

(a) $\frac{3}{2}g$ (b) $\frac{g}{3}$

(c) $\frac{2}{3}g$ (d) g

37. The mass of a lift is 500 *kg*. When it ascends with an acceleration of $2\,m/s^2$, the tension in the cable will be $[g = 10\,m/s^2]$

(a) 6000 *N* (b) 5000 *N*

(c) 4000 *N* (d) 50 *N*

38. If force on a rocket having exhaust velocity of 300 *m/sec* is 210 *N*, then rate of combustion of the fuel is

(a) 0.7 *kg/s* (b) 1.4 *kg/s*

(c) 0.07 *kg/s* (d) 10.7 *kg/s*

39. In an elevator moving vertically up with an acceleration *g*, the force exerted on the floor by a passenger of mass *M* is

(a) *Mg* (b) $\frac{1}{2}Mg$ (c) Zero (d) 2 *Mg*

40. A mass 1 *kg* is suspended by a thread. It is

(i) lifted up with an acceleration $4.9\,m/s^2$

(ii) lowered with an acceleration $4.9\,m/s^2$.

The ratio of the tensions is

(a) 3 : 1 (b) 1 : 3 (c) 1 : 2 (d) 2 : 1

41. A 5000 *kg* rocket is set for vertical firing. The exhaust speed is $800\,ms^{-1}$. To give an initial upward acceleration of $20\,ms^{-2}$, the amount of gas ejected per second to supply the needed thrust will be $(g = 10\,ms^{-2})$

(a) $127.5\,kg\,s^{-1}$ (b) $187.5\,kg\,s^{-1}$

(c) $185.5\,kg\,s^{-1}$ (d) $137.5\,kg\,s^{-1}$

42. If a person with a spring balance and a body hanging from it goes up and up in an aeroplane, then the reading of the weight of the body as indicated by the spring balance will

(a) Go on increasing

(b) Go on decreasing

(c) First increase and then decrease

(d) Remain the same

43. The time period of a simple pendulum measured inside a stationary lift is found to be *T*. If the lift starts accelerating upwards with an acceleration *g*/3, the time period is

(a) $T\sqrt{3}$ (b) $T\sqrt{3}/2$

(c) $T/\sqrt{3}$ (d) $T/3$

44. A cork is submerged in water by a spring attached to the bottom of a pail. When the pail is kept in a elevator moving with an acceleration downwards, the spring length

(a) Increases (b) Decreases

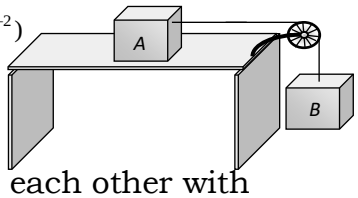
(c) Remains unchanged (d) Data insufficient

45. Two trolleys of mass m and $3m$ are connected by a spring. They were compressed and released once, they move off in opposite direction and comes to rest after covering distances S_1 and S_2 respectively. Assuming the coefficient of friction to be uniform, the ratio of distances $S_1 : S_2$ is

(a) 1 : 9 (b) 1 : 3

(c) 3 : 1 (d) 9 : 1

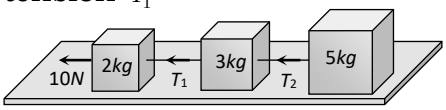
46. A block A of mass 7 *kg* is placed on a frictionless table. A thread tied to it passes over a frictionless pulley and carries a body B of mass 3 *kg* at the other end. The acceleration of the system is (given $g = 10\, ms^{-2}$)



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

(b) $3ms^{-2}$ (d) $30 ms^{-2}$

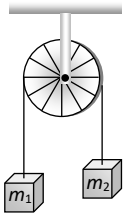
47. Three blocks of masses 2 *kg*, 3 *kg* and 5 *kg* are connected to each other with light string and are then placed on a frictionless surface as shown in the figure. The system is pulled by a force $F = 10\, N,$ then tension $T_1 =$



(a) $1N$ (c) 8 *N*

(b) 5 *N* (d) 10 *N*

48. Two masses m_1 and m_2 are attached to a string which passes over a frictionless smooth pulley. When $m_1 = 10kg,\ m_2 = 6kg,$ the acceleration of masses is



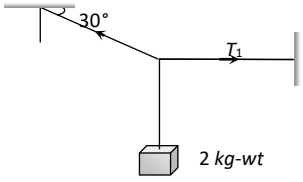
(a) 20 m/s^2

(b) $5m/s^2$

(c) 2.5 m/s^2

(d) $10m/s^2$

49. A body of weight $2kg$ is suspended as shown in the figure. The tension T_1 in the horizontal string (in *kg wt*) is



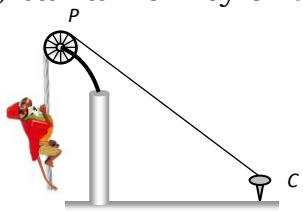
(a) $2/\sqrt{3}$

(b) $\sqrt{3}/2$

(c) $2\sqrt{3}$

(d) 2

50. One end of a massless rope, which passes over a massless and frictionless pulley *P* is tied to a hook *C* while the other end is free. Maximum tension that the rope can bear is 360 *N*. with what value of minimum safe acceleration (in ms^{-2}) can a monkey of $60\, kg$ move down on the rope



(a) 16

(b) 6

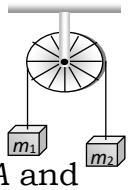
(c) 4

(d) 8

51. A light string passing over a smooth light pulley connects two blocks of masses m_1 and m_2 (vertically). If the acceleration of the system is $g/8$ then the ratio of the masses is

(a) 8 : 1 (b) 9 : 7 (c)4 : 3 (d)5 : 3

52. Two masses $m_1 = 5\,kg$ and $m_2 = 4.8\,kg$ tied to a string are hanging over a light frictionless pulley. What is the acceleration of the masses when they are free to move $(g = 9.8\ m/s^2)$



(a) $0.2\ m/s^2$ (c) $5\ m/s^2$

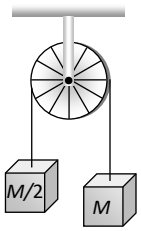
(b) $9.8\ m/s^2$ (d) $4.8\ m/s^2$

53. A block of mass 4 *kg* is suspended through two light spring balances *A* and *B*. Then *A* and *B* will read respectively

(a) 4 *kg* and zero *kg* (c) 4 *kg* and 4 *kg*

(b) Zero *kg* and 4 *kg* (d) 2 *kg* and 2 *kg*

54. Two masses *M* and *M*/2 are joint together by means of a light inextensible string passes over a frictionless pulley as shown in figure. When bigger mass is released the small one will ascend with an acceleration of



(a) *g*/3

(b) 3*g*/2

(c) *g*/2

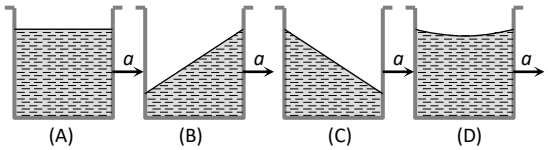
(d) *g*

55. Two masses m_1 and m_2 ($m_1 > m_2$) are connected by massless flexible and inextensible string passed over massless and frictionless pulley. The acceleration of centre of mass is

(a) $\left(\frac{m_1 - m_2}{m_1 + m_2}\right)^2 g$ (b) $\frac{m_1 - m_2}{m_1 + m_2} g$

(c) $\frac{m_1 + m_2}{m_1 - m_2} g$ (d) Zero

56. A vessel containing water is given a constant acceleration *a* towards the right, along a straight horizontal path. Which of the following diagram represents the surface of the liquid



(a)A (b) B

(c) C (d) D

57. A closed compartment containing gas is moving with some acceleration in horizontal direction. Neglect effect of gravity. Then the pressure in the compartment is

(a) Same everywhere (b)Lower in front side

(c) Lower in rear side (d)Lower in upper side

58. A ship of mass $3\times10^7\,kg$ initially at rest is pulled by a force of $5\times10^4\,N$ through a distance of 3 *m*. Assume that the resistance due to water is negligible, the speed of the ship is

(a) 1.5 *m*/*s* (b) 60 *m*/*s*

(c) 0.1 *m*/*s* (d) 5 *m*/*s*

59. The mass of a body measured by a physical balance in a lift at rest is found to be m. If the lift is going up with an acceleration a, its mass will be measured as

(a) $m\left(1-\frac{a}{g}\right)$ (b) $m\left(1+\frac{a}{g}\right)$

(c) m (d) Zero

60. Three weights W, $2W$ and $3W$ are connected to identical springs suspended from a rigid horizontal rod. The assembly of the rod and the weights fall freely. The positions of the weights from the rod are such that

(a) $3W$ will be farthest

(b) W will be farthest

(c) All will be at the same distance

(d) $2W$ will be farthest

Chemistry

61 According to modern periodic law, the physical and chemical properties of elements are the periodic functions of their ?

(a) Density (b) Atomic Number

(c) Mass Number (d) Atomic Mass

62 Highest electropositive element in the periodic table is

(a) Cs (b) Rb

(c) K (d) Na

63 The correct order of ionic radii of the species N^{3-}, O^{2-}, Na^+ and F^- is

(a) $Na^+ < F^- < O^{2-} > N^{3-}$ (b) $F^- < O^{2-} < N^3 > Na^+$

(c) $O^{2-} < N^{3-} < F^- > Na^+$ (d) $N^{3-} < Na^+ < F^- > O^{2-}$

64 The basic strength of the oxides follows the order

(a) $Al_2O_3 > MgO > Na_2O$ (b) $Al_2O_3 < MgO < Na_2O$

(c) $Na_2O_3 < MgO > Al_3O_2$ (d) $Al_2O_3 > MgO > Na_2O$

65 The correct order of the size of C, N, P, S follows the order

(a) $N < C < P < S$ (b) $C < N < S < P$

(c) $C < N < P < S$ (d) $N < C < S < P$

66 Which of the following oxide is most acidic?

(a) Na_2O (b) Al_3O_2

(c) P_2O_5 (d) SO_3

67 Downward in a group, electropositive character of elements

(a) increases (b) decreases

(c) remains same (d) none of these

68 Element which has more negative electron gain enthalpy is

(a) F (b) O

(c) Cl (d) S

69 The electronegivity of the following elements increase in the order

(a) C, N, Si, P (b) N, Si, C, P

(c) Si, P, C, N (d) P, Si, N, C

70 The ionisation enthalpy of nitrogen is more than that of oxygen molecules because of

(a) greater attraction of electrons by the nucleus
(b) extra stability of the half filled p-orbitals
(c) smaller size of nitrogen
(d) more penetrating effect

71 Packet of energy is called

(a) Electron (b) Photon
(c) Position (d) Proton

72 Orbital which is not possible

(a) 2p (b) 3d
(c) 3s (d) 3f

73 the magnetic quantum number of an atom is related to the

(a) size of the orbital (b) spin angular momentum
(c) orbital angular momentum (d) orientation of the orbital in space

74 The principal quantum number of an atom is related to the

(a) size of the orbital (b) spin angular momentum
(c) orbital angular momentum (d) orientation of the orbital in Spence

75 The designation of an orbital with in = 4 and 1 = 3

(a) 4s (b) 4p
(c) 4d (d) 4f

76 What transition in the hydrogen spectrum would have the same wavelength as the Balmer transition n = 4 to n = 2 in the He^+ spectrum?

(a) n = 4 to n =1 (b) n = 3 to n = 2
(c) n = 3 to n = 1 (d) n = 2 to n = 1

77 The wave number of first line of Balmer series of hydrogen in 15200 cm-1. The wave number of the first Balmer line of Li^{2+} ion is

(a) 15200 cm^{-1} (b) 60800 cm^{-1}
(c) 76000 cm^{-1} (d) 136,800 cm^{-1}

78 An electron is moving in Bohr's orbit. Its de Broglie wavelength is λ. What is the circumference of the forth orbit?

(a) $2/\lambda$ (b) 2λ
(c) 3λ (d) $3/\lambda$

79 Which of the following is dependent of temperature ?

(a) Molarity (b) Molality

(c) Mole fration (d) Mass percentage

80 4 g of NaOH dissolved in 100 ml solution. Molarity of the solution is

(a) 1 M (b) 10 M

(c) 0.1 M (d) 4 M

81 Which has the maximum number of molecules among the following ?

(a) 44g of CO_2 (b) 44g of O_2

(c) 8g of H_2 (d) 64g of SO_2

82 10 mol of Zn react with 10 mol of HCl. Calculate the number of moles of H_2 produced.

(a) 5 mol (b) 10 mol

(c) 20 mol (d) 2.5 mol

83 The number of oxygen atoms in 4.4g of CO_2 is approximately

(a) 1.2×10^{23} (b) 6×10^{22}

(c) 6×10^{23} (d) 12×10^{23}

84 The molarity of a solution obtained by mixing 750 mL of 0.5 M HCl with 250 ml of 2 M HCl will be

(a) 0.975 M (b) 0.875 M

(c) 1.00 M (d) 1.175 M

85 Number of atoms of He in 100 u of He (Atomic mass of He is 4 u)

(a) 25 (b) 50

(c) 100 (d) 400

86 6.02×10^{20} molecules of urea are present in 100 mL of its solution. The concentration of the solution is

(a) 0.02 M (b) 0.01 M

(c) 0.001 M (d) 0.1 M

87 Which of the following statements in relation to the hydrogen atom is correct?

(a) 3s-orbital is lower in energy than 3p-orbital

(b) 3p-orbital is lower in energy than 3-d-orbital

(c) 3s and 3p orbitals all have the same energy.

(d) 3s, 3p and 3d orbitals all have the same energy.

88 For principle quantum number, n = 4, the total number of orbitals having l = 3 is

(a) 3 (b) 7

(c) 5 (d) 9

89 The number of d-electrons retained in Fe^{2+} (At. no. of Fe = 26) ion is

(a) 3 (b) 4

(c) 5 (d) 6

90 Pauli exclusion principle helps to calculate the maximum number of electrons that can be accommodated in any

(a) orbital (b) subsell

(c) shell (d) All of these