SMART ACHIEVERS
JEE | NEET | FOUNDATION

SAISAT TEST
1 YEAR PROGRAM JEE SAMPLE PAPER

Questions : 45
Max Marks: 180
Duration : 60 Minutes

Pattern: **PHY** – 15 Ques. **CHE** – 15 Ques **MAT** – 15 Ques. All Questions are compulsory.

PHYSICS

1. If Force = (x/density) + C is dimensionally correct, the dimension of x are –
(A) MLT^{-2} (B) MLT^{-3}
(C) ML^2T^{-3} (D) $M^2L^{-2}T^{-2}$

2. The dimensions of electrical conductivity is
(A) $[M^{-1}L^{-3}T^3A^2]$ (B) $[M^{-1}L^{-2}T^3A^1]$
(C) $[M^2L^{-3}T^1A^2]$ (D) None

3. The physical quantities not having same dimensions are –
(A) Momentum and Planck's constant (B) Stress and Young's modulus
(C) Speed and $(□_0□_0)^{-1/2}$ (D) Torque and work

4. A ball is released from the top of a tower of height h meters. It takes T seconds to reach the ground. What is the position of the ball at T/3 second –
(A) h/9 meters from the ground (B) 7h/9 meters from the ground
(C) 8h/9 meters from the ground (D) 17h/18 meters from the ground

5. Which of the following statements is false for a particle moving in a circle with a constant angular speed?
(A) The acceleration vector points to the centre of the circle
(B) The acceleration vector is tangent to the circle
(C) The velocity vector is tangent to the circle
(D) The velocity and acceleration vectors are perpendicular to each other

6. A thief stole a box full of valuable articles of weight W and while carrying it on his back, he jumped down a wall of height h from the ground. Before he reached the ground, he experienced a load of
(A) 2W (B) W
(C) W/2 (D) Zero

7. A force of 10 Newton acts on a body of mass 20 kg for 10 seconds. The change produced in momentum is given by-
(A) 5 kg m/sec (B) 100 kg m/sec
(C) 200 kg m/sec (D) 2000 kg m/sec

8. A particle moves in the xy plane under the action of a force **F** such that the value of its linear momentum (**P**) at any time t is, $P_x = 2\cos t$, $P_y = 2\sin t$. The angle □ between **P** and **F** at that time t will be -
(A) 0º (B) 30º
(C) 90º (D) 180º

9. A spring toy weighing 1 kg on a spring balance suddenly jumps upward. A boy standing near the toy notices that the scale of the balance reads 1.05 kg. In this process the maximum acceleration of the toy is - ($g = 10$ m sec^{-2})
(A) 0.05 m sec^{-2} (B) 0.5 m sec^{-2}
(C) 1.05 m sec^{-2} (D) 1 m sec^{-2}

10. A billiard ball moving at a speed 2m/s strikes an identical ball initially at rest, at a glancing blow. After the collision one ball is found to be moving at a speed of 1m/s at 60° with the original line of motion. The velocity of the other ball shall be -
(A) $(3)^{1/2}$m/s at 30° to the original direction.
(B) 1m/s at 60º to the original direction.
(C) $(3)^{1/2}$m/s at 60° to the original direction.
(D) 1 m/s at 30º to the original direction.

11. A ball moving on a horizontal frictionless plane hits an identical ball at rest with a velocity of 50cm/sec. If the collision is elastic, calculate the speed imparted to the target ball if the speed of the striking ball after the collision is 30cm/sec.
(A) 20 cm/sec (B) 30 cm/sec
(C) 40 cm/sec (D) 50 cm/sec

12. Two bodies of masses 10 kg and 5 kg moving on concentric orbits of radii R and r such that their period of revolution are same. The ratio of their centripetal acceleration is -
(A) $\frac{R}{r}$ (B) $\frac{r}{R}$
(C) $\frac{R^2}{r^2}$ (D) $\frac{r^2}{R^2}$

13. When a mass rotates about any axis, the direction of the angular velocity will be -
(A) towards radius (B) towards the tangent to the orbit
(C) at an angle of 45º to the plane of rotation (D) along the direction of axis of rotation

14. A satellite S is moving in an elliptical orbit around the earth. The mass of the satellite is very small compared to the mass of the earth.
(A) The acceleration of S is always directed towards the centre of the earth
(B) The angular momentum of about the centre of the earth changes in direction , but its magnitude remains constant
(C) The total mechanical energy of S varies periodically with time
(D) The linear momentum of remains constant in magnitude

15. A mass m is raised from a distance 2 Re from surface of earth to 3Re. Work done to do so against gravity will be
(A) $\frac{Mg\,Re}{10}$ (B) $\frac{Mg\,Re}{11}$
(C) $\frac{Mg\,Re}{12}$ (D) $\frac{Mg\,Re}{14}$

CHEMISTRY

16. If water samples are taken from sea, rivers, clouds, lake or snow, they will be found to contain H_2 and O_2 in the fixed ratio of 1 : 8. This indicates the law of -
(A) Multiple proportion (B) Definite proportion
(C) Reciprocal proportion (D) None of these

17. $CaCO_3$ is 90% pure. Volume of CO_2 collected STP when 10 gms of $CaCO_3$ is decomposed is -
(A) 2.016 litres (B) 1.008 litres
(C) 10.08 litres (D) 20.16 litres

18. The number of unpaired electrons in Zn^{+2} -
(A) 0 (B) 1
(C) 2 (D) 3

19. For a d-electron, the orbital angular momentum is
(A) $\sqrt{6}$ h/2□ (B) $\sqrt{2}$ h/2□
(C) h/2□ (D) 2h/2□

20. The number of electrons in Na, having n+□ = 3
(A) 4 (B) 6
(C) 7 (D) 8

21. Which of the following is largest -
(A) Cl^- (B) S^{2-}
(C) Na^+ (D) F^-

22. Ce^{3+}, La^{3+}, Pm^{3+} and Yb^{3+} have ionic radii in the increasing order as –
(A) $La^{3+} < Ce^{3+} < Pm^{3+} < Yb^{3+}$ (B) $Yb^{3+} < Pm^{3+} < Ce^{3+} < La^{3+}$
(C) $La^{3+} = Ce^{3+} < Pm^{3+} < Yb^{3+}$ (D) $Yb^{3+} < Pm^{3+} < La^{3+} < Ce^{3+}$

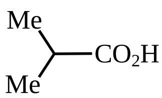
23. In a triple bond there is sharing of:
(A) 3 electrons (B) 4 electrons
(C) Several electrons (D) 6 electrons

24. In compounds of type ECl_3, where E = B, P, As or Bi, the angles Cl–E–Cl for different E are in the order -
(A) B > P = As = Bi (B) B > P > As > Bi
(C) B < P = As = Br (D) B < P < As < Bi

25. In acidic medium, equivalent weight of $K_2Cr_2O_7$ (Mol. wt. = M) is-
(A) M/3 (B) M/4
(C) M/6 (D) M/2

26. Equivalent weight of Mn^{3+} in the following reaction is (Mn = 55)
$Mn^{3+} \longrightarrow Mn^{2+} + MnO_2$
(A) 27.5 (B) 55
(C) 110 (D) 165

27. Which one of the following has the smallest heat of hydrogenation per mole ?
(A) 1-Butene (B) trans-2-Butene
(C) cis-2-Butene (D) 1,3-Butadiene

28. The correct order of increasing acid strength of the compounds
(a) CH_3CO_2H (b) $MeOCH_2CO_2H$
(c) CF_3CO_2H (d)  is
(A) d < a < c < b (B) d < a < b < c
(C) a < d < c < b (D) b < d < a < c

29. m-directing character of $-CCl_3$ is caused by -
(A) – I effect (B) – M effect
(C) (–) ve hyper conjugation (D) All

30. Ortho-Nitrophenol is less soluble in water than p-and m-Nitrophenols because
(A) o-Nitrophenol shows Intramolecular H-bonding
(B) o-Nitrophenol shows Intermolecular H-bonding
(C) Melting point of o-Nitrophenol is lower than those of m- and p –isomers
(D) o-Nitrophenol is more volatile in steam than those of m- and p-isomers

MATHEMATICS

31. The set {x : x □ N, x is prime and 3 < x < 5} is-
(A) {4}
(B) {3, 5}
(C) Void
(D) Non – Void

32. Let P = {□ : sin □ $=1/\sqrt{2}$: 0< □<90} and Q = {□ : cos □ $=1/\sqrt{2}$: 0< □<90} be two sets. Then
(A) P □ Q and Q – P □ □
(B) Q □ P
(C) P □ Q
(D) P = Q

33. If A = {x | x/2 □ Z, 0 □□x □ 10},
B = {x | x is one digit prime}
C = {x | x/3 □ N, x □ 12},
Then A □ (B □ C) is equal to-
(A) {2, 6}
(B) {3, 6, 12}
(C) {2, 6, 12}
(D) {6, 8}

34. Let f : R □□R defined by $f(x) = \dfrac{\sin([x]\pi)}{x^2+2x+4}$, [.] = G.I.F., then which one is not true -
(A) f is periodic
(B) f is even
(C) f is many-one
(D) f is onto

35. If f : □ □□□, $f(x) = x^2 - x$, then f is -
(A) one-one onto
(B) one-one into
(C) many-one onto
(D) many-one into

36. The period of function |cos 2x| is -
(A) □
(B) □/2
(C) 4□
(D) 2□

37. The equation $k(x^2 + y^2) - x - y + k = 0$ represents a real circle, if-
(A) $k < \sqrt{2}$
(B) $k > \sqrt{2}$
(C) $k > 1/\sqrt{2}$
(D) $0 < |k|$ □ $\dfrac{1}{\sqrt{2}}$

38. The circum-circle of the quadrilateral formed by the lines x = a, x = 2a, y = – a, y = a is-
(A) $x^2 + y^2 - 3ax - a^2 = 0$
(B) $x^2 + y^2 + 3ax + a^2 = 0$
(C) $x^2 + y^2 - 3ax + a^2 = 0$
(D) $x^2 + y^2 + 3ax - a^2 = 0$

39. The x coordinates of two points A and B are roots of equation $x^2 + 2x - a^2 = 0$ and y coordinate are roots of equation $y^2 + 4y - b^2 = 0$ then equation of the circle which has diameter AB is-
(A) $(x - 1)^2 + (y - 2)^2 = 5 + a^2 + b^2$
(B) $(x + 1)^2 + (y + 2)^2 = \sqrt{(5+a^2+b^2)}$
(C) $(x + 1)^2 + (y + 2)^2 = (a^2 + b^2)$
(D) $(x + 1)^2 + (y + 2)^2 = 5 + a^2 + b^2$

40. $\lim\limits_{x\to 0} \dfrac{e^x + e^{-x} - 2\cos x}{x \sin x}$ equals-
(A) 1
(B) 2
(C) –1
(D) –2

41. $\lim\limits_{x\to 0} \dfrac{\sqrt{x}\tan x}{(e^x - 1)^{3/2}}$ equals-
(A) 0
(B) 1
(C) 1/2
(D) 2

42. $\lim\limits_{h\to 0} 2\left[\dfrac{\sqrt{3}\sin\left(\frac{\pi}{6}+h\right) - \cos\left(\frac{\pi}{6}+h\right)}{\sqrt{3}h(\sqrt{3}\cos h - \sin h)}\right]$ is equal to
(A) 2/3
(B) 4/3
(C) $-2\sqrt{3}$
(D) –4/3

43. From a group of 5 boys and 3 girls, three persons are chosen at random. The probability that there are more girls than boys is-
(A) 4/7
(B) 3/8
(C) 2/7
(D) 5/8

44. The items produced by a firm are supposed to contain 5% defective items. The probability that a sample of 8 items will contain less than 2 defective items, is-

(A) $\frac{27}{20}\left(\frac{19}{20}\right)^7$ (B) $\frac{533}{400}\left(\frac{19}{20}\right)^6$

(C) $\frac{153}{20}\left(\frac{1}{20}\right)^7$ (D) $\frac{35}{16}\left(\frac{1}{20}\right)^6$

45. A bag contains 3 white and 3 black balls. Balls are drawn one by one without replacing them in the bag. The probability that drawing ball will be in alternate colors is-

(A) 1/10 (B) 5/21

(C) 1/2 (D) None of these