JEE Main 2025 Physics Questions

1. If mass M, area A' and velocity V are chosen as fundamental units, then the dimension of the coefficient of viscosity will be: (a)M V/ A (b)MA/V (c)MV A (d)M/ VA'

2. The speed of sound in a particular gas at a temperature of 27oC is 340 m/s. Then, the speed of sound in the same gas at a temperature 90oC is: (a) 340 m/s (b) 357 m/s (c) 374 m/s (d) 411.4 m/s

3. Two trains are approaching each other on the same track with velocities of 100 km/h and 50 km/h. When they are at a distance of 300 km from each other, a bird starts flying from train 1 towards train 2. When the bird reaches train 2, it instantly reverses its direction and flies again towards train 1. This process continues till the bird is trapped between the trains when they collide. If the bird always travels at a constant speed of 200 km/h, the total distance the bird flies is: (a) 200 km (b) 400 km (c) 300 km (d) 600 km

4. If the temperature of a liquid is increased, choose the correct option regarding a change in its surface tension and viscosity. (a) Surface tension decreases while viscosity increases (b) Surface tension increases while viscosity decreases (c) Both increases (d) Both decreases

5. Distance travelled by the linear scale of the screw gauge during two full rotations of circular scale is 1mm and the circular scale has 50 divisions. In an experiment to measure the thickness of a plate, six divisions of the main scale are visible and the 28th division of the circular scale coincides with the reference line. Moreover, when studs touch each other, the zero of the circular scale lies 4 divisions below the reference line, the thickness of the plate will be:
(a) 3.28 mm (b) 2.74 mm (c) 3.32 mm (d) 3.24 mm

6. When monochromatic light of wavelength 620 nm is used to illuminate a metallic surface, the maximum kinetic energy of photoelectrons emitted is 1 eV. Find the maximum kinetic energy of the photoelectron emitted (in eV) if a wavelength of 155 nm is used on the same metallic surface. (hc = 1240 eV-nm)

7. In the colour coding system of carbon resistors, the tolerance (in %) shown by the gold band is_____.

8. The fundamental frequency of an organ pipe open at one end is 300 Hz. The frequency of the 3rd overtone of n Find n.this organ pipe is 100 Hz.

9. Consider a p-n junction diode that has a potential drop of 0.5 V which is to be taken independent of current (under forward bias). If we want to use a 1.5 V cell to forward bias the diode then what should be the value of resister (in) used in series with the diode so that current may not exceed 10 mA, and hence may work safely?

10. Abhishek and Deepak have two samples of magnetic materials X and Y. Experimentally they determine the following properties of the samples.

Retentivity	Coercivity
X 1.5 T	20 Am-1
Y 1.0 T	100 Am-1

Considering this, choose the best choice
(a) X and Y both for electromagnets
(b) X for electromagnetic and Y for permanent magnets
(c) X and Y are both for permanent magnets
(d) X for permanent magnets and Y for electromagnets

11. A free particle having one electronic charge with initial kinetic energy 9 eV and de Broglie wavelength 1 mm enters a region of $V0$ potential difference such that new de Broglie wavelength is now 1.5 mm. Then $eV0$ is (1) 5 eV (3) 13.5 eV (2) 6 eV (4) 15 eV

12. Radiation from the hydrogen gas excited to the first excited state is used for illuminating certain metallic plates. When the same plate is exposed to the radiation from some unknown hydrogen-like gas excited to the same level it is found that the de-Broglie wavelength of the fastest photoelectron has decreased by 2.3 times. It is given that energy corresponding to the longest wavelength of the Lyman series of the unknown gas is 3 times the ionization energy of hydrogen gas (13.6eV). The work function (in eV) of the metallic plate is [$Take$ (2.3)2 = 5.25]

13. If the molar specific heat at constant pressure for a polyatomic non-linear gas is x and the molar specific heat at constant volume for a diatomic gas is y, find the value of x y.

14. In the colour coding system of carbon resistors, the tolerance (in %) shown by the gold band is____.

15. Consider the following statements about amines and select the incorrect one.
(1) Ethylamine is soluble in water whereas aniline is not
(2) Aniline does not undergo Friedel Crafts reaction
(3) Diazonium salts of aliphatic amines are more stable than those of aromatic amines
(4) Gabriel phthalimide synthesis is preferred for synthesising primary amines

JEE Main 2025 Chemistry Questions

1. An organic compound (P) upon reacting with NH3 gives (Q). On heating, (Q) gives (R). (R) in the presence of KOH reacts with Br2 to give ethylamine. (P) is :

(a)   CH3CH2CH2COOH (b) CH3CH2COOH (c) CH3COOH

(d)

$$CH_3 - CH - COOH$$
$$|$$
$$CH_3$$
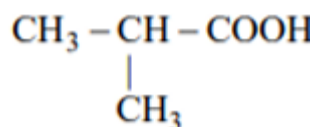
2. Which among the following is a false statement?
(a) SiO_2 has a structure similar to that of CO_2 (b) Natural Si exists only in the combined state
(c) Si can be prepared by reducing SiO_2 with Mg   (d) Si does not exist in graphite-like structure, but exists only in diamond-like structure

3. To stop bleeding, $FeCl_3$ is applied locally because :
(a) $FeCl_3$ seals the blood vessels   (B) $FeCl_3$ changes the direction of blood flow   (C) $FeCl_3$ reacts with the blood to form a solid substance that seals the blood vessels (D) $FeCl_3$ causes denaturation of proteins present in the blood

4. Which of the following combinations will produce H_2 gas?   (a) Zn metal and NaOH(aq)   (b) Au metal and NaCN(aq) in the presence of air   (c) Cu metal and conc. HNO_3 (d) Fe metal and conc. HNO_3

5. The value of the spin-only magnetic moment for one of the following configurations is 2.84 BM. The correct one is : (a) $d5$ (in strong field ligand)   (b) $d3$ (in weak as well as strong field ligand) (c) $d4$ (in weak field ligand)   (d) $d4$ (in strong field ligand)
6. The function of the "sodium pump" is a biological process operating in every cell of all animals. Which of the following biologically important ions is also a constituent of this pump? (a) Ca^{2+} (b) Mg^{2+} (c) K^+ (d) Fe^{2+}

7. Lassaigne's test was used in qualitative analysis to detect :   (a) Nitrogen (b) Sulphur (c) Chlorine (d) All of these

8. Two glass bulbs A and B are connected by a very small tube having a stop-cock. Bulb A has a volume of 100 cm^3 and contains the gas; while bulb B was empty. On opening the stopcock, the pressure fell to 40%. The volume (in mL) of the bulb B must be :

9. The equilibrium constant Kp for a homogenous gaseous reaction is 10^{-3}, and the standard Gibb's free energy change (o ΔG) in cal mol^{-1} for the reaction at 27^oC (using R = 2 cal K^{-1} mol^{-1}) is: 28. Time required for complete decomposition of 4 mol of water using a current of 4 ampere is y × 10^5 seconds. Value of y is? (Use F = 96500 $Cmol^{-1}$)

10. Which of the following pairs is from the same osazone?
(a) Glucose and fructose   (b) Glucose and galactose   (c) Glucose and arabinose (d) Lactose and maltose

11. Which of the following is an extensive state variable? (a) W (work done)   (b) G (Gibb's free energy) (c) Cm (molar heat capacity)   (d) of H (standard molar enthalpy of formation).

12. An amount of solid NH4 HS is placed in a flask already containing ammonia gas at a certain temperature and 0.50 atm pressure. Ammonium hydrogen sulphide decomposes to yield NH3 and H2S gases in the flask. When the decomposition reaction reaches equilibrium, the total pressure in the flask rises to 0.84 atm. The equilibrium constant (Kp) for NH4HS decomposition at this temperature is:

$$[NH_4HS(s) \rightleftharpoons NH_3(g) + H_2S(g)]$$
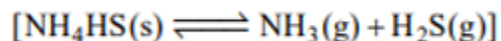
(a) 0.029 (b) 0.091 (c) 0.40 (d) 0.114

13. The following acids have been arranged in the decreasing order of their acid strength. Identify the correct order.
I. *ClOH* II. *BrOH* III. *IOH*
(1) I > II > III
(2) II > I > III
(3) III > II > I
(4) I > III > II

14. 10.30 *mg* of *O*2 is dissolved in 1*L* of sea water of density 1.03 *g/mL*. The concentration of *O*2 in ppm is _____.

15. The oxidation number of phosphorus in ATP (adenosine triphosphate) is :

JEE Main 2025 Mathematics Questions

1. A JEE aspirant estimates that he will be successful with an 80% chance if he studies 10 hr/day 60% chance if he studies 7 hr/day and with 40% chance if he studies 4 hr/day. Further, he believes that he will study 10 hr, 7hr and 4 hr/day with probability 0.1, 0.2 and 0.7 respectively. Given that he is successful, the probability that he studies for 4 hr/day equals.
(a) 14/19 (b) 1/4 (c) 7/12 (d) 2/5

2. If M is a 3 × 3 matrix such that $M^2 = O$, then det $((I + M)^{50} - 50M)$ where I is an identity matrix of order 3, is equal to : (a) 3 (b) 50 (c) 2 (d) 1

3. The variance of 20 observations is 5. If each observation is multiplied by 2 then the new variance of the resulting observations is: (a) 5 (b) 10 (c) 20 (d) 40

4. The number of ways in which three distinct numbers can be selected between 1 and 20 both inclusive, whose sum is even is_____.

5. A circle passes through the points (2, 2) and (9, 9) and touches the x-axis. The absolute value of the difference of possible x-coordinate of the point of contact is_____.

6. Let A be a square matrix of order 2 such that A² – 4A + 4I = 0, where I is an identity matrix of order 2. If B = A⁵ + 4A⁴ + 6A³ + 4A² + A – 162 I, then det(B) is equal to _____.

7. The graph of function

$$f(x) = \frac{x^5}{20} - \frac{x^4}{12} + 5$$

 has :
(a) no local extremum, one point of inflexion.
(b) two local maximum, one local minimum, two points of inflexion
(c) one local maximum, one local minimum, one point of inflexion.
(d) one local maximum, one local minimum, and two points of inflexion.

8. The letters of the word COCHIN are permutated and all the permutations are arranged in an alphabetical order as in an English dictionary. The number of words that appear before COCHIN is : (a) 360 (b) 192 (c) 96 (d) 48

9. A man invites 6 non-vegetarian friends and 5 vegetarian friends for a dinner party. He arranges 6 nonvegetarian friends on one round table and 5 vegetarian friends along another round table. The number of ways this can be done is: (a) 11! (b) 9! (c) 2880 (d) 8280

10. m men and w women are to be seated in a row so that all women sit together. The number of ways in which they can be seated is : (a) (m + 1)! (b) m! w! (c) m! (w-1)! (d) (m + 1)! W!

11. There are three piles of identical yellow, black and green balls and each pile contains at least 20 balls. The number of ways of selecting 20 balls if the number of black balls to be selected is twice the number of yellow balls, is : (a) 6 (b) 7 (c) 8 (d) 9

12. Kunal Gaba has n objects, each of weight w. He weighs them in pairs and finds the sum of the weights of all possible pairs is 120 g. When his friend Rakshit weighs them in triplets, the sum of all possible weights is 240 g. The value of n is : (a) 7 (b) 6 (c) 5 (d) 10

13. In a geometric progression the ratio of the sum of the first 5 terms to the sum of their reciprocals is 49 and the sum of the first and the third term is 35. The fifth term of the G.P. is p, and the value of 4p is _____.

14. 5-digit numbers are formed using 2, 3, 5, 7, 9 without repeating the digits. If p is the number of such numbers that exceed 20000 and q is the number of those that lie between 30000 and 90000 then 3p/q is _____.

15. Rakshit is allowed to select 1 or more books out of (2n + 1) distinct books. If the number of ways in which he may not select all of them is 126, then the value of n is _____.

16. In a geometric progression the ratio of the sum of the first 5 terms to the sum of their reciprocals is 49 and the sum of the first and the third term is 35. The fifth term of the G.P. is p, and the value of 4p is _____.

17. Rakshit is allowed to select 1 or more books out of (2n + 1) distinct books. If the number of ways in which he may not select all of them is 126, then the value of n is _____.

18. A circle passes through the points (2, 2) and (9, 9) and touches the x-axis. The absolute value of the difference of possible x-coordinate of the point of contact is_____.

19. If two of the straight lines given by $3x^2 + 3x^2y - 3xy^2 + dy^3 = 0$ are at right angles, then d is equal to _____.

20. Rakshit is allowed to select 1 or more books out of (2n + 1) distinct books. If the number of ways in which he may not select all of them is 126, then the value of n is _____.