VMC Vidyamandir Classes SINCE 1986

IIT JEE | MEDICAL | FOUNDATION

CODE A

Mock JEE Main - 5 | JEE

[redacted] Maximum Marks: 300

Timing: 04:00 PM to 04:00 AM

General Instructions

1. The test is of **3 hours** duration and the maximum marks is **300.**
2. The question paper consists of **3 Parts** (Part I: **Physics**, Part II: **Chemistry**, Part III: **Mathematics**). Each Part has **two** sections (Section 1 & Section 2).
3. **Section 1** contains **20 Multiple Choice Questions**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE CHOICE** is correct.
4. **Section 2 contains 10 Numerical Value Type Questions Out of which ONLY 5 (any) questions have to be attempted.**

   You will NOT be allowed to attempt the sixth question. If you wish to attempt any other question apart from the five already attempted, then you will have to delete any one response from the five previously answered and then proceed to answer the new one.

   The answer to each question is a NUMERICAL VALUE. For each question, enter the correct numerical value of the answer. If the answer is a decimal numerical value, then round-off the value to TWO decimal places. If the answer is an Integer value, then do not add zero in the decimal places. (Example: 6, 81, 1.50, 3.25,

   0.08)
5. No candidate is allowed to carry any textual material, printed or written, bits of papers, pager, mobile phone, any electronic device, etc. inside the examination room/hall.
6. On completion of the test, the candidate must hand over the Answer Sheet to the **Invigilator** on duty in the Room/Hall. **However, the candidates are allowed to take away this Test Booklet with them**.

Marking Scheme

1. **Section – 1:** +4 for correct answer, –1 (negative marking) for incorrect answer, 0 for all other cases.
2. **Section – 2:** +4 for correct answer, 0 for all other cases. There is no negative marking.

Name of the Candidate (In CAPITALS) : _____

Roll Number : _____

OMR Bar Code Number : _____

Candidate's Signature : _____ **Invigilator's Signature** _____

PART I : PHYSICS 100 MARKS

SECTION-1

This section contains 20 Multiple Choice Questions. Each question has 4 choices (A), (B), (C) and (D), out of which ONLY ONE CHOICE is correct.

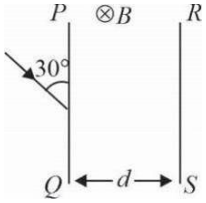
1. A particle is moving in a circle of radius $1m$ with angular velocity (ω) given as a function of angular displacement (θ) by the relation $\omega = \theta^2 + 2\theta$. The total acceleration of the particle when $\theta = 1\ rad$ is:

(A) $9m/s^2$ **(B)** $12m/s^2$ **(C)** $15m/s^2$ **(D)** $24m/s^2$

2. An inverted cone is rotating about its vertical axis. A particle is kept on the inner surface of cone and it is at rest relative to the cone at a height of $0.4m$ above its vertex. The coefficient of friction between the surface of cone and the particle is 0.6 and the apex angle of cone is 90°. The maximum angular velocity of revolution of the cone can be: (take $g = 10/s^2$)

(A) $12.5\ rad/s$ **(B)** $10\ rad/s$ **(C)** $7.5\ rad/s$ **(D)** $5\ rad/s$

3. Magnetic field exists in the region between lines PQ and RS as shown in the figure. A particle having charge to mass ratio of $'a'$ enters the magnetic field as shown in the figure with a speed v. Lines PQ and RS are parallel to each other. Find the value of d such that the charged particle exits the magnetic field region with velocity perpendicular to line RS.



(A) $\frac{\sqrt{3}v}{2aB}$ **(B)** $\frac{v}{2aB}$ **(C)** $\frac{v}{aB}$ **(D)** $\frac{v}{\sqrt{3}aB}$

4. A satellite is moving around a planet of radius R in a circular orbit of radius r. The speed of the satellite is v. Find the acceleration due to gravity on the surface of the planet.

(A) $\frac{v^2 r}{2R^2}$ **(B)** $\frac{v^2 r}{R^2}$ **(C)** $\frac{v^2}{r}$ **(D)** $\frac{v^2 R}{r^2}$

5. Two infinite line charges having linear charge density λ_1 and λ_2 are placed along the x and y axis respectively. The electric field at a point (x_1, y_1) in the first quadrant is inclined at an angle of 60° with the x-axis. Then which of the following relations is correct.

(A) $\sqrt{3}\lambda_2 x_1 = \lambda_1 y_1$ **(B)** $\lambda_2 x_1 = \sqrt{3}\lambda_1 y_1$ **(C)** $\lambda_2 y_1 = \sqrt{3}\lambda_1 x_1$ **(D)** $\sqrt{3}\lambda_2 y_1 = \lambda_1 x_1$

6. The molar specific heat C_v of a diatomic gas is $\frac{5}{2}R$ when we treat its molecules to be rigid having no vibrations. But this assumption is not always valid especially at high temperatures. In that case, molecules are treated as non-rigid having vibrational energy also. C_v for diatomic gas with non-rigid gas molecules will be:

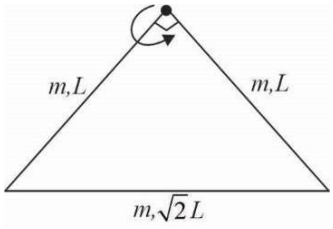
(A) $\frac{5}{2}R$ **(B)** $3R$ **(C)** $\frac{7}{2}R$ **(D)** $4R$

7. An electron moving with a velocity of $2m/s$ along +ve *x*-axis at a point in a magnetic field experiences a force of $2N$ along -ve *y*-axis. If the electron moves with of a velocity of $2m/s$ along +ve *y*-axis at the same point, it experiences a force of $2N$ along +ve *x*-axis. Find force that the electron would experience if it were moving with a velocity of $2m/s$ along *z*-axis.

(A) zero **(B)** $2N$ + ve along y-axis

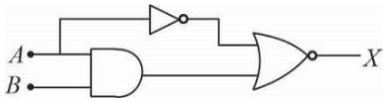
(C) $2N$ along –ve *x*-axis **(D)** $2N$ along –ve z-axis

8. Three rods of equal mass having length *L*, *L* and $\sqrt{2}L$ are joined to form a triangular frame as shown in the figure. The system is rotating about an axis passing through the vertex of the triangle and perpendicular to the plane of the triangle with an angular velocity ω. Find the angular momentum of the system.



(A) $\frac{1}{2}mL^2\omega$ **(B)** $\frac{5}{6}mL^2\omega$ **(C)** $\frac{4}{3}mL^2\omega$ **(D)** $\frac{2}{3}mL^2\omega$

9. The truth table for the circuit given in the figure is :



(A)

A	B	X
1	1	0
1	0	1
0	1	0
0	0	0

(B)

A	B	X
1	1	0
1	0	0
0	1	1
0	0	0

(C)

A	B	X
1	1	1
1	0	0
0	1	0
0	0	0

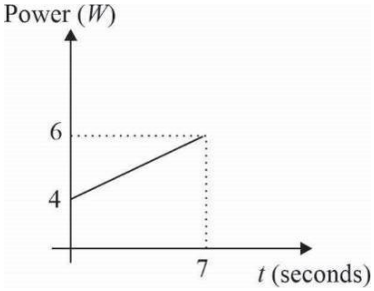
(D)

A	B	X
1	1	0
1	0	0
0	1	0
0	0	1

10. In an imaginary electric field, the electric potential energy of an electron at a distance *r* from the centre of force field is given by $U = kr^2$, where *k* is a positive constant of appropriate dimensions. If the electron is moving in a circular orbit of radius *r* about the centre, then the orbital time period of the electron is proportional to:

(A) $r^{3/2}$ **(B)** r **(C)** $r^{1/2}$ **(D)** r^0

11. A particle of mass 2 kg is moving in the direction of positive $x-$axis. Initial velocity of the particle is $1m/s$. The instantaneous power vs time graph of the particle is shown in the figure. Find the velocity of the particle at 7 seconds.



(A) $5m/s$ **(B)** $5.5m/s$ **(C)** $6m/s$ **(D)** $7m/s$

12. Two particles are executing SHM which are described by the equations $x_1 = a\sin(\omega t + \pi/6)$ and $x_2 = a\sin(\omega t + \pi/4)$. Find the minimum time interval between the particles to cross their mean position.

(A) $\frac{\pi}{12\omega}$ **(B)** $\frac{\pi}{6\omega}$ **(C)** $\frac{\pi}{4\omega}$ **(D)** $\frac{\pi}{3\omega}$

13. A vernier calliper whose 10 vernier scale divisions coincide with 9 main scale divisions is used to take a reading. Each main scale division is $1mm$. Before taking the reading it is observed that the 4^{th} division of the vernier scale coincides with the main scale and zero of main scale is behind zero of vernier scale. When the reading is taken using this vernier calliper, the main scale reads $2.5cm$ and the 7^{th} division of the vernier scale coincides with the main scale. Find the final value of the measurement.

(A) $2.53cm$ **(B)** $2.54cm$ **(C)** $2.57cm$ **(D)** $2.61cm$

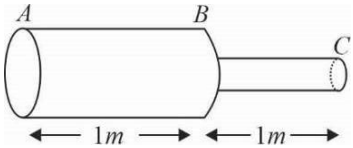
14. An inductor and a resistor are connected to an ac supply of $120V, 50Hz$. The resistance of the resistor is 20Ω. If the voltages leads the current by a phase difference of $45°$, find the inductance of the inductor.

(A) $40mH$ **(B)** $63.7mH$ **(C)** $66.7mH$ **(D)** $133.3mH$

15. Two particles start moving from the same point in two different directions. The first particle moves along the positive x-axis with a constant acceleration of $3m/s^2$. The second particle moves in a straight line making an angle of $60°$ with the positive x-axis with a constant speed of $24m/s$. Find the time after which the relative velocity of the particles is minimum.

(A) $8\sqrt{3}$ **(B)** $8s$ **(C)** $4\sqrt{3}$ **(D)** $4s$

16. A cylindrical metal rod BC of length $1m$ and radius $1cm$ is joint in series to another rod AB of same material and length but having twice the radius as shown in the figure.



End A is placed at a temperature of $100°C$ and end C is placed at $50°C$ temperature. Find the temperature of the junction B.

(A) $90°C$ **(B)** $80°C$ **(C)** $75°$ **(D)** $70°C$

17. As a train moving with constant speed crosses the platform, the apparent frequency heard by a person standing on the platform during approach and recession differ by 2% of the actual frequency of the horn. If the speed of sound is $330 m/s$, find the approximate speed of the train.

(A) $2.2 m/s$ **(B)** $3 m/s$ **(C)** $3.3 m/s$ **(D)** $4.4 m/s$

18. The rest mass of the deuteron, proton and neutron is equivalent to energy of $1877 MeV, 939 MeV$, $940 MeV$ respectively. A deuteron may disintegrate to a proton and neutron if it.

(A) emits a γ - ray photon of energy $2 MeV$

(B) captures a γ - ray photon of energy $2 MeV$

(C) emits a γ - ray photon of energy $3 MeV$

(D) captures a γ - ray photon of energy $3 MeV$

19. An electromagnetic wave is represented by the electric field
$\vec{E} = E_0 \hat{n}\left[\omega t + (y - z)\right]$
The direction of propagation of the wave, $\hat{s}$ is:

(A) $\hat{s} = \dfrac{\hat{i} + \hat{j}}{\sqrt{2}}$ **(B)** $\hat{s} = \dfrac{\hat{j} + \hat{k}}{\sqrt{2}}$ **(C)** $\hat{s} = -\dfrac{-\hat{j} + \hat{k}}{\sqrt{2}}$ **(D)** $\hat{s} = \dfrac{\hat{j} - \hat{k}}{\sqrt{2}}$

20. A fish moving up in water $(\mu = 4/3)$ with a speed of $4 cm/s$ observes a bird coming directly towards itself with a speed of $12 cm/s$. Find the actual speed of the bird with respect to a stationary observer on the ground.

(A) $5 cm/s$ **(B)** $6 cm/s$ **(C)** $8 cm/s$ **(D)** $9 cm/s$

SECTION-2

Section 2 contains 10 Numerical Value Type Questions Out of which ONLY 5 (any) questions have to be attempted.
The answer to each question is a NUMERICAL VALUE. For each question, enter the correct numerical value of the answer. If the answer is a decimal numerical value, then round-off the value to TWO decimal places. If the answer is an Integer value, then do not add zero in the decimal places. *In the OMR, do not bubble the ⊕ sign for positive values. However, for negative values, Θ sign should be bubbled.* (Example: 6, 81, 1.50, 3.25, 0.08)

21. $12 gm$ of gas occupy a volume of $4 \times 10^{-3} m^3$ at a temperature of $7°C$. After the gas is heated at constant pressure its density becomes $6 \times 10^{-4} gm/cm^3$. What is the temperature to which the gas was heated (in kelvin)?

22. In a young's double slit experiment with monochromatic light, fringes are obtained on a screen placed at some distance from the slits. If the screen is moved $8 cm$ towards the slits, the change in fringe width is $4 \times 10^{-5} m$. If the separation between the slits is $1 mm$, find the wavelength of light used (in nm).

23. A bucket of height $20 cm$ is placed under a tap such that water flows into the bucket at a constant rate of $100 cm^3/s$. There is a small hole in the bucket of cross-sectional area of $1 cm^2$ at height of $3 cm$ from the bottom. Area of hole is very small as compared to area of the bucket. Find the maximum height (in cm) above the bottom upto which the water is filled in the bucket. (Take $g = 10 m/s^2$)

24. A wooden wheel having radius of $1m$ is to be fitted with an iron ring around it. The diameter of the ring is $6mm$ smaller than the wooden wheel. If the coefficient of linear expansion of iron is $1.2\times10^{-5}/°C$, then find the minimum increase in temperature (in $°C$) to fit the ring on the wheel.

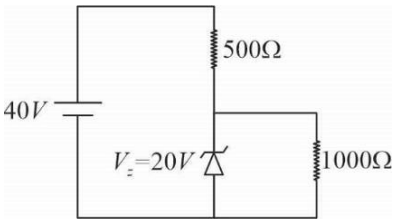
25. A capacitor of capacitance $3\mu F$ is charged to a potential difference of $12V$. Another identical capacitor, initially uncharged is filled with a dielectric having dielectric constant K and it is connected to the charged capacitor. The final common potential difference across both capacitors is found to be $2V$. Find the value of k.

26. Speed of sound in a resonance tube experiment is given by the expression $v=2f_0(l_2-l_1)$ where f_0 is the frequency of the tuning fork and l_1, l_2 are length of the air column. Consider $f_0=300Hz$ with no error in its value. Lengths of the air column l_1 and l_2 are measured as $25.0cm$ and $80.0cm$ respectively. Find the absolute error in the speed of sound (in m/s).

27. An inductor of inductance $0.1H$ and a resistor of resistance 8Ω are connected in series to a battery of emf $1.5V$ through a switch. Find the initial rate of growth of current when the switch is closed (in A/s).

28. A particle of mass $3kg$ moving with speed of $3m/s$ is acted upon by an impulse. As a result, the particle starts moving in a direction $90°$ to the original direction with a speed of $4m/s$. Find the impulse acted upon on the particle in SI units.

29. In the given circuit find the current through the Zener diode in mA.



30. A beam of unpolarized light of intensity I_0 is incident on a polaroid A. Then it is passed through another polaroid B. If the intensity of the emergent light is 18% of the original unpolarized light then find the angle (nearest integer in degree) between the principal plane of polaroid A and B.

PART II : CHEMISTRY 100 MARKS

SECTION-1

This section contains 20 Multiple Choice Questions. Each question has 4 choices (A), (B), (C) and (D), out of which ONLY ONE CHOICE is correct.

1. The BOD value of two samples of water are 4ppm and 18 ppm, respectively and this indicates:

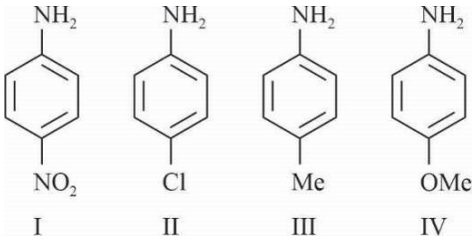
(A) Clean water, Clean Water **(B)** Polluted water, Clean water

(C) Clean water, Polluted water **(D)** Polluted water, Polluted water

2. Molality of sulphuric acid solution in which the mole fraction of water is 0.74 is:

(A) 9.51 **(B)** 12 **(C)** 19.5 **(D)** 5.25

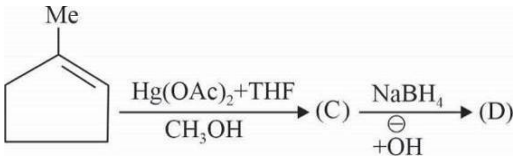
3. The increasing order of pk_b values of the following compounds is:



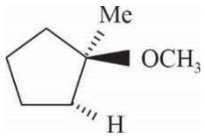
(A) II < I < III < IV **(B)** II < III < I < IV

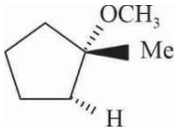
(C) IV < III < II < I **(D)** IV < II < III < I

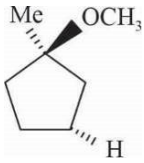
4.

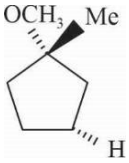


Structure of (D) is:

(A) 

(B) 

(C) 

(D) 

5. Arrange the following solutions in the decreasing order of pH:

(1) 0.1 NaOH **(2)** 0.1 M NaCl

(3) 0.1 M H_2SO_4 **(4)** 0.1 M NH_4Cl

(A) (1) > (2) > (3) > (4) **(B)** (1) > (4) > (3) > (2)

(C) (1) > (4) > (2) > (3) **(D)** (1) > (2) > (4) > (3)

6. Among the nitrates of alkaline earth metals, the thermal stability of $Mg(NO_3)_2$ and $Sr(NO_3)_2$ respectively are:

(A) poor and poor **(B)** high, poor **(C)** high and high **(D)** poor, high

7. For the reaction $NH_4Cl(g) \rightleftharpoons NH_3(g) + HCl(g)$

(A) $Kc = Kp(RT)^{-2}$ **(B)** $Kp = Kc(RT)^{2}$

(C) $Kc = Kp(RT)^{-1}$ **(D)** $Kc = Kp(RT)$

8. The incorrect statement is:

(A) H_2SO_5 contain no S – S bond **(B)** Marshall's acid contain one S – S bond.

(C) $H_2S_2O_7$ contain no S – S bond **(D)** $H_2S_2O_4$ contain one S – S bond.

9. Consider the assertion and reason given below:

Assertion (A) : Buta-1,3 - diene is a monomer of gutta percha.

Reason (R) : Gutta Percha is formed through cationic addition polymerisation

Choose the correct answer from the following:

(A) (A) and (R) both are wrong

(B) Both (A) and (R) are correct and (R) is correct explanation of (A)

(C) (A) is wrong but (R) is correct

(D) Both (A) and (R) are correct but (R) is not correct explanation of (A)

10. Which of the following compounds do not show geometrical isomerism?

(A) But -2-ene **(B)** 3-Methyl -2- butenoic acid

(C) 3-Methyl-2-pentenoic acid **(D)** 3-Phenyl-2- propenoic acid

11. The equilibrium constant for the reaction given below at 400K, if $\Delta H^0 = 77.2\,KJ/mol$ and

$\Delta S° = 122 JK^{-1}mol^{-1}$, $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$

(A) 1.95×10^{-6} **(B)** 1.2×10^{-12} **(C)** 5.0×10^{-6} **(D)** 1.95×10^{-4}

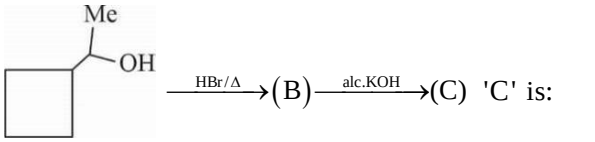
12. Which of the following is not an example of σ – bonded organometallic complex?

(A) $Pb(C_2H_5)_4$ **(B)** $Zn(C_2H_5)_2$ **(C)** Ferrocene **(D)** $(C_2H_5)_2CuLi$

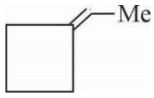
13. The set that contains atomic numbers of only inner transition elements is:

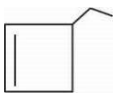
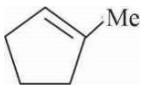
(A) 9,17,34,38 **(B)** 21,25,42,72 **(C)** 32,53,64,67 **(D)** 98,67,103,90

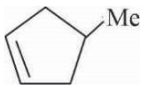
14. Consider the following reactions



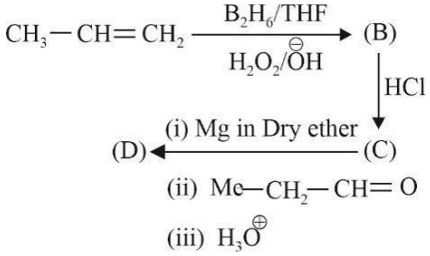
'C' is:

(A) 

(B)  **(C)** 

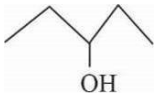
(D) 

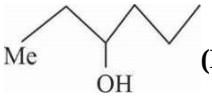
15.

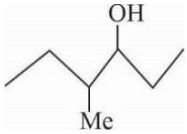


Compound D is:

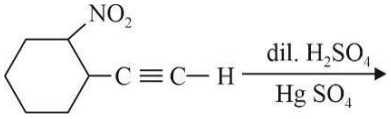
(A) 

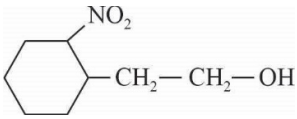
(B) 

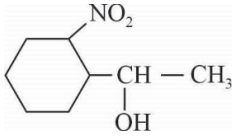
(C) 

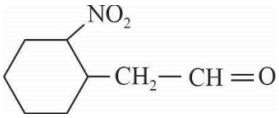
(D) 

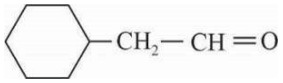
16. The major product obtained from the following reaction is:



(A) 

(B) 

(C) 

(D) 

17. The Lanthanoid that does not show +2 oxidation states is:

(A) Sm **(B)** Gd **(C)** Tm **(D)** Nd

18. The correct statement is:

(A) Magnalium is an alloy of Al and Cu

(B) Bell metal is an alloy of Cu and Sn

(C) Gun metal is an alloy of Cu, Zn and Ni

(D) Chrome steel is an alloy of Cr, Al and Ni

19. The incorrect statement for lyophilic colloids is

(A) Easy to prepare

(B) Viscosity is high and surface tension is low for D.P. (dispersed phase) than D.M. (dispersion medium)

(C) Viscosity and surface tension for D.P. is almost similar to D.M.

(D) Stable

20. For a reaction $P \rightarrow Q$, the E_a for the forward reaction and backward reaction is $15KJ/mol$ and $5KJ/mol$, respectively, potential energy of P is $8KJ/mol$, then the heat of reaction (in kJ) is:

(A) 10 **(B)** 15 **(C)** 20 **(D)** 23

SECTION-2

Section 2 contains 10 Numerical Value Type Questions Out of which ONLY 5 (any) questions have to be attempted.
The answer to each question is a NUMERICAL VALUE. For each question, enter the correct numerical value of the answer. If the answer is a decimal numerical value, then round-off the value to TWO decimal places. If the answer is an Integer value, then do not add zero in the decimal places. *In the OMR, do not bubble the ⊕ sign for positive values. However, for negative values, Θ sign should be bubbled*. (Example: 6, 81, 1.50, 3.25, 0.08)

21. In an estimation of sulphur by carius method, 0.25gm of an organic compound gave 0.35gm of $BaSO_4$. The mass percentage of sulphur in the compound is_____. (Molecular weight of $BaSO_4 = 233\ \text{g/mol}$)

22. How much propyl alcohol must be added to 1.00 lt. of water so the solution will not freeze at $-15°C$? (K_f of water $= 1.86\ \text{K Kg mol}^{-}$) [$d(H_2O) = 1\text{g/ml}$ and molecular mass of propyl alcohol = 60 g/mol]

23. Calculate the volume occupied by 12.0g of propane gas at $60°C$ and 740mm of pressure. (Molecular weight of C = 12 g/mol, H = 1 g/mol) [R = 0.082 L atm/mol K]

24. 200 ml of $0.5M$ solution of $CuBr_2$ was electrolysed using Pt as electrodes with a current of 0.965 ampere in one hour, what is the normality of the remaining $CuBr_2$ solution assuming no change in volume?

25. The number of $Cl=O$ bond in Chlorous acid is_____.

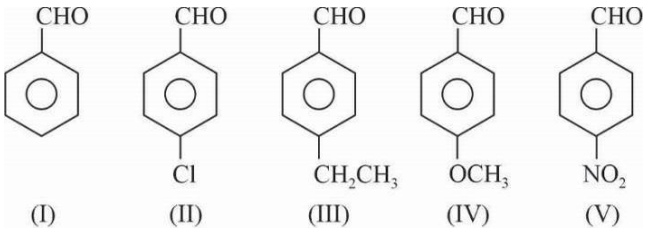
26. For how many metals leaching method is used for its concentration of ore
Metals: Cu, Zn, Pb, Al, Au, Ag

27. The EAN value of $\left[\text{Ti}\left(\sigma-C_5H_5\right)_2\left(\pi-C_5H_5\right)_2\right]$ is_____.

28. The Number of Species which have square pyramidal shape
Species:- $XeOF_4$, ClF_5, XeF_4, PCl_5, XeO_3F_2, $SbCl_5$, BrF_5.

29. Consider the following reaction
$CH_2=CH-CH=CH_2 + HBr \xrightarrow{40°C}$ the number of geometrically active products is/are:

30. The number of compounds which do not show Fehling solution test?
Compounds:



(I) (II) (III) (IV) (V)

PART III : MATHEMATICS 100 MARKS

SECTION-1

This section contains 20 Multiple Choice Questions. Each question has 4 choices (A), (B), (C) and (D), out of which ONLY ONE CHOICE is correct.

1. If $\Delta = \begin{vmatrix} 1 & 3\cos\theta & 1 \\ \sin\theta & 1 & 3\cos\theta \\ 1 & \sin\theta & 1 \end{vmatrix}$, then the maximum value of Δ is:

(A) 3 **(B)** 9 **(C)** 10 **(D)** 13

2. The statement $p \to (q \to p)$ is equivalent is:

(A) $p \to (q \wedge p)$ **(B)** $p \to (q \vee p)$ **(C)** $p \to (p \to q)$ **(D)** $p \to (q \leftrightarrow p)$

3. From first 100 natural numbers, 3 numbers are selected. If these numbers are in A.P., then the probability that these numbers are even is:

(A) $\frac{29}{66}$ **(B)** $\frac{1}{66}$ **(C)** $\frac{12}{49}$ **(D)** $\frac{29}{49}$

4. The parabola $y = x^2 - 9$ and $y = kx^2$ intersect each other at the points A and B. If the length AB is equal to 10 units then the value of k is:

(A) $\frac{9}{16}$ **(B)** $\frac{9}{25}$ **(C)** $\frac{16}{25}$ **(D)** $\frac{16}{9}$

5. Let α and β are roots of the equation $x^2 - 6x + 12 = 0$. The value of the expression $(\alpha - 2)^{12} + \frac{(\beta - 6)^{12}}{\alpha^{12}} - 1$ is:

(A) 2^{10} **(B)** 3^{10} **(C)** 2^{12} **(D)** 3^{12}

6. a, b, c are positive integers forming an increasing G.P. whose common ratio is a natural number. $b - a$ is cube of a natural number and $\log_6 a + \log_6 b + \log_6 c = 6$, then $a + b + c =$

(A) 100 **(B)** 111 **(C)** 122 **(D)** 189

7. The value of 'a' for which the straight line $4x - 3y + 4z - 2 = 0 = 3x - 2y + z - 5$ is parallel to the plane $2x - y + az - 7 = 0$, is:

(A) 2 **(B)** –2 **(C)** 8 **(D)** –8

8. Set of all possible values of k for which $f(x) = \sin x - \cos x - kx + b$ decreases for all real values of x, is:

(A) $(-\infty, 1)$ **(B)** $[-\sqrt{2}, \infty)$ **(C)** $[\sqrt{2}, \infty)$ **(D)** $[-\infty, \sqrt{2})$

9. The tangent at a point where eccentric angle $60°$ on the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1 (a > b)$ meet the auxiliary circle at L and M. If LM subtends a right angle at the centre, then eccentricity of the ellipse is:

(A) $\frac{1}{\sqrt{7}}$ **(B)** $\frac{2}{\sqrt{7}}$ **(C)** $\frac{3}{\sqrt{7}}$ **(D)** $\frac{1}{2}$

10. Coefficient of variation of two distributions are 50% and 60% and their arithmetic means are 30 and 25 respectively. Difference of standard deviation is:

(A) 1 **(B)** 1.5 **(C)** 2.5 **(D)** 0

11. The remainder when 5^{2222} is divided by 7 is:

(A) 2 **(B)** 3 **(C)** 4 **(D)** 5

12. A variable line passing through the point $P\left(2,\frac{3}{2}\right)$ meets co-ordinate axes at points A and B, then locus of the foot of perpendicular from origin on the line is:

(A) $x^2+y^2-4x-3y=0$ **(B)** $x^2+y^2-3x+4y=0$

(C) $2x^2+2y^2-4x-3y=0$ **(D)** $2x^2+2y^2+4x+3y=0$

13. Two teachers are taking 6 students to a zoo. The teachers decide to split up. Each student must choose one of the teachers, with the condition that each teacher must take at least one student. Number of possible ways of doing this is:

(A) 60 **(B)** 62 **(C)** 56 **(D)** 64

14. If $\frac{dy}{dx}=\left(e^y-x\right)^{-1}$ where $y(0)=0$, then y is equal to:

(A) $\frac{1}{2}\ln\left(1+x^2\right)$ **(B)** $\ln\left(1+x^2\right)$ **(C)** $\ln\left(x+\sqrt{1+x^2}\right)$ **(D)** $\ln\left(x+\sqrt{1-x^2}\right)$

15. Area of the region bounded by $x=0, y=0, x=2, y=2, y\le e^x$ and $y\ge \ln x$, is:

(A) $6-4\ln 2$ **(B)** $4\ln 2-2$ **(C)** $2\ln 2-4$ **(D)** $6-2\ln 2$

16. Let α,β and γ are the real roots of equation $x^3+ax^2+bx+c=0\left(a,b,c\in R, a\ne 0\right)$. if system of equations $\alpha x+\beta y+\gamma z=0, \beta x+\gamma y+\alpha z=0, \gamma x+\alpha y+\beta z=0$ has non trivial solution then the value of $\frac{a^2}{b}$ is :

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

17. If $I_1=\int_0^1\left(1-x^4\right)^7dx$ and $I_2=\int_0^1\left(1-x^4\right)^6dx$ then $\frac{29}{4}\frac{I_1}{I_2}$ is equal to:

(A) 3 **(B)** 5 **(C)** 7 **(D)** 9

18. If $z=\cos 20^\circ+i\sin 20$, then $\left|z+2z^2+3z^3+.....+18z^{18}\right|^{-1}$ is:

(A) $\frac{2}{9}\sin 10^\circ$ **(B)** $\frac{1}{9}\sin 10^\circ$ **(C)** $\frac{2}{9}\sin 20^\circ$ **(D)** $\frac{1}{9}\sin 20^\circ$

19. $\lim_{x\to\infty}\frac{\int_0^x\tan^{-1}t\,dt}{\sqrt{x^2+1}}$ is equal to:

(A) $\frac{\pi}{2}$ **(B)** 0 **(C)** 1 **(D)** π

20. Let a^2,b^2,c^2 be three distinct numbers in A.P. If $ab+bc+ca=1$ then $(b+c),(c+a)$ and $(a+b)$ are in:

(A) *A.P.* **(B)** *G.P.* **(C)** *H.P.* **(D)** None of these

SECTION-2

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21. Let a,b,c be the roots of the equation $x^3-9x^2+15x+2=0$. The volume of a parallelopiped with non-parallel sides $a\hat{i}+b\hat{j}+c\hat{k}, b\hat{i}+c\hat{j}+a\hat{k}$ and $c\hat{i}+a\hat{j}+b\hat{k}$ is _____.

22. There are two sets $A=\{a:a\in N \text{ and } -3\le a\le 5\}$ and $B=\{b:b\in Z \text{ and } 0\le b\le 4\}$. The number of elements common in $A\times B$ and $B\times A$ are _____.

23. If x & y are real numbers satisfying the relation $x^2+y^2-6x+8y+24=0$ then minimum value of $\log_2\left(x^2+y^2\right)$ is_____.

24. Let $f(x)=\begin{cases}\left(\sin\dfrac{2x^2}{a}+\cos\dfrac{3x}{b}\right)^{\frac{ab}{x^2}}, & x\neq 0\\ e^{2x+3}, & x=0\end{cases}$ is a continuous function at $x=0,\ \forall b\in R$,

then $\left|\dfrac{1}{a_{\min}}\right|$ is _____.

25. A vertical pole PS has two marks at Q and R such that portions PQ, PR and PS subtends angle α,β,γ respectively at a point on the ground which is at distance x from the bottom of pole P. If $PQ=1,\ PR=2,\ PS=3$ and $\alpha+\beta+\gamma=180°$, then x^2 is _____.

26. The product of real roots of the equation $|x|^{6/5}-26|x|^{3/5}-27=0$ is -3^k where k is _____.

27. In a hurdle race, a runner has probability p of jumping over a specific hurdle. Given that in 5 trials, the runner succeeded 3 times, the conditional probability that the runner has succeeded in the first trial is _____.

28. If $\tan x+\tan\left(x+\dfrac{\pi}{3}\right)+\tan\left(x+\dfrac{2\pi}{3}\right)=3$ then value of $\tan 3x$ is _____.

29. Let $n(A)=4$ and $n(B)=6$, then the number of one- one functions from A to B is _____.

30. Let $\int\dfrac{x^{1/2}}{\sqrt{1-x^3}}dx=\dfrac{2}{3}gof(x)+c$ and $f(x)=x^{3/2}$, then the value of $g(0)$ is_____.

End of Mock JEE Main - 5 | JEE