VMC Vidyamandir Classes SINCE 1986
IIT JEE | MEDICAL | FOUNDATION

CODE A

JEE Advanced Full Test-1 | Paper – 2 | JEE 2024

Maximum Marks: 180

Timing: 2:00 PM to 5:00 PM **Duration : 3.0 Hours**

General Instructions

1. The question paper consists of 3 Subject (Subject I: **Physics**, Subject II: **Chemistry**, Subject III: **Mathematics**). Each Part has **three** sections (Section 1, Section 2 & Section 3).

2. **Section 1** contains **8 Single Digit Integer Type Questions** ranging from **0 to 9**, Both Inclusive. For each question, enter the correct numerical value of the answer using the mouse and the onscreen virtual numeric keypad in the place designated to enter the answer.

   Section 2 contains **6 Multiple Correct Answers Type Questions**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONE OR MORE THAN ONE CHOICE** is correct.

   Section 3 contains **4 Multiple Choice Questions**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE CHOICE** is correct.

3. For answering a question, an ANSWER SHEET (OMR SHEET) is provided separately. Please fill your **Test Code, Roll No.** and **Group** properly in the space given in the ANSWER SHEET.

Name of the Candidate (In CAPITALS) : _____

Roll Number : _____

OMR Bar Code Number : _____

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

MARKING SCHEME

SECTION – 1 | (Maximum Marks: 24)

- **Section 1** contains **8 Single Digit Integer Type Questions** ranging from **0 to 9**, Both Inclusive. For each question, enter the correct numerical value of the answer using the mouse and the onscreen virtual numeric keypad in the place designated to enter the answer.
- Answer to each question will be evaluated according to the following marking scheme:

Full Marks: +3 **ONLY** the correct integer is entered.

Zero Mark: 0 If the questions is unanswered.

Negative Marks: –1 In all other cases.

SECTION – 2 | (Maximum Marks: 24)

- This section consists of **Six (06)** Questions. Each question has **FOUR** options. **ONE OR MORE THAN ONE** of these four option(s) is(are) correct answer(s).
- Answer to each question will be evaluated according to the following marking scheme:

Full Marks: +4 If only (all) the correct option(s) is(are) chosen

Partial Marks: +3 If all the four options are correct but ONLY three options are chosen

Partial Marks: +2 If three or more options are correct but ONLY two options are chosen and both of which are correct

Partial Marks: +1 If two or more options are correct but ONLY one option is chosen, and it is a correct option

Zero Mark: 0 if none of the options is chosen (i.e. the question is unanswered)

Negative Marks: –2 In all other cases.

SECTION – 3 | (Maximum Marks: 12)

- This section contains **FOUR (04)** Multiple Choice Questions. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE CHOICE** is correct.
- Answer to each question will be evaluated according to the following marking scheme:

Full Marks: +3 If only (all) the correct option(s) is(are) chosen

Zero Mark: 0 if none of the options is chosen (i.e. the question is unanswered)

Negative Marks: –1 In all other cases.

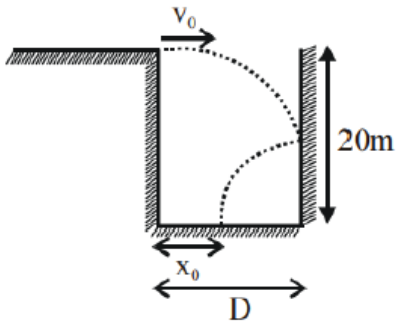
SUBJECT I : PHYSICS 60 MARKS

SECTION 1

SINGLE DIGIT INTEGER TYPE

This section contains **8 Single Digit Integer Type Questions** ranging from **0 to 9**, Both Inclusive. For each question, enter the correct numerical value of the answer using the mouse and the onscreen virtual numeric keypad in the place designated to enter the answer.

1. A ball leaves a horizontal table with velocity $v_0 = 5\,m/s$. The ball bounces elastically from a vertical smooth wall a horizontal distance D (= 8m) from the table, as shown in figure. The ball then strikes the floor a distance x_0 from the table. The value of x_0 (in meter) is_____. $(g = 10\,m/s^2)$.



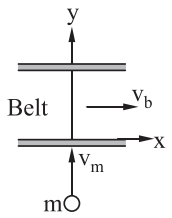
2. Two particles execute SHM along close parallel lines with same mean position, same time period 6 second and same amplitude 5 cm. Both the particles start SHM from their mean position (in same direction) with a time gap of 1 second. Find the maximum separation (in cm) between the two particles during their motion.

3. A solid sphere of mass *m* rolling without slipping on a horizontal surface with speed $v_0 = 5m/s$ strikes a vertical wall elastically. The coefficent of friction between the sphere and the wall is $\mu = \frac{1}{2}$. After collision, the centre of mass of the sphere follows a parabolic trajectory and the sphere strikes the horizontal surface at a distance R from the wall. Find R (in meters). [Take $g = 10m/s^2$]

4. On a highway, two buses *A* and *B* are running at the same velocity of magnitude $30ms^{-1}$. The brakes cause a deceleration of $\frac{30}{7}ms^{-2}$ in bus *A* and $3ms^{-2}$ in bus *B*. In an emergency, when driver of the front bus applies brakes, immediately its rear light turns red and braking begins. In response, driver of the rear bus also applies brakes to avoid a collision with the front bus. Every driver takes 1*s* to apply the brakes after he saw a need for it. If bus *A* is ahead of bus *B*, then the minimum separation between the buses (before driver of bus *A* applies the brake) to avoid collision is x_1. If bus *B* is running ahead of bus A, then the minimum separation between the buses (before the driver of bus *B* applies brake) to avoid collision is x_2. Find the value of $\frac{x_1}{5x_2}$.

5. A particle of mass *m* is projected on a conveyer belt moving with velocity v_b. Initial velocity of the particle is v_m directed along y-axis. Coefficient of friction between particle and belt is μ. The particle touches the belt at the origin of a fixed coordinate system and remains on the belt. Determine the product of inverse of coordinates (x, y) of the point where sliding stops.

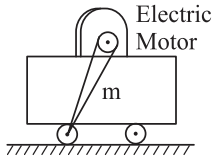
[$v_m = 1ms^{-1}, v_b = 2ms^{-1}, \mu = \frac{1}{2\sqrt{2}}$, $g = 10m/s^2$, coordinates are to be taken in meters]



6. Let us assume that sun radiates like a blackbody with surface temperature at $T_0 = 6000K$ and earth absorbs radiations coming from sun only. If both earth and sun are considered perfect sphere with distance between centre of earth and centre of sun to be 200 times the radius of sun. The temperature (in kelvin) of surface of earth in steady state is 50n. Find the value of n. (assume radiations incident on earth to be almost parallel).

7. A glass blub contains air and mercury. If the volume of air in bulb is to remain constnat at all temperature then the fraction of the volume of the bulb that must be occupied by mercury is $\frac{x}{20}$. Find out the value of 'x'. (Coefficient of linear expansion of glass = $9\times10^{-5}K^{-1}$, coefficient of expansion of merucry is $1.8\times10^{-4}K^{-1}$)

8. A box of mass 1 kg is mounted with two cylinders each of mass 1 kg and moment of inertia $0.5kg\,m^2$ and radius 1 m as shown in figure. Cylinders are mounted on their control axis of rotation and this system is placed on a rough horizontal surface. The rear cylinder is connected to a battery operated motor which provides a torque of 100 N-m to this cylinder via a belt as shown. Sufficient friction is present between cylinders and horizontal surface for pure rolling. If acceleration of the vehicle in m/s^2 is 5n then n is_____. (Neglect mass of motor, belt and other accessories of the vehicle)

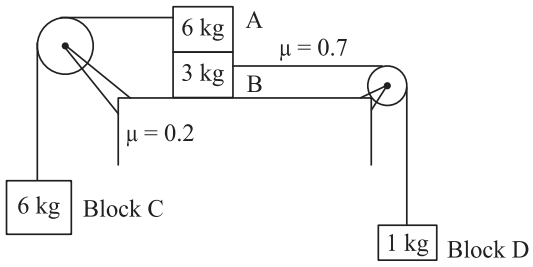


SECTION 2

MULTIPLE CORRECT ANSWERS TYPE

This Section contains **6 Multiple Correct Answers Type Questions**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONE OR MORE THAN ONE CHOICE** is correct.

9. An arrangement of masses and pulleys is shown in the figure. Strings connecting masses A and B with the pulleys are horizontal and all the pulleys and strings are light. Friction coefficient between the surface and the block B is 0.2 and that between blocks A and B is 0.7. The system is released from rest. Which of the following statements is (are) correct? (Take $g = 10\,m/s^2$)



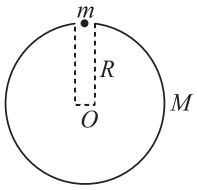
(A) The magnitude of acceleration of the system is $2m/s^2$ and there is no slipping between block A and block B

(B) The magnitude of friction between block A and block B is 42 N.

(C) Acceleration of block C is $1m/s^2$ downwards

(D) Tension in the string connecting blocks B and D is 12 N

10. A tunnel is dug in earth upto its centre and a particle of mass *m* is dropped into it as shown. Coefficient of restitution $e = \frac{1}{2}$, for all collisions. Which of the following options are correct?



(A) The impulse on the particle by earth in the collision at the centre of earth is $\frac{3}{2}m\sqrt{\frac{GM}{R}}$

(B) The ratio of time taken by the particle to cover the first half of the journey to the later half is $2:1$

(C) Particle moves to a distance $\frac{R}{2}$ from center before coming to rest after first collision

(D) If the particle in projected from centre of earth out of the tunnel, then the minimum speed of projection for which it doesn't return to centre is $\sqrt{\frac{3GM}{R}}$

11. Two SHM's are superimposed on a particle. Choose the correct alternative(s) regarding the motion in following case.

Case I : $x = A\sin(\omega t)$ $\quad y = B\cos(\omega t)$ **Case II :** $x = A\sin(\omega t)$ $\quad y = B\sin(\omega t)$

(A) In case I motion is oscillatory

(B) In case II motion is SHM with amplitude $\sqrt{A^2 + B^2}$

(C) In case I motion is periodic

(D) In case II particle moves on a straight line in *x*-*y* plane with slope $\frac{A}{B}$

12. A uniform planet has half the mass of earth and its radius is 4 times the radius of earth. If g is acceleration due to gravity at the surface of earth, R is radius of earth and M is mass of earth then. Which of the following options are correct?

(A) Acceleration due to gravity at centre of the planet is $\frac{g}{2}$

(B) Acceleration due to gravity at the surface of planet is $\frac{g}{32}$

(C) Acceleration due to gravity at a height R above the surface of planet is $\frac{g}{50}$

(D) Acceleration due to gravity at a height $\frac{R}{2}$ below the surface of planet is $\frac{g}{64}$

13. A model rocket fired from the ground ascends with a constant upward acceleration. A small bolt is dropped from the rocket 1.0 s after the firing and fuel of the rocket is finished 4.0 s after the bolt is dropped. Air-time of the bolt is 2.0 s. Acceleration of free fall is 10 m/s^2. Which of the following statements is/are correct?

(A) Acceleration of the rocket while ascending on its fuel is 8.0 m/s^2.

(B) Fuel of the rocket was finished at a height 100 m above the ground.

(C) Maximum speed of the rocket during its upward flight is 40 m/s.

(D) Total air-time of the rocket is 15s

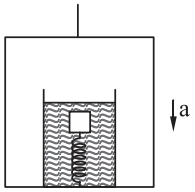
14. In the situation shown in figure, the block is in equilibrium and the vessel is placed in a lift. The density of block is more then density of liquid. If the lift starts moving down with constant acceleraiton *a*, then which of the following options are correct?

(A) The buoyant force will decrease

(B) The equilibrium compression in the spring will be more

(C) The equilibrium compression in the spring will be less

(D) The buoyant force will remain same

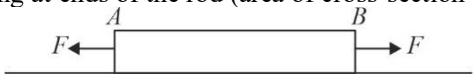


SECTION - 3

SINGLE CHOICE CORRECT TYPE

Section 3 contains **4 Multiple Choice Questions**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE CHOICE** is correct.

15. Young's modulus of a uniform cross-section rod, linearly varies from Y_0(end A) to $2Y_0$ (end B). Two equal forces are acting at ends of the rod (area of cross-section = A, length = l), then:



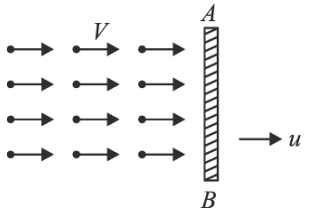
(A) Total extension in rod is $\frac{Fl}{AY_0}$ **(B)** Total extension in rod is $\frac{2Fl}{3AY_0}$

(C) Total extension in rod is $\frac{Fl}{AY_0}ln2$ **(D)** Total extension in rod is $\frac{Fl}{2AY_0}ln2$

16. In still water, a steamer is observed by two persons traveling at a speed $5m/s$ into two boats moving in opposite direction on a straight track AB. To an observer in one boat, the steamer appears to cross the track AB at right angles while to the observer in other boat the angle appears to be 45°. Then steamer actually crosses the track with speed:

(A) $5\,m/s$ **(B)** $5\sqrt{2}\,m/s$ **(C)** $5\sqrt{5}\,m/s$ **(D)** $10\,m/s$

17. A beam of gas molecules is incident normally on a plate AB. Each gas molecule has mass m and velocity V. The incident beam falls on an area A on the plate and all the molecules strike the plate elastically. Number of molecules in unit volume of the beam is n. When the plate is moved to right (See Figure) a force F_1 is needed to keep it moving with constant velocity $u(<V)$. When the plate is moved to left with constant velocity u, an external force F_2 is needed. Find $F_2 - F_1$.



(A) $4mnAVu$ **(B)** $8mnAVu$ **(C)** $4mnAV^2$ **(D)** Zero

18. A particle moves in x-y plane with constant acceleration $-4\hat{j}$. The equation of trajectory of the particle is $y=\sqrt{3}x-2x^2$. The velocity of the particle when it passes through the origin is:

(A) $\hat{i}+\hat{j}$ **(B)** $\hat{i}-\hat{j}$ **(C)** $\hat{i}+\sqrt{3}\hat{j}$ **(D)** $\sqrt{3\hat{i}}-\hat{j}$

SPACE FOR ROUGH WORK

SUBJECT II : CHEMISTRY 60 MARKS

SECTION 1

SINGLE DIGIT INTEGER TYPE

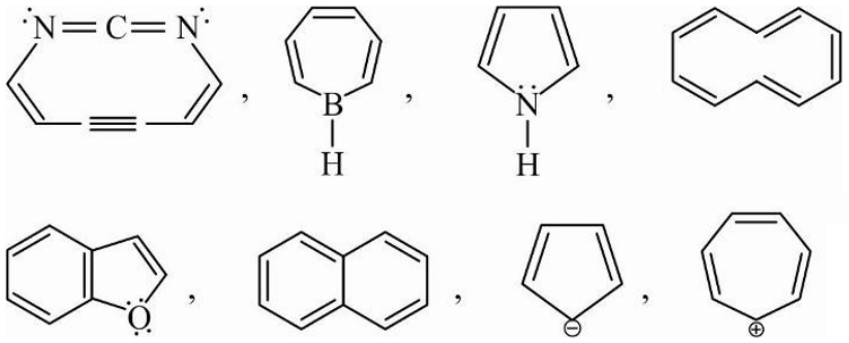
This section contains **8 Single Digit Integer Type Questions** ranging from **0 to 9**, Both Inclusive. For each question, enter the correct numerical value of the answer using the mouse and the onscreen virtual numeric keypad in the place designated to enter the answer.

1. How many neutral aromatic resonating structures are possible for Anthracene $(C_{14}H_{10})$?

2. In the list of compounds given below, identify the number of compounds that have $d\pi - p\pi$ bonding in the molecular structure with sp^2 hybridisation of the underlined atom.

$\underline{C}Cl_4$, $\underline{P}OCl_3$, $\underline{S}O_2$, $\underline{S}O_3$, $H_2\underline{S}O_4$, $\underline{S}OCl_2$, $\underline{S}O_2Cl_2$, $\underline{B}F_3$, $\underline{B}Cl_3$, $\underline{N}(SiH_3)_3$

3. Among the following, the number of aromatic compound(s) having only sp^2 hybridized atoms is _____.

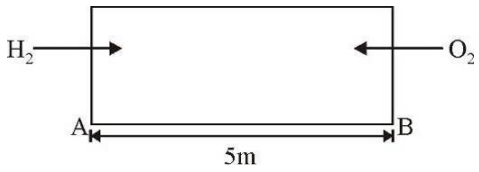


4. Among N_2^+, CO, O_2^+, CN^-, NO^+, N_2, B_2, N_2^-, NO the number of species with bond order equal to 3 is:

5. How many of these are intensive properties?

Volume	Internal energy	Temperature
Specific heat capacity	Heat capacity	Pressure
Density	Molar heat capacity	Molar enthalpy

6. In a tube of length 5 m having 2 identical holes at the opposite ends H_2 & O_2 are made to effuse into the tube from opposite ends under identical conditions. Find from point A the distance where gases will meet for the first time. [Atomic mass H = 1, O = 16]



7. A transition for H-atom from 2nd to 1st orbit has same wavelength as from nth orbit to 2nd orbit for He^+ ion. Find the value of n. [Assume $R_H \approx R_{He^+}$]

8. How many of the following compounds have zero dipole moment?

PCl_3F_2, PF_3Cl_2, OCl_2, H_2O , CCl_4, SF_4, SF_6, C_2H_4, NCl_3

SPACE FOR ROUGH WORK

SECTION 2

MULTIPLE CORRECT ANSWERS TYPE

This Section contains **6 Multiple Correct Answers Type Questions**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONE OR MORE THAN ONE CHOICE** is correct.

9. Which of the following is/are true for a mixture having 1 mole of $NaOH$ and $NaHCO_3$ each in 1 litre solution ?

(A) $NaOH$, $NaHCO_3$ can't coexist.

(B) Titre value of 1 N HCl is 50 mL for 50 mL of above mixture in presence of phenolphthalein as indicator.

(C) Titre value of 1 N HCl is 100 mL for 50 mL of above mixture in presence of methyl orange as indicator.

(D) Titre value of 1 N HCl is 50 mL for 50 mL of above mixture in presence of methyl orange as indicator after first end point with phenolphthalein indicator.

10. Which of the following is/are true for Maxwell Boltzmann curve for an ideal gas ?

(A) area under the curve signifies number of molecules

(B) on increasing temperature number of molecules possessing average speed decreases

(C) on increasing temperature number of molecules possessing root mean square velocity increases

(D) on changing temperature area under the curve remains same

11. Which of the following sample of reducing agents is/are chemically equivalent to 25 mL of $0.2\ N\ KMnO_4$ in acidic medium?

(A) 50 mL of 0.1 M $FeSO_4$ to be oxidized to Fe^{+3}

(B) 50 mL of 0.05 M $SnCl_2$ to be oxidized to Sn^{4+}

(C) 25 mL of 0.1 M H_3AsO_3 to be oxidized to H_3AsO_4

(D) 25 mL of 0.1 M H_2O_2 to be oxidized to O_2

12. Consider the equilibrium $NH_4Cl(s) \rightleftharpoons NH_3(g) + HCl(g)$. An inert gas is added to the system at constant volume and temperature. The **CORRECT** statement(s) is(are) :

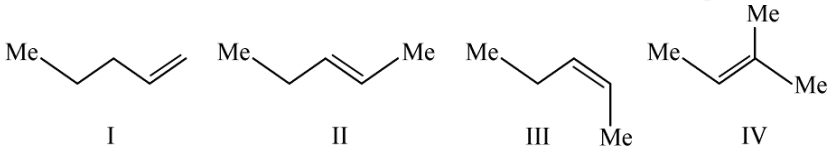
(A) The partial pressures of NH_3 and HCl in the system will increase

(B) The partial pressures of NH_3 and HCl in the system will remain the same

(C) The partial pressures of NH_3 and HCl in the system will decrease

(D) The entropy of the system will increase

13. Which of the following statement(s) is(are) **CORRECT** regarding compounds I to IV?



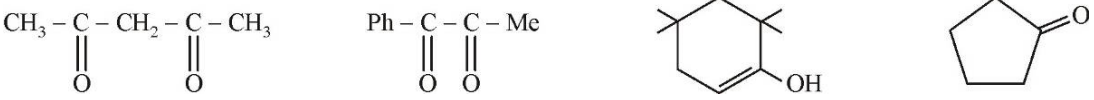
(A) Compound III and IV are constitutional isomers

(B) Compound II and III are diastereomers

(C) Compound IV has maximum number of hyperconjugable H atoms

(D) Compound I and IV are chain isomers

14. Which of the following can show tautomerism?



(A) **(B)** **(C)** **(D)**

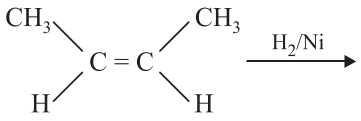
SPACE FOR ROUGH WORK

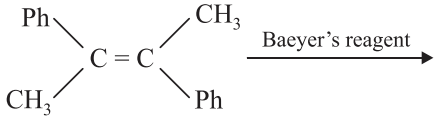
SECTION - 3

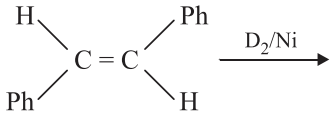
SINGLE CHOICE CORRECT TYPE

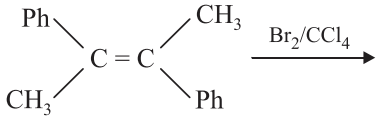
Section 3 contains **4 Multiple Choice Questions**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE CHOICE** is correct.

15. Which of these following reactions gives meso compound as major product?

(A) 

(B) 

(C) 

(D) 

16. A mixture of H_2SO_4, $H_2C_2O_4$ (oxalic acid) and some inert impurity weighing 3.185g is dissolved in 1 litre water. 10 mL of this solution require 3 mL of 0.1 N NaOH solution for complete neutralisation. In another experiment, 100 mL of the same solution in hot conditions required 4 mL of 0.02 M $KMnO_4$ solution for complete reaction. The % (w/w) of H_2SO_4 in the mixture is:

(A) 80% **(B)** 60% **(C)** 40% **(D)** 20%

17. Photons of equal energy were allowed to strike on two different gas samples. One sample contains H-atoms is in some excited state with a principal quantum number 'n' and other sample has n-atoms of H in ground state. The photonic beams totally ionise the H-atoms in both samples. If the difference in the kinetic energy of the ejected electrons in the two different cases is 12.75eV. Then the principal quantum no. 'n' of the excited state is:

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

18. The correct decreasing order of oxidation state of the sulphur atom in H_2SO_3, H_2SO_4 and H_2S is :

(A) $H_2SO_4 > H_2SO_3 > H_2S$ **(B)** $H_2SO_3 > H_2SO_4 > H_2S$

(C) $H_2S > H_2SO_3 > H_2SO_4$ **(D)** $H_2SO_4 > H_2S > H_2SO_3$

SPACE FOR ROUGH WORK

SUBJECT III : MATHEMATICS 60 MARKS

SECTION 1
SINGLE DIGIT INTEGER TYPE

This section contains **8 Single Digit Integer Type Questions** ranging from **0 to 9**, Both Inclusive. For each question, enter the correct numerical value of the answer using the mouse and the onscreen virtual numeric keypad in the place designated to enter the answer.

1. Two circles of unequal radii have four common tangents. A transverse common tangent meets the direct common tangents at the points P & Q. If length of direct tangent (between the point of contacts) is 8 units then length (in units) of PQ is: _____.

2. If $S_n = 3 + \frac{1+3+3^2}{3!} + \frac{1+3+3^2+3^3}{4!}$..... upto n-terms.

Then the value of $\left[\lim_{n\to\infty} S_n\right]$, (where [.]represent G.I.F) is _____.

Hint: Use $e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + ...$

3. If the exhaustive set of 'K' for which two distinct chords of the ellipse $\frac{x^2}{8} + \frac{y^2}{2} = 1$ passing through (2, –1) are bisected by the line $x + y = K$ is (a,b), then $(a+b)$ is _____.

4. If $ax^3 - cx + b \geq 0\ \forall x \in R^+ - \{0\}$, where $a,b,c \in R^+$. Then the minimum value of $\left(\frac{27ab^2}{c^3}\right)$ is _____.

5. If x, y, z are positive real numbers, such that $x + y + z = 1$, If the minimum value of $\left(1+\frac{1}{x}\right)\left(1+\frac{1}{y}\right)\left(1+\frac{1}{z}\right)$ is K^2, then $|K|$ is _____.

6. If $\frac{9a}{\cos\theta} + \frac{5b}{\sin\theta} = 56$ and $\frac{9a\sin\theta}{\cos^2\theta} - \frac{5b\cos\theta}{\sin^2\theta} = 0$

If the value of $\left[(9a)^{\frac{2}{3}} + (5b)^{\frac{2}{3}}\right]^3 = (8K)^3$, then K is _____.

7. The equation of common tangent to the curve $xy = 4$ and $x^2 + y^2 = 8$, whose x and y intercepts are positive is $x + y = \lambda$. Find the value of λ.

8. In a sequence of circles $c_1, c_2, c_3, ...c_n$, the centres lie along positive x-axis with abscissa forming an A.P. of first term unity and common difference 3. The radius of these circles are in G.P. with first term unity and common ratio 2. If the tangents with slope m_1 and m_2 of c_3 intersect each other at the centre of c_5, then the value of $10|m_1 m_2|$ is _____.

SECTION 2

MULTIPLE CORRECT ANSWERS TYPE

This Section contains **6 Multiple Correct Answers Type Questions**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONE OR MORE THAN ONE CHOICE** is correct.

9. Which of the following must hold good for the expansion of the binomial $\left(x^4+\frac{1}{x^3}\right)^{15}$?

(A) There exists a term which is independent of x.

(B) 8^{th} and 9^{th} terms of the expansion have the greatest binomial coefficient.

(C) Coefficients of x^{32} and x^{-17} are equal.

(D) If $x=\sqrt{2}$, then number of rational terms in the expansion is 5.

10. The centre of a circle $S=0$ lies on $2x-2y+9=0$ and $S=0$ cuts orthogonally the circle $x^2+y^2=4$. Then the circle must pass through the point

(A) (1, 1) **(B)** (–1/2, 1/2) **(C)** (5, 5) **(D)** (–4, 4)

11. Let a, b, x and y be real numbers such that $a-b=1$ and $y\neq 0$. If the complex number $z=x+iy$ satisfies $\text{Im}\left(\frac{az+b}{z+1}\right)=y$, then which of the following is(are) possible value(s) of x?

(A) $1-\sqrt{1+y^2}$ **(B)** $-1-\sqrt{1-y^2}$

(C) $1+\sqrt{1+y^2}$ **(D)** $-1+\sqrt{1-y^2}$

12. Let S be the set of all non-zero real numbers α such that the quadratic equation $\alpha x^2-x+\alpha=0$ has two distinct real roots x_1 and x_2 satisfying the inequality $|x_1-x_2|<1$. Which of the following interval(s) is/are subset of S?

(A) $\left(-\frac{1}{2},-\frac{1}{\sqrt{5}}\right)$ **(B)** $\left(-\frac{1}{\sqrt{5}},0\right)$ **(C)** $\left(0,\frac{1}{\sqrt{5}}\right)$ **(D)** $\left(\frac{1}{\sqrt{5}},\frac{1}{2}\right)$

13. If $z^3+(3+2i)z+(-1+ia)=0$ has one real root, then the value of a lies in the interval $(a\in R)$.

(A) (–2, 1) **(B)** (–1, 0) **(C)** (0, 1) **(D)** (–2, 3)

14. For a complex number z, the minimum value of $|z|+|z-\cos\alpha-i\sin\alpha|$ (where $i=\sqrt{-1}$) is $(\alpha\in R)$.

(A) Odd natural number **(B)** Even natural Number

(C) Rational number **(D)** Prime Number

SECTION - 3

SINGLE CHOICE CORRECT TYPE

Section 3 contains **4 Multiple Choice Questions**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE CHOICE** is correct.

15. In triangle ABC, if $y = x+1$ and $y = 2x+3$ are altitude through A and angle bisector of B respectively. If vertex $C \equiv (3, 4)$ then equation of median through C is _____.

(A) $x+7y=31$ **(B)** $7x+2y=29$ **(C)** $7x+y=25$ **(D)** $2x+7y=34$

16. The value of ${}^{n}c_0 + {}^{n}c_4 + {}^{n}c_8 + \ldots..$ till last possible term is (n is a natural number greater than 8).

(A) $2^{n-1} + 2^{\frac{n-4}{2}} \cos n\frac{\pi}{4}$ **(B)** $2^{n-2} + 2^{\frac{n-2}{2}} \cos n\frac{\pi}{4}$

(C) $2^{n-2} + 2^{\frac{n-4}{2}} \cos n\frac{\pi}{4}$ **(D)** $2^{n} + n^{\frac{n-2}{2}} \cos n\frac{\pi}{4}$

17. If the line $x+y+1=0$ and $y-2x+5=0$ are tangents to a parabola whose focus at (1, 2) then the equation of normal to the parabola through $\left(\frac{29}{17}, -\frac{14}{17}\right)$ is _____.

(A) $2x+4y-\frac{2}{17}=0$ **(B)** $y-3x+\frac{101}{17}=0$

(C) $4x+y-5=0$ **(D)** $4x+y=6$

18. Define polynomial $f_n(x)$ of n^{th} degree as:

$f_n(\cos\theta) = \cos n\theta$, n = natural number.

i.e $f_2(x) = 2x^2 - 1$ $\quad$ $f_3(x) = 4x^3 - 3x$

Then $f_6(x)$ is equal to:

(A) $36x^6 - 48x^4 + 18x^2 - 5$ **(B)** $32x^6 - 48x^4 + 18x^2 - 1$

(C) $36x^6 - 45x^4 + 18x^2 - 8$ **(D)** $36x^6 - 48x^4 + 18x^2 - 7$

SPACE FOR ROUGH WORK

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