

## JEE(Advanced) : MOCK TEST

PAPER-2

HAVE CONTROL $\longrightarrow$ HAVE PATIENCE $\longrightarrow$ HAVE CONFIDENCE $\Rightarrow 100 \%$ SUCCESS

## BEWARE OF NEGATIVE MARKING

## PART-1 : PHYSICS

## SECTION-I (i) : (Maximum Marks: 12)

- This section contains FOUR (04) questions.
- Each question has FOUR options (A), (B), (C) and (D). ONLY ONE of these four options is the correct answer.
- For each question, choose the option corresponding to the correct answer.
- Answer to each question will be evaluated according to the following marking scheme :

Full Marks : +3 If ONLY the correct option is chosen.
Zero Marks : 0 If none of the options is chosen (i.e. the question is unanswered)
Negative Marks : -1 In all other cases

1. A uniform rope of mass $m$ and length $L$ hangs from the ceiling. A small wave pulse is created near bottom, Then which of following is correct regarding wave pulse?

(i) Rate of change of speed with respect to time varies.
(ii) Rate of change of speed with respect to time is constant.
(iii) Rate of change of speed with respect to time is zero.
(iv) Wave speed varies
(A) i,iii
(B) i,iv
(C) ii, iv
(D) iii, iv
2. The maximum velocity of an electron emitted by light of wavelength $\lambda$ incident on the surface of a metal of work function W is :
(A) $\left[\frac{2(\mathrm{hc}+\lambda \mathrm{W})}{\mathrm{m} \lambda}\right]^{1 / 2}$
(B) $\frac{2(\mathrm{hc}-\lambda \mathrm{W})}{\mathrm{m}}$
(C) $\left[\frac{2(h c-\lambda W)}{m \lambda}\right]^{1 / 2}$
(D) $\left[\frac{2(\mathrm{~h} \lambda-\mathrm{W})}{\mathrm{m}}\right]^{1 / 2}$
3. An electron beam is accelerated by a potential difference $V$ to hit a metallic target to produce X-rays. It produces continuous as well as characteristic X -rays. If $\lambda_{\min }$ is the smallest possible wavelength of X-ray in the spectrum, the variation of $\log \lambda_{\text {min }}$ with $\log \mathrm{V}$ is correctly represented in :-
(A)

(B)

(C)

(D)

4. If $\theta=110^{\circ}$ then total number of images formed by the mirror system will be :-

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

## SECTION-I (ii) : (Maximum Marks: 12)

- This section contains THREE (03) questions.
- Each question has FOUR options. ONE OR MORE THAN ONE of these four option(s) is (are) correct answer(s).
- For each question, choose the option(s) corresponding to (all ) the 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 Marks : 0 If none of the options is chosen (i.e. the question is unanswered).
Negative Marks : -2 In all other cases.

- For Example : If first, third and fourth are the ONLY three correct options for a question with second option being an incorrect option; selecting only all the three correct options will result in +4 marks. Selecting only two of the three correct options (e.g. the first and fourth options), without selecting any incorrect option (second option in this case), will result in +2 marks. Selecting only one of the three correct options (either first or third or fourth option), without selecting any incorrect option (second option in this case), will result in +1 marks. Selecting any incorrect option(s) (second option in this case), with or without selection of any correct option(s) will result in -2 marks.

5. The p -T diagram of a cyclic process on an ideal gas is as shown.


Which of the following indicator diagrams is/are correctly represent the above cyclic process?
(A)

(B)

(C)

(D)

6. A thin-walled, spherical conducting shell S of radius R is given charge Q . The same amount of charge is also placed at its centre C. Which of the following statement(s) are correct?
(A) On the outer surface of S , the charge density is $\frac{\mathrm{Q}}{2 \pi \mathrm{R}^{2}}$.
(B) The electric field is zero at all points inside S .
(C) At a point just outside $S$, the electric field is double the field at a point just inside $S$.
(D) At any point inside S , the electric field is inversely proportional to the square of its distance from C .
7. Switch $S$ of the circuit shown in figure is closed at $t=0$. If e denotes the induced e.m.f. in $L$ and $I$ is the current flowing through the circuit at time $t$, which of the following graphs is/are correct?

(A)

(B)

(C)

(D)


SECTION-II (i) : (Maximum Marks: 12)

- This section contains TWO (02) paragraphs.
- Based on each paragraph, There are TWO (02) questions.
- The answer to each question is a NUMERICAL VALUE.
- For each question, enter the correct numerical value corresponding to the answer in the designated place.
- If the numerical value has more than two decimal places, truncate/round-off the value to TWO decimal places.
- Answer to each question will be evaluated according to the following marking scheme:

Full Marks : +3 If ONLY the correct numerical value is entered at the designated place;
Zero Marks : 0 In all other cases.

## Paragraph for Questions 1 and 2

A semi cylinder made of a transparent plastic has a refraction index of $n=\sqrt{2}$ and a radius of $R$. There is a narrow incident light ray perpendicular to the flat side of the semi cylinder at distance from the axis of symmetry.


1. What can the maximum value of d (in cm ) be so that the light ray can still leave the other side of the semi cylinder? [Take : $\mathrm{R}=10 \mathrm{~cm}$ ]
2. When the value of $d$ chosen is such that TIR just takes place then time (in nanoseconds) for which light remains inside the cylinder is (take $\mathrm{R}=9 \mathrm{~cm} \& \mathrm{C}=3 \times 10^{8} \mathrm{~m} / \mathrm{s}$ )

## Paragraph for Questions 3 and 4

In the given circuit all capacitor were uncharged initially. First switch $S_{1}$ is closed for long time when circuit reaches to steady state, switch $S_{1}$ is opened \& $S_{2}$ is closed.

3. The current through $\mathrm{R}_{2}$, just after closing the switch $\mathrm{S}_{2}$ is (in A ) :-
4. Net heat produced in $\mathrm{R}_{2}$ after closing switch $\mathrm{S}_{2}$ (in $\mu \mathrm{J}$ ) :-

## SECTION-II (ii) : (Maximum Marks: 24)

- This section contains SIX (06) questions.
- The answer to each question is a NON-NEGATIVE INTEGER
- For each question, enter the correct integer value of the answer in the place designated to enter the answer.
- For each question, marks will be awarded in one of the following categories :
$\begin{array}{llll}\text { Full Marks } & : & +4 & \text { If only the correct answer is given. } \\ \text { Zero Marks } & : & 0 & \text { In all other cases }\end{array}$

5. In the figure shown the current I in ampere is :- $(\mathrm{R}=1 \Omega)$

6. A square of side $L / 2$ is removed from one corner of a square sandwich that has sides of length $L$. The center of mass of the remainder of the sandwich moves from C to $\mathrm{C}^{\prime}$. The displacement of the center of mass (from C to $\mathrm{C}^{\prime}$ ) is $\mathrm{p} \frac{\sqrt{2}}{12} \mathrm{~L}$. The value of p is :-

7. In an $\alpha$-decay the kinetic energy of $\alpha$ particle is 48 MeV and Q value of the reaction is 50 MeV . The mass number of the parent nucleus is 20 n then find n : (Assume that daughter nucleus is in ground state)
8. The potential energy of a particle of mass $m$ is given by $V(x)=\left\{\begin{array}{ll}E_{0} & 0 \leqslant x \leqslant 1 \\ 0 & x>1\end{array}\right\} \lambda_{1}$ and $\lambda_{2}$ are the de-Broglie wavelengths of the particle, when $0 \leq x \leq 1$ and $x>1$ respectively. If the total energy of particle is $2 \mathrm{E}_{0}$, find $\left(\lambda_{1} / \lambda_{2}\right)^{2}$.
9. A tuning fork of frequency 480 Hz is used in an experiment for measuring speed of sound (v) in air by resonance tube method. Resonance is observed to occur at two successive lengths of the air column, $\ell_{1}=30 \mathrm{~cm}$ and $\ell_{2}=70 \mathrm{~cm}$. Then $v($ in $\mathrm{m} / \mathrm{s}$ ) is equal to:
10. In a Young's double slit experiment 15 fringes are observed on a small portion of the screen when light of wavelength 500 nm is used. Ten fringes are observed on the same section of the screen when another light source of wavelength $\lambda$ is used. Then the value of $\lambda$ is (in nm ) $\qquad$ .

## PART-2 : CHEMISTRY

## SECTION-I (i) : (Maximum Marks: 12)

- This section contains FOUR (04) questions.
- Each question has FOUR options (A), (B), (C) and (D). ONLY ONE of these four options is the correct answer.
- For each question, choose the option corresponding to the correct answer.
- Answer to each question will be evaluated according to the following marking scheme :

Full Marks : +3 If ONLY the correct option is chosen.
Zero Marks : 0 If none of the options is chosen (i.e. the question is unanswered)
Negative Marks : -1 In all other cases

1. Colligative properties of the solution depend upon:
(A) Nature of the solution
(B) Nature of the solvent
(C) Number of solute particles
(D) Number of moles of solvent
2. Correct formula of apatite family is :
(where $\mathrm{X}=\mathrm{F}, \mathrm{Cl}, \mathrm{OH}$ )
(A) $\mathrm{Ca}_{3}\left(\mathrm{PO}_{4}\right)_{2} \cdot \mathrm{CaX}_{2}$
(B) $2 \mathrm{Ca}_{3}\left(\mathrm{PO}_{4}\right)_{2} \cdot \mathrm{CaX}_{2}$
(C) $\mathrm{Ca}_{3}\left(\mathrm{PO}_{4}\right)_{2} \cdot 2 \mathrm{CaX}_{2}$
(D) $3 \mathrm{Ca}_{3}\left(\mathrm{PO}_{4}\right)_{2} \cdot \mathrm{CaX}_{2}$
3. 


(A)

(B)

(C)

(D)

4.


Correct statement(s) for above reaction is :
(A) (C) is cyclohexanol
(B)

(C) (C) is benzene
(D)


## SECTION-I (ii) : (Maximum Marks: 12)

- This section contains THREE (03) questions.
- Each question has FOUR options. ONE OR MORE THAN ONE of these four option(s) is (are) correct answer(s).
- For each question, choose the option(s) corresponding to (all ) the 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 Marks : $0 \quad$ If none of the options is chosen (i.e. the question is unanswered).
Negative Marks : -2 In all other cases.

- For Example : If first, third and fourth are the ONLY three correct options for a question with second option being an incorrect option; selecting only all the three correct options will result in +4 marks. Selecting only two of the three correct options (e.g. the first and fourth options), without selecting any incorrect option (second option in this case), will result in +2 marks. Selecting only one of the three correct options (either first or third or fourth option), without selecting any incorrect option (second option in this case), will result in +1 marks. Selecting any incorrect option(s) (second option in this case), with or without selection of any correct option(s) will result in -2 marks.

5. Three different solutions of oxidising agents $\mathrm{KMnO}_{4}, \mathrm{~K}_{2} \mathrm{Cr}_{2} \mathrm{O}_{7}$ and $\mathrm{I}_{2}$ is titrated separately with 0.158 gm of $\mathrm{Na}_{2} \mathrm{~S}_{2} \mathrm{O}_{3}$. If molarity of each oxidising agent is 0.1 M and reactions are :
$\mathrm{MnO}_{4}{ }^{-}+\mathrm{S}_{2} \mathrm{O}_{3}{ }^{2-} \rightarrow \mathrm{MnO}_{2}+\mathrm{SO}_{4}{ }^{2-}$
$\mathrm{Cr}_{2} \mathrm{O}_{7}{ }^{2-}+\mathrm{S}_{2} \mathrm{O}_{3}{ }^{2-} \rightarrow \mathrm{Cr}^{3+}+\mathrm{SO}_{4}{ }^{2-}$
$\mathrm{I}_{2}+\mathrm{S}_{2} \mathrm{O}_{3}{ }^{2-} \rightarrow \mathrm{S}_{4} \mathrm{O}_{6}{ }^{2-}+\mathrm{I}^{-}$
Then,
(A) Volume of $\mathrm{KMnO}_{4}$ used is maximum
(B) Volume of iodine used is minimum
(C) Wt. of $\mathrm{I}_{2}$ used in titration is maximum
(D) Gram equivalent of $\mathrm{Na}_{2} \mathrm{~S}_{2} \mathrm{O}_{3}$ are same in all the reactions.
6. The cubic unit cell structure of a compound containing cation M and anion X is shown below. When compared to the anion, the cation has smaller ionic radius. Choose the correct statement(s) :


- M ○x
(A) The empirical formula of the compound is MX.
(B) The cation M and anion X have different coordination geometries.
(C) The ratio of $\mathrm{M}-\mathrm{X}$ bond length to the cubic unit cell edge length is 0.866 .
(D) The ratio of the ionic radii of cation M to anion X is 0.414 .

7. Which of following are ores of Pb ?
(A) Calamine
(B) Galena
(C) Cerrusite
(D) Cassiterite

## SECTION-II (i) : (Maximum Marks: 12)

- This section contains TWO (02) paragraphs.
- Based on each paragraph, There are TWO (02) questions.
- The answer to each question is a NUMERICAL VALUE.
- For each question, enter the correct numerical value corresponding to the answer in the designated place.
- If the numerical value has more than two decimal places, truncate/round-off the value to TWO decimal places.
- Answer to each question will be evaluated according to the following marking scheme:

Full Marks : $\quad+3$ If ONLY the correct numerical value is entered at the designated place;
Zero Marks : 0 In all other cases.

## Paragraph for Questions 1 and 2

0.20 moles of CO taken in a 2.463 litre flask is maintained at 750 K along with a catalyst so that the following reaction can take place: $\mathrm{CO}(\mathrm{g})+2 \mathrm{H}_{2}(\mathrm{~g}) \rightleftharpoons \mathrm{CH}_{3} \mathrm{OH}(\mathrm{g})$. Hydrogen is introduced until the total pressure of the system is 7.5 atm at equilibrium and 0.1 mole of methanol is formed.
( $\mathrm{R}=0.0821 \mathrm{~L}-\mathrm{atm} / \mathrm{K}-\mathrm{mol}$ ).

1. For the reaction, $\mathrm{K}_{\mathrm{P}}\left(\mathrm{in} \mathrm{atm}^{-2}\right)$ is
2. What is the final pressure (in atm) if the same amount of CO and $\mathrm{H}_{2}$ as before used, but with no catalyst so that the reaction does not take place?

## Paragraph for Questions 3 and 4

$\mathrm{KMnO}_{4}$ act as oxidising agent in acidic, basic and neutral medium.
In acidic medium $\mathrm{KMnO}_{4}$ oxidises $\mathrm{I}^{-}$to $\mathrm{I}_{2}, \mathrm{C}_{2} \mathrm{O}_{4}^{2-}$ into $\mathrm{CO}_{2}$
Answer the following questions.
3. Number of moles of $\mathrm{KMnO}_{4}$ needed to oxidises 3 moles of $\mathrm{C}_{2} \mathrm{O}_{4}^{2-}$ in acidic medium is $\qquad$
4. In alkaline medium $\mathrm{KMnO}_{4}$ oxidises KI into a potassium salt ' X ' and itself is converted into Y . Sum of atomicity of X and oxidation number of metal in Y is ....

## SECTION-II (ii) : (Maximum Marks: 24)

- This section contains SIX (06) questions.
- The answer to each question is a NON-NEGATIVE INTEGER
- For each question, enter the correct integer value of the answer in the place designated to enter the answer.
- For each question, marks will be awarded in one of the following categories :

Full Marks : +4 If only the correct answer is given.
Zero Marks : $0 \quad$ In all other cases
5. At 298 K , pure $\mathrm{T}_{2} \mathrm{O}$ has pT (like pH ) is 7.60. Find out the pT of a solution prepared by adding 10 ml of 0.2 M TCl to 15 ml of 0.20 M NaOT . (Given $\log 2=0.30$ )

Report your answer by multiplying actual answer with 100 .
6. Consider following statements :
(I) CrO is basic oxide
(II) $\mathrm{Mn}_{2} \mathrm{O}_{7}$ is green oil
(III) $\mathrm{K}_{2} \mathrm{Cr}_{2} \mathrm{O}_{7}$ act as oxidising agent in basic medium
(IV) Stability $\mathrm{Bi}^{3+}>\mathrm{Bi}^{5+}$
(V) Aqua regia is mixture of conc. HCl and conc. $\mathrm{HNO}_{3}$ in $3: 1$ molar
(VI) Common oxidation state of lanthanides is +3
(VII) Highest oxidation state shown by actinides is +7

Number of correct statements is.
7. Number of correct statements among following is.
(I) Barium salt imparts apple green colour to oxidising flame
(II) In Mac-Arthur Forest cyanide process Zn act as reducing agent
(III) $\mathrm{K}_{2} \mathrm{CO}_{3}$ cannot be prepared by Solvay soda process
(IV) $\mathrm{Fe}(\mathrm{CO})_{5}$ is diamagnetic and having trigonal bipyramidal geometry
(V) $\left[\mathrm{Co}\left(\mathrm{H}_{2} \mathrm{O}\right)_{3} \mathrm{~F}_{3}\right]$ is high spin complex
(VI) $\mathrm{EA}_{1}: \mathrm{F}>\mathrm{Cl}>\mathrm{Br}>\mathrm{I}$
(VII) Bond energy: $\mathrm{Cl}_{2}>\mathrm{F}_{2}>\mathrm{Br}_{2}>\mathrm{I}_{2}$
8. Which of the following reaction(s) can produce
 as one of the product?
(i)

(ii)

(iii)

(iv)

(v)

9. Which of the following reaction is showing correct major product :
(i)

(ii)

(iii)

(iv)

(v)

10. In how many of the following reactions phenol will be one of the products?
(i)

(ii)

(iii) $\mathrm{O}_{2}$
(iv) $\mathrm{H}_{3}^{\oplus} \mathrm{O}$
(iii)

(iv)

(v)

(vi)


## PART-3 : MATHEMATICS

## SECTION-I (i) : (Maximum Marks: 12)

- This section contains FOUR (04) questions.
- Each question has FOUR options (A), (B), (C) and (D). ONLY ONE of these four options is the correct answer.
- For each question, choose the option corresponding to the correct answer.
- Answer to each question will be evaluated according to the following marking scheme :

Full Marks : +3 If ONLY the correct option is chosen.
Zero Marks : 0 If none of the options is chosen (i.e. the question is unanswered)
Negative Marks : -1 In all other cases

1. If $z_{1}, z_{2} \& z_{3}$ are three complex numbers with modulus $2,3 \& 4$ respectively and if $\left|z_{1}+z_{2}+z_{3}\right|=5$, then $\left|4 z_{2} z_{3}+9 z_{3} z_{1}+16 z_{1} z_{2}\right|$ is -
(A) 24
(B) 60
(C) 120
(D) 240
2. If $z$ is a complex number such that $z+i|z|=i \bar{z}+1$, then $|z|$ is -
(A) 4
(B) 2
(C) 1
(D) 0
3. The x -intercept of the plane which is passing through the intersection of the planes $x+2 y+3 z+5=0$ and $2 x-3 y+7 z+1=0$ and parallel to line $\vec{r}=\hat{i}+2 \hat{j}+\lambda(8 \hat{i}-7 \hat{j}-4 \hat{k})$, is -
(A) $\frac{13}{5}$
(B) $-\frac{7}{5}$
(C) $\frac{6}{5}$
(D) $-\frac{9}{5}$
4. Equation of the plane passing through line of intersection of the planes $2 x-4 y+3 z=5$ and $x+2 y+z=4$ and perpendicular to the plane $2 x-y+z=4$ is -
(A) $-9 x+26 y+8 z+39=0$
(B) $9 x+26 y+8 z-39=0$
(C) $9 x-26 y-8 z-39=0$
(D) $9 x+26 y+8 z+39=0$

## SECTION-I (ii) : (Maximum Marks: 12)

- This section contains THREE (03) questions.
- Each question has FOUR options. ONE OR MORE THAN ONE of these four option(s) is (are) correct answer(s).
- For each question, choose the option(s) corresponding to (all ) the 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 Marks : $0 \quad$ If none of the options is chosen (i.e. the question is unanswered).
Negative Marks : -2 In all other cases.

- For Example : If first, third and fourth are the ONLY three correct options for a question with second option being an incorrect option; selecting only all the three correct options will result in +4 marks. Selecting only two of the three correct options (e.g. the first and fourth options), without selecting any incorrect option (second option in this case), will result in +2 marks. Selecting only one of the three correct options (either first or third or fourth option), without selecting any incorrect option (second option in this case), will result in +1 marks. Selecting any incorrect option(s) (second option in this case), with or without selection of any correct option(s) will result in -2 marks.

5. If $A=\left[\begin{array}{ll}1 & 2 \\ 2 & 1\end{array}\right] \& A^{n}=\left[\begin{array}{ll}a & b \\ c & d\end{array}\right]$, (where $\left.n \geq 2 \& n \in N\right)$, then -
(A) $\mathrm{a}=\mathrm{d}$
(B) $\mathrm{b}=\mathrm{c}$
(C) $\mathrm{b}=\mathrm{a}+1$ if n is odd
(D) $b=a-1$ if $n$ is even
6. $\lim _{\mathrm{n} \rightarrow \infty} \sum_{\mathrm{i}=1}^{\mathrm{n}} \frac{\mathrm{i}}{\mathrm{n}^{2}+\mathrm{i}^{2}}$ is equal to -
(A) $\frac{1}{4}-\ln 2$
(B) $\frac{1}{2}-\ln 2$
(C) $\ln \sqrt{2}$
(D) $\frac{1}{2} \ln 2$
7. System of equation $x+y+a z=b, 2 x+3 y=2 a \& 3 x+4 y+a^{2} z=a b+2$ has
(A) unique solution when $a \neq 0, b \in R$
(B) no solution when $\mathrm{a}=0, \mathrm{~b}=1$
(C) infinite solution when $\mathrm{a}=0, \mathrm{~b}=2$
(D) infinite solution when $a=1, b \in R$

## SECTION-II (i) : (Maximum Marks: 12)

- This section contains TWO (02) paragraphs.
- Based on each paragraph, There are TWO (02) questions.
- The answer to each question is a NUMERICAL VALUE.
- For each question, enter the correct numerical value corresponding to the answer in the designated place.
- If the numerical value has more than two decimal places, truncate/round-off the value to TWO decimal places.
- Answer to each question will be evaluated according to the following marking scheme:

Full Marks : +3 If ONLY the correct numerical value is entered at the designated place;
Zero Marks : 0 In all other cases.

## Paragraph for Questions 1 and 2

Let bag 'A' contains 2 Red \& 3 Green balls \& bag 'B' contains 3 Red \& 2 Green balls. If two balls are drawn randomly from each of bag $\mathrm{A} \& \mathrm{~B}$ and then put in empty bag C .

1. Probability that bag C contains 3 Red balls, is -
2. If it is found that bag $C$ contains equal number of Red and Green balls, then probability that 2 Red balls were drawn from bag $B$, is -

## Paragraph for Questions 3 and 4

There are 5 boys and 5 girls.
3. If they are seated in a straight line, then the number of ways in which all boys and all girls are together is $\lambda(5!5!)$, then the value of $\lambda$ is -
4. Number of ways in which they can be divided into two groups, if first group contains 2 boys \& 3 girls, second group contains 3 boys and 2 girls is -

## SECTION-II (ii) : (Maximum Marks: 24)

- This section contains SIX (06) questions.
- The answer to each question is a NON-NEGATIVE INTEGER
- For each question, enter the correct integer value of the answer in the place designated to enter the answer.
- For each question, marks will be awarded in one of the following categories :

Full Marks : +4 If only the correct answer is given.
Zero Marks : $0 \quad$ In all other cases
5. Consider the curves $C_{1}:|z-2|=2+\operatorname{Re}(z)$ and $C_{2}:|z|=3$ (where $z=x+i y, x, y \in R$ and $i=\sqrt{-1}$ ). They intersect at P and Q in the first and fourth quadrants respectively. Tangents to $\mathrm{C}_{1}$ at P and Q intersect the $x$-axis at $R$ and tangents to $C_{2}$ at $P$ and $Q$ intersect the $x$-axis at $S$. If area of $\triangle P R S$ is $\lambda \sqrt{2}$ sq.units, then $\left(\lambda^{2}\right)$ is
6. A plane passes point $\mathrm{P}(0,1,-1)$ and contains a line $\mathrm{L}: \frac{\mathrm{x}-1}{2}=\frac{\mathrm{y}-1}{3}=\frac{\mathrm{z}+2}{1}$. If R is a point on line $L$ such that $\triangle P Q R$ is right angled at $P$, where $Q(1,1,-2)$, then the value of $[P R]$ is (where [.] denotes greatest integer function)
7. If the ratio of $2^{\text {nd }}$ to $3^{\text {rd }}$ term in the expansion of $(x+y)^{n}$ is equal to the ratio of $3^{\text {rd }}$ to $4^{\text {th }}$ term in the expansion of $(x+y)^{n+3}$, then $n$ is equal to
8. If the function $f(x)=\sin ^{3} x+\operatorname{msin}^{2} x$ has exactly one point of local minima and one point of local maxima in $x \in\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$, then number of possible integral values of ' $m$ ' is
9. Images of circle $C: x^{2}+y^{2}-8 x-10 y+16=0$ are taken in variable line $(\lambda+1) x+(1-2 \lambda) y+\lambda=2$ $\forall \lambda \in R$. If locus of centre of there images intersects circle ' $C$ ' at $A$ and $B$, then $\frac{A B}{\sqrt{3}}$, is
10. If the vectors $\overrightarrow{\mathrm{PQ}}=-4 \hat{i}+5 \hat{k}$ and $\overrightarrow{\mathrm{PR}}=3 \hat{i}-\lambda \hat{j}+\hat{k}$ (where $\lambda>0$ are the sides of a $\Delta \mathrm{PQR}$ ). Length of median through P is $\sqrt{24}$ and length of the side QR is $\sqrt{\mathrm{k}}$, then sum of digits of k is

