

PART 1 : PHYSICS

SECTION-I : (Maximum Marks: 80)

This section contains 20 questions. Each question has 4 options for correct answer. Multiple-Choice Questions (MCQs) Only one option is correct. For each question, marks will be awarded as follows:

Full Marks : +4 If correct answer is selected.

Zero Marks : 0 If none of the option is selected.

Negative Marks : -1 If wrong option is selected.

1. Two balls having mass 2 kg and 3 kg are approaching each other with velocities 3m/s and 2 m/s respectively on the horizontal frictionless surface. They undergo a head on elastic collision. Find out the maximum potential energy of deformation.

- (A) zero
- (B) 12.5 J
- (C) 15 J
- (D) none of these

2. Choose the incorrect statement for the system

- (A) The net momentum of the system, in the centre of mass frame will be zero
- (B) The kinetic energy of the system in center of mass frame will be minimum
- (C) In the presence of non-zero impulsive external force for the system, we cannot conserve the momentum of the system.
- (D) In the presence of non-zero external force for the system, it might not be possible to conserve the mechanical energy.

3. A transverse sinusoidal wave moves along a string in the positive x direction. In figure (I) displacement of particle at P as a function of time is given and in figure (II) at a particular time t, the snap shot of wave is shown. The wave velocity (cm/s) and velocity of particle at P (cm/s) will be :

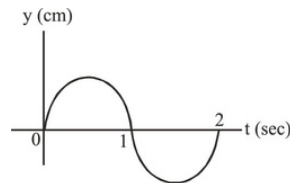


Figure-I

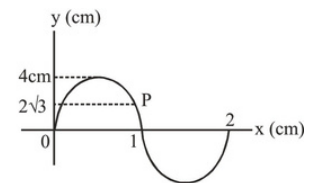
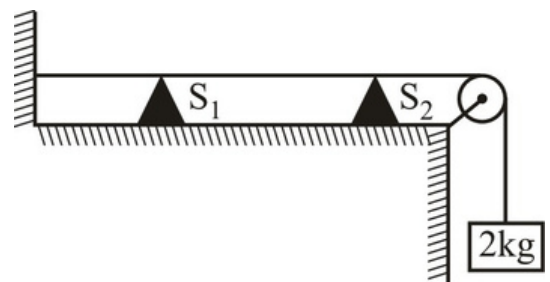


Figure-II

- (A) $1\hat{i}^{\wedge}, -3\pi\hat{j}^{\wedge}$
- (B) $1\hat{i}^{\wedge}, 3\pi\hat{j}^{\wedge}$
- (C) $1\hat{i}^{\wedge}, 2\pi\hat{j}^{\wedge}$
- (D) $-1\hat{i}^{\wedge}, -2\pi\hat{j}^{\wedge}$

4. A sonometer wire vibrates with tuning fork of frequency 400 Hz. When the support S2 of sonometer wire is moved by a distance of 25cm, it again resonates with the given tuning fork. If mass of 2 kg was suspended by the wire find mass per unit length of wire : (There is no resonance in between)



- (A) 0.5 gm/m
- (B) 1 gm/m
- (C) 1.5 gm/m
- (D) 2 gm/m

5. Four tuning forks of frequencies 200, 201, 204 and 206 Hz are sounded together. The beat frequency will be -

- (A) 6
- (B) 12
- (C) 15
- (D) None of these

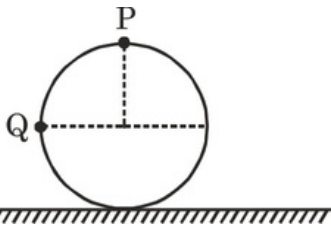
6. A train moving at a speed of 220 ms^{-1} towards a stationary man, emits a sound of frequency 1000 Hz . The frequency of the sound detected by the man (speed of sound in air is 330 ms^{-1})

- (A) 5000 Hz (B) 3000 Hz
 (C) 3500 Hz (D) 4000 Hz

7. A closed organ pipe and an open organ pipe have their first overtones identical in frequency. Their length are in the ratio :

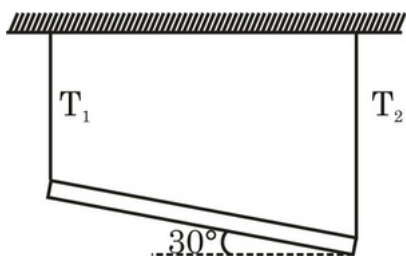
- (A) $1 : 2$ (B) $2 : 3$
 (C) $3 : 4$ (D) $4 : 5$

8. A ball is rolling on the ground. The ratio of speed at P and speed at Q is:



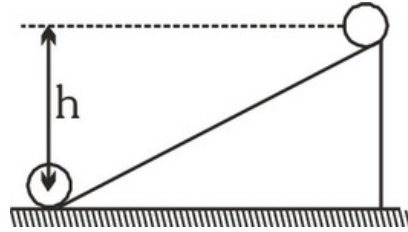
- (A) $2 : \sqrt{2}$
 (B) $2 : 1$
 (C) $2\sqrt{2} : 1$
 (D) $1 : 2$

9. A uniform rod of mass m and length l is connected with two ideal strings from ends of rod as shown in figure, if tensions in strings are T_1 & T_2 respectively then :-



- (A) $T_1 > \frac{mg}{2}$
 (B) $T_2 > \frac{mg}{2}$
 (C) $T_1 < \frac{mg}{2}$
 (D) $T_1 = T_2 = \frac{mg}{2}$

10. A ring of mass M and radius R is at rest at the top of an incline as shown. The ring rolls down the plane without slipping. When the ring reaches bottom, its angular momentum about its center of mass is:

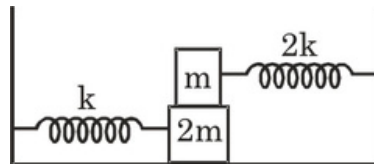


- (A) $MR\sqrt{gh}$
 (B) $MR\frac{\sqrt{gh}}{2}$
 (C) $MR\sqrt{2gh}$

(D) None of these A particle executes a simple harmonic motion of time period T . The time taken by the particle from its mean position to half the amplitude will be :-

- (A) $\frac{T}{4}$ (B) $\frac{T}{8}$
 (C) $\frac{T}{12}$ (D) $\frac{3T}{4}$

12. In the shown arrangement, the coefficient of friction between the blocks is μ and no friction between ground surface and block $2m$. The blocks are displaced slightly and released. They move together without slipping on each other. The time period will be :-



- (A) $2\pi\sqrt{\frac{m}{k}}$
 (B) $2\pi\sqrt{\frac{3m}{2k}}$
 (C) $2\pi\sqrt{\frac{2m}{3k}}$
 (D) $2\pi\sqrt{\frac{9m}{2k}}$

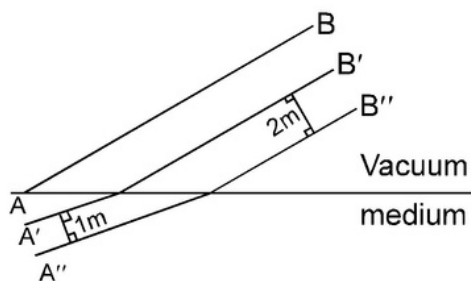
13. The intensity of light from a source is $\frac{\pi}{2}(500)W/m^2$. Find the amplitude of electric field in this wave.

- (A) $\sqrt{3} \times 10^2 N/C$
 (B) $2\sqrt{3} \times 10^2 N/C$
 (C) $\frac{\sqrt{3}}{2} \times 10^2 N/C$
 (D) $2\sqrt{3} \times 10^1 N/C$

14. A plane electromagnetic wave travelling along the X-direction has a wavelength of 3mm. The variation in the electric field occurs in the Y-direction with an amplitude $66Vm^{-1}$. The equation for the electric and magnetic fields as a function of x and t are respectively.

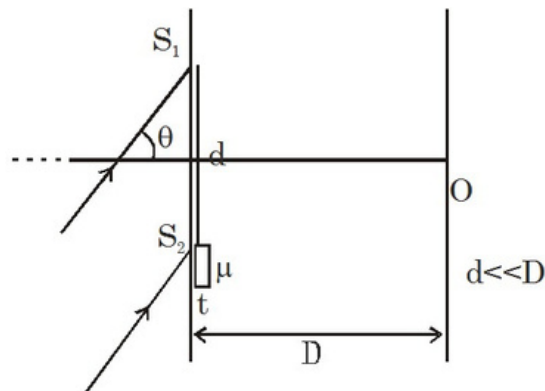
- (A) $E = 33 \cos \frac{\pi}{c} \times 10^{11} (t-x)$; $B = 1.1 \times 10^{-7} \cos \frac{\pi}{c} \times 10^{11} (t-x)$
 (B) $E = 11 \cos 2 \frac{\pi}{c} \times 10^{11} (t-x)$; $B = 1.1 \times 10^{-7} \cos 2 \frac{\pi}{c} \times 10^{11} (t-x)$
 (C) $E_x = 33 \cos \frac{\pi}{c} \times 10^{11} (t-x)$; $B = 1.1 \times 10^{-7} \cos \frac{\pi}{c} \times 10^{11} (t-x)$
 (D) $E_y = 66 \cos 2 \frac{\pi}{c} \times 10^{11} (t-x)$; $B = 2.2 \times 10^{-7} \cos 2 \frac{\pi}{c} \times 10^{11} (t-x)$

15. Certain plane wavefronts are shown in figure. The refractive index of medium is



- (A) 2 (B) 4 (C) 1.5
 (D) Cannot be determined

16. A monochromatic beam of light falls on Young's double slit experiment apparatus as shown in figure. A thin sheet of glass is inserted in front of lower slit S₂. ($\lambda = 600$ nm is wavelength of light in vacuum). If zeroth order bright fringe (corresponding to zero phase difference) is obtained on screen at O, then



- (A) $(\mu - 1)t = d \sin \theta$
 (B) $(\mu - 1)t = d \cos \theta$
 (C) $\mu t = d \theta$
 (D) $\frac{t}{\mu - 1} = \frac{d}{\sin \theta}$

17. The β rays which are emitted from a radioactive material are :-

- (A) electro - magnetic radiations
 (B) orbital electrons
 (C) electrons or positrons emitted by a nucleons
 (D) neutral particle emitted by nucleons

18. Two particles of mass m and 2m moving in opposite direction collide head on. They have same de-Broglie wavelength before collision. After the collision :-

- (A) If $e = 1$, de-Broglie wavelength of m is greater than that of 2m.
 (B) If $e = 1$, de-Broglie wavelength of 2m is greater than that of m.
 (C) The de-Broglie wavelength of m increases if $e = 1$.
 (D) The de-Broglie wavelength of 2m remains same if $e = 1$.

19. The binding energies of the nuclei of ${}^4_2\text{He}$, ${}^7_3\text{Li}$, ${}^{12}_6\text{C}$ & ${}^{14}_7\text{N}$ are 28, 52, 90, 98 MeV respectively. Which of these is most stable.

- (A) ${}^4_2\text{He}$ (B) ${}^7_3\text{Li}$
 (C) ${}^{12}_6\text{C}$ (D) ${}^{14}_7\text{N}$

20. For photoelectric emission from certain metal the cut-off frequency is ν . If radiation of frequency 2ν impinges on the metal plate, the maximum possible velocity of the emitted electron will be (m is the electron mass):

- (A) $2\sqrt{\frac{h\nu}{m}}$ (B) $\sqrt{\frac{h\nu}{2m}}$
 (C) $\sqrt{\frac{h\nu}{m}}$ (D) $\sqrt{\frac{2h\nu}{m}}$

SECTION-II : (Maximum Marks: 20)

This section contains 05 questions.

The answer to each question is a Numerical Value.

For each question, enter the correct integer value (In case of non-integer value, the answer should be rounded off to the nearest Integer).

Answer to each question will be evaluated according to the following marking scheme:

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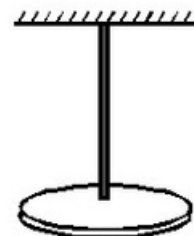
1. The minimum energy of an incident electron necessary for ionization of atom of hydrogen is equal to W_0 . Find minimum initial energy W ($= \alpha W_0$) of singly ionized incident helium atom, necessary for ionization of stationary hydrogen atom. Write the value of α in OMR sheet.

2. The work functions of Silver and sodium are 4.6 and 2.3 eV, respectively. The ratio of the slope of the stopping potential versus frequency plot for Silver to that of Sodium is.

3. One slit of a Young's experiment is covered by a glass plate ($\mu_1 = 1.4$) and the other by another glass plate ($\mu_2 = 1.7$) of the same thickness. The point of central maxima on the screen, before the plates were introduced is now occupied by the third bright fringe. Find the thickness of the plates (in μm), the wavelength of light used is 4000 \AA .

4. A sound level meter placed in front of the loudspeaker of a 60W and audio system reads 70dB. All else being equal, when placed in front of 120W system, the meter will read ('x' in dB). Write $\frac{x+7}{10}$ as your answer. (x is in nearest integer and $\log_{10} 2 = 0.30$).

5. A circular disc suspended from a torsional wire, oscillates with a time period T when twisted by a small angle θ from equilibrium and released.



If another disc of same material but twice the radius and one fourth thickness is made to oscillate (alone) with same wire, its time period is found to be nT . Write the value of n .

PART 2 : CHEMISTRY

SECTION-I : (Maximum Marks: 80)

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1. The pH range of most suitable indicator which should be used for titration of NaX (0.1 M, 10 ml) with 0.1 M HCl should be (K_b of $X^- = 10^{-6}$)

(A) 2 to 3

(B) 3 to 5

(C) 6 to 8

(D) 8 to 10

2. Phenol is heated with chloroform and alcoholic KOH when salicylaldehyde is produced. This reaction is known as

(A) Friedel-Crafts reaction

(B) Reimer-Tiemann reaction (C) Rosenmund reaction

(D) Perkin reaction

3. When phenyl magnesium bromide reacts with tertiary butanol, the product formed will be :

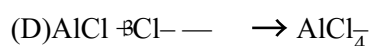
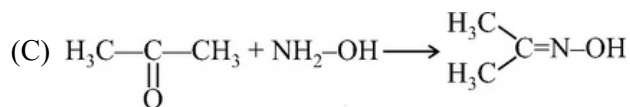
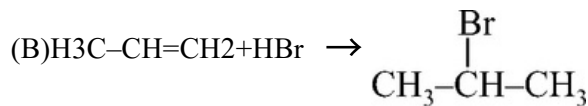
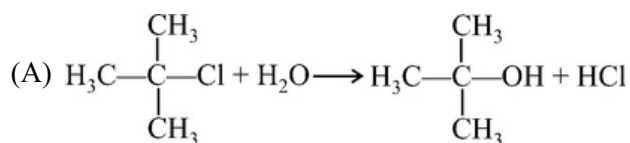
(A) Phenol

(B) Benzene

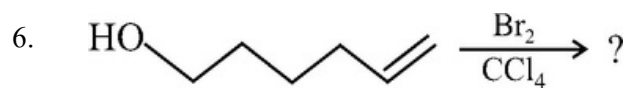
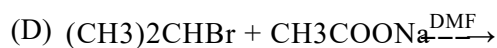
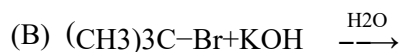
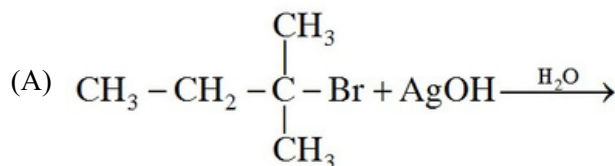
(C) Tertiary butyl phenyl ether

(D) tertiary butyl benzene

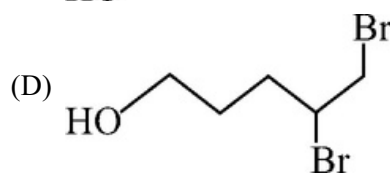
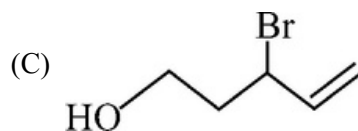
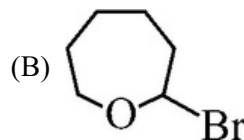
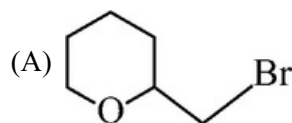
4. In which reaction Ist compound acts as nucleophile ?



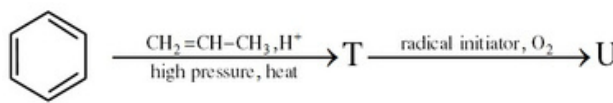
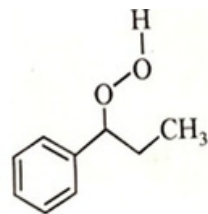
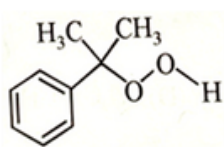
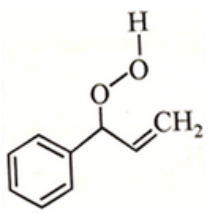
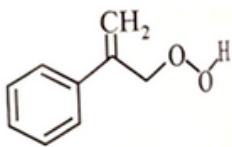
5. Which of the following reaction is expected to take place by SN2 mechanism ?



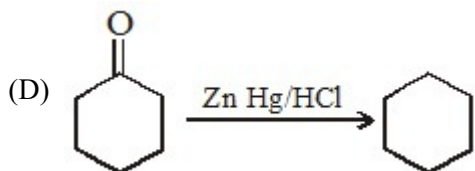
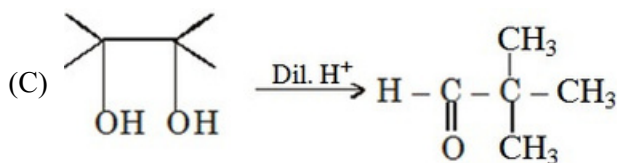
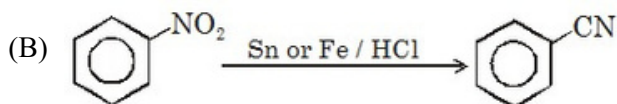
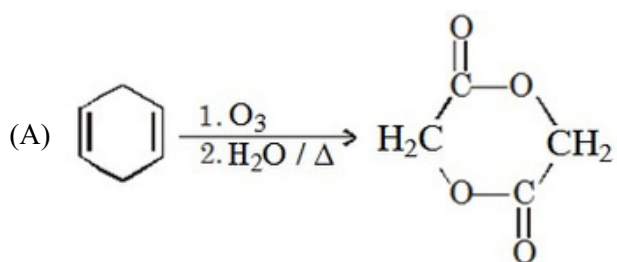
Major product of above reaction is :



7. When 1 mol of a real gas absorbs 100 kJ heat at constant pressure of 10 bar, its volume changes from 2L to 2.5 L. What is the internal energy change for the real gas-
- (A) 150 kJ (B) 100 kJ
(C) 99.5 kJ (D) 100.5 kJ
8. Enthalpy of hydrogenation of one mol benzene to cyclohexane is :
Given : Resonance energy of benzene = - 70 kJ/mol
Enthalpy of hydrogenation of cyclohexene = - 100 kJ/mol
- (A) -170 kJ mol⁻¹ (B) -30 kJ mol⁻¹
(C) -370 kJ mol⁻¹ (D) -230 kJ mol⁻¹
9. When one mole of an ideal gas is compressed to half to its initial volume & simultaneously heated to twice its initial temperature. The change in entropy (ΔS) is :
- (A) $C_v \ln 2$ (B) $C_p \ln 2$
(C) $R \ln 2$ (D) $(C_v - R) \ln 2$
10. Assume that the decomposition of HNO₃ is
 $4\text{HNO}_3(\text{g}) \rightleftharpoons 4\text{NO}_2(\text{g}) + 2\text{H}_2\text{O}(\text{g}) + \text{O}_2(\text{g})$
and the reaction approaches equilibrium at 400K & 30 atm pressure. At equilibrium the partial pressure of HNO₃ is 2atm. Find KC at 400 K
($R = 0.08 \text{ l - atm/K - mol}$)
- (A) 4 (B) 8 (C) 16 (D) 32
11. $\text{SO}_2(\text{g}) + \text{Cl}_2(\text{g}) \rightleftharpoons \text{SO}_2\text{Cl}_2(\text{g})$
Backward reaction is endothermic. If some quantity of Cl₂ is added keeping volume of container constant which of the following statement is correct.
- (A) No effect on instantaneous pressure of container
(B) Temp of container will increase
(C) Temp of container will decrease
(D) No effect on temperature of container

12. A certain weak acid has $K = 1 \times 10^{-4}$. Calculate the equilibrium constant for its reaction with strong base -
- (A) 106 (B) 108
(C) 1010 (D) 10-10
13. The compound which undergo nucleophilic substitution fastest would be :
- (A) CH₃CH₂CONH₂ (B) CH₃CH₂COOCH₃
(C) CH₃CH₂COCl (D) CH₃CH₂COCH₃
14. The major product U in the following reactions is:
- 
- (A) 
- (B) 
- (C) 
- (D) 
15. In the following sequence of reactions 'Z' will be :
- $\text{CH}_3\text{CH}_2\text{OH} \xrightarrow{\text{KMnO}_4} (\text{X}) \xrightarrow[\text{(ii) NH}_3]{\text{(i) SOCl}_2} (\text{Y}) \xrightarrow{\text{Br}_2/\text{NaOH}} (\text{Z})$
- (A) Acetic acid (B) Acetone
(C) Methyl amine (D) Ethyl amine

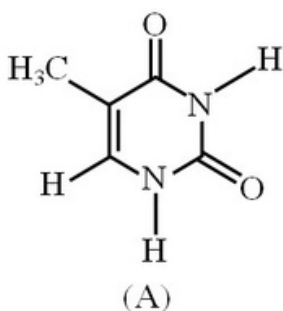
16. Reaction correctly matched with major product :



17. Which of the following term is not applicable for Glucose–galactose pair?

- (A) Isomer
- (B) Epimer
- (C) Anomer
- (D) Stereoisomer

18.

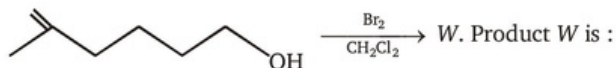


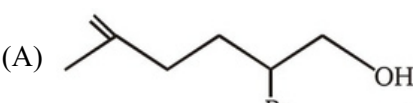
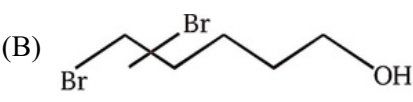
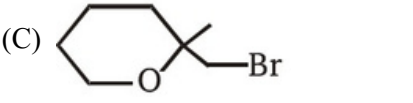
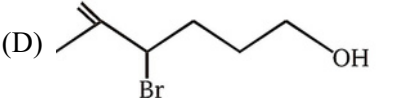
The compound 'A' is a complementary base of _____ in DNA stands.

- (A) Uracil
- (B) Guanine
- (C) Adenine
- (D) Cytosine

19. Which one of the following statements is not true about enzymes ?

- (A) Enzymes are non-specific for a reaction and substrate.
- (B) Almost all enzymes are proteins.
- (C) Enzymes work as catalysts by lowering the activation energy of a biochemical reaction.
- (D) The action of enzymes is temperature and pH specific

20.  W. Product W is :

- (A) 
- (B) 
- (C) 
- (D) 

SECTION-II : (Maximum Marks: 20)

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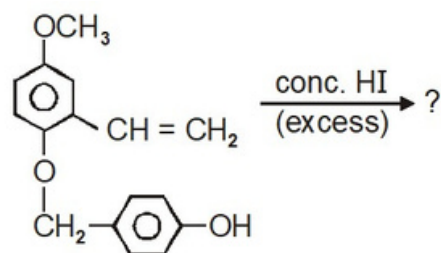
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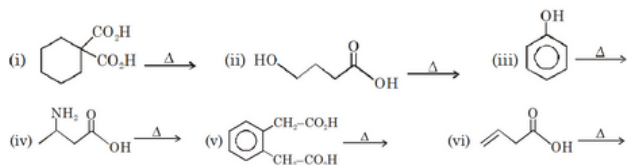
1. Total moles of HI consumed to complete the reaction :

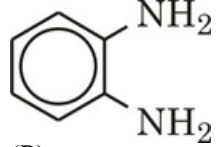


2. The number of possible enantiomers (pairs) can be produced during monochlorination of 2-methyl butane is

3. A system undergoes a process in which $\Delta U = +300\text{J}$, while absorbing 400J of heat energy and undergoing an expansion against 0.5 bar . What is the change in volume (in L)

4. Number of reactions giving either decarboxylation or dehydration or both on heating :



5.  $\xrightarrow[\text{HCl}]{\text{NaNO}_2}$ Major organic product

(P)

Find the total number of π electron in cyclic conjugation

Fill your answer as sum of digits (excluding decimal places) till you get the single digit answer.

PART 3 : MATHEMATICS

SECTION-I : (Maximum Marks: 80)

This section contains 20 questions. Each question has 4 options for correct answer. Multiple-Choice Questions (MCQs) Only one option is correct. For each question, marks will be awarded as follows:

Full Marks : +4 If correct answer is selected.

Zero Marks : 0 If none of the option is selected.

Negative Marks : -1 If wrong option is selected.

1. If, $\int \frac{x+\cos 2x+1}{x \cos^2 x} dx = f(x) + K. \ln|x| + C$

Where $f(\frac{\pi}{4})=1$, then $f(0) + 10K$ is equal to

- (A) 0 (B) 10 (C) 20 (D) 21

2. $\int e^{\tan^{-1}x} (1+x+x^2) d(\cot^{-1}x)$ is equal to

- (A) $e^{\tan^{-1}x} + c$
 (B) $e^{\tan^{-1}x} + c$
 (C) $-x e^{\tan^{-1}x} + c$
 (D) $x e^{\tan^{-1}x} + c$

3. $\lim_{n \rightarrow \infty} (1 - \frac{1}{n^2} \sec^2 \frac{1}{n^2} + \frac{2}{n^2} \sec \frac{1}{n^2} - \frac{24}{n^2} + \dots + \frac{1}{n^2} \sec 21)$ equals to:

- (A) $\frac{1}{2} \tan 1$ (B) $\tan 1$
 (C) $\frac{1}{2} \operatorname{cosec} 1$ (D) $\frac{1}{2} \sec 1$

4. The solution of the differential equation $\frac{dy}{dx} = -\frac{x^2+3y^2}{3x^2+y^2}$, $y(1) = 0$ is

- (A) $\log_e |x+y| \frac{xy}{(x+y)^2} = 0$
 (B) $\log_e |x+y| \frac{xy}{(x+y)^2} = 0$
 (C) $\log_e |x+y| \frac{2xy}{(x+y)^2} = 0$
 (D) $\log_e |x+y| \frac{2xy}{(x+y)^2} = 0$

5. The value of the integral $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \frac{x + \frac{\pi}{4}}{2 - \cos 2x} dx$ is :

- (A) $\frac{\pi^2}{6}$ (B) $\frac{\pi^2}{12\sqrt{3}}$
 (C) $\frac{\pi^2}{3\sqrt{3}}$ (D) $\frac{\pi^2}{6\sqrt{3}}$

6. The area bounded by the curves $y=x(x-3)^2$ and $y=x$ is (in sq. units)

- (A) 28 (B) 32
 (C) 4 (D) 8

7. Area enclosed by the curve $y=f(x)$ defined parametrically as $x=1-\frac{t}{1+t^2}, y=\frac{2t}{1+t^2}$ is equal to

- (A) π sq. units (B) $\frac{\pi}{2}$ sq. units
 (C) $\frac{3\pi}{4}$ sq. units (D) $\frac{3\pi}{2}$ sq. units

8. The angle between the line $\frac{x-2}{2} = \frac{y+1}{-1} = \frac{z-3}{2}$ and the plane $3x + 6y - 2z + 5 = 0$ is

- (A) $\cos^{-1}(\frac{4}{21})$ (B) $\tan^{-1}(\frac{21}{4})$
 (C) $\sin^{-1}(\frac{6}{21})$ (D) $\sin^{-1}(\frac{4}{21})$

9. If the vectors $\vec{AB}=3\hat{i}+4\hat{k}$ and $\vec{AC}=5\hat{i}-2\hat{j}+4\hat{k}$ are the sides of a triangle ABC, then the length of the median through A is

- (A) $\sqrt{18}$ (B) $\sqrt{72}$
 (C) $\sqrt{33}$ (D) $\sqrt{45}$

10. Let \vec{a}, \vec{b} and \vec{c} be three non-zero vectors, non two of which are collinear. If the vector $\vec{a}+2\vec{b}$ is collinear with \vec{c} and $\vec{b}+3\vec{c}$ is collinear with \vec{a} , then $\vec{a} + \vec{b} + \vec{c}$ is equal to

- (A) $\lambda \vec{a}$ (B) $\lambda \vec{c}$
 (C) $\lambda \vec{c}$ (D) $\vec{0}$

11. A unit vector perpendicular to the plane of $\vec{a} = 2\hat{i} - 6\hat{j} - 3\hat{k}$, $\vec{b} = 4\hat{i} + 3\hat{j} - \hat{k}$ is
- (A) $\frac{4\hat{i} + 3\hat{j} - \hat{k}}{\sqrt{26}}$
 (B) $\frac{2\hat{i} - 6\hat{j} - 3\hat{k}}{7}$
 (C) $\frac{3\hat{i} - 2\hat{j} + 6\hat{k}}{7}$
 (D) $\frac{2\hat{i} - 3\hat{j} - 6\hat{k}}{7}$
12. The distance of the point (1, -2, 3) from the plane $x - y + z = 5$ measured parallel to a line, whose direction ratios are 2, 3, -6 is :
- (A) 3 (B) 5
 (C) 2 (D) 1
13. In a ΔABC , $A : B : C = 3 : 5 : 4$. Then $[a+b+c\sqrt{2}]$ is equal to
- (A) 2b
 (B) 2c
 (C) 3b
 (D) 3a
14. If in a triangle ABC,
- $$\frac{2 \cos A + \cos B + 2 \cos C}{a} = \frac{a+b}{bc} + \frac{b}{ac}$$
- Then the value of $\angle A =$
- (A) 90°
 (B) 60°
 (C) 30°
 (D) None of these
15. The equation of the circle passing through the point (-1, -3) and touching the line $4x + 3y - 12 = 0$ at the point (3, 0) is :-
- (A) $x^2 + y^2 - 2x + 3y - 3 = 0$
 (B) $x^2 + y^2 + 2x - 3y - 5 = 0$
 (C) $2x^2 + 2y^2 - 2x + 5y - 8 = 0$
 (D) None of these

16. Let $A \equiv (1, 2)$, $B \equiv (3, 4)$ and let $C \equiv (x, y)$ be a point such that $(x - 1)(x - 3) + (y - 2)(y - 4) = 0$. If area (ΔABC) = 1 then maximum number of positions of C in the xy-plane is :-
- (A) 2 (B) 4 (C) 8 (D) 10
17. If one of the diameters of the circle $x^2 + y^2 - 2x - 6y + 6 = 0$ is a chord to the circle with centre (2, 1), then the radius of circle is -
- (A) $\sqrt{3}$ (B) $\sqrt{2}$
 (C) 3 (D) 2
18. If $y = \frac{1}{x}$, then the value of $\frac{dy}{\sqrt{1+y^4}} + \frac{dx}{\sqrt{1+x^4}} + 4$ is equal to -
- (A) 2 (B) 4 (C) 6
 (D) 8
- A function $f''(x) = -1$
19. $y = f(x)$ satisfies $\frac{d}{dx} - \pi 2 \sin(\pi x)$; $f'(2) = \pi + 1$ and $f(1) = 0$. The value of $[f(1)]$ (where $[.]$ represents greatest integer function) is -
- (A) 0
 (B) 1
 (C) 2
 (D) 3
20. Let $f : \mathbb{R} \rightarrow \mathbb{R}$ be a continuously differentiable function such that $f(2) = 6$ and $f'(2) = \frac{1}{48}$. If $\int_6^{f(x)} 4t^3 dt = (x-2)g(x)$, then $\lim_{x \rightarrow 2} g(x)$ is equal to
- (A) 9
 (B) 12
 (C) 18
 (D) 21

SECTION-II : (Maximum Marks: 20)

This section contains 05 questions.

The answer to each question is a Numerical Value.

For each question, enter the correct integer value (In case of non-integer value, the answer should be rounded off to the nearest Integer).

Answer to each question will be evaluated according to the following marking scheme:

Full Marks : +4 If correct answer is entered.

Zero Marks : 0 If the question is unanswered.

Negative Marks : -1 If wrong answer is entered.

1. $\int_{-1}^1 \frac{dx}{(1+x^3+\sqrt{1+x^6})} =$

2. If $y(x)$ is the solution of the differential equation $xy dy - (y^2 - 4y)dx = 0$ for $x > 0$, $y(1) = 2$, and the slope of the curve $y = y(x)$ is never zero, then the value of $10y(\sqrt{-2})$ is _____ .

3. If the foot of the perpendicular drawn from the point $(1, 0, 3)$ on a line passing through $(\alpha, 7, 1)$ is

$(\frac{5-\alpha}{3}, \frac{17}{3}, \frac{\alpha}{3})$, then α is equal to _____

4. Consider a ΔABC whose sides AB, BC and CA are represented by the straight lines $2x + y = 0$, $x + py = q$ and $x - y = 3$, respectively. The point P is $(2, 3)$ is orthocentre then the value of $(p + q)/10$. Let a

5. line having direction ratios $1, -4, 2$ intersect

the lines $\frac{x-7}{3} = \frac{y-1}{-1} = \frac{z+2}{1}$ and

$\frac{x}{2} = \frac{y-7}{3} = \frac{z}{1}$ at the point A and B. Then $(AB)^2$ is equal to _____ .