FIITJEE COMMON TEST

PHYSICS, CHEMISTRY & MATHEMATICS

CODE: 123594

Time Allotted: 3 Hours **Maximum Marks: 240**

- Please read the instructions carefully. You are allotted 5 minutes specifically for this purpose.
- You are not allowed to leave the Examination Hall before the end of the test.

INSTRUCTIONS

Caution: Question Paper CODE as given above MUST be correctly marked in the answer OMR sheet before attempting the paper. Wrong CODE or no CODE will give wrong results.

A. General Instructions

1. Attempt ALL the questions. Answers have to be marked on the OMR sheets.
2. This question paper contains Three Section.
3. **Section-I** is Physics, Section-**II** is Chemistry and Section-**III** is Mathematics.
4. Each section is further divided into three parts: Part-**A , Part-B & Part-C**
5. Rough spaces are provided for rough work inside the question paper. No additional sheets will be provided for rough work.
6. Blank Papers, clip boards, log tables, slide rule, calculator, cellular phones, pagers and electronic devices, in any form, are not allowed.

B. Filling of OMR Sheet

1. Ensure matching of OMR sheet with the Question paper before you start marking your answers on OMR sheet.
2. On the OMR sheet, darken the appropriate bubble with HB pencil for each character of your Enrolment No. and write in ink your Name, Test Centre and other details at the designated places.
3. OMR sheet contains alphabets, numerals & special characters for marking answers.

C. Marking Scheme For All Three Parts.

(i) **Part-A (01 – 8)** contains 8 multiple choice questions which have only one correct answer. Each question carries **+3 marks** for correct answer and **– 1 mark** for wrong answer.

PART – A (**09 – 12)** contains **4** Multiple Choice Questions which have **One or More Correct** answer.
For each question in the group **Q. 09 – 11** of **PART – A** you will be awarded
Full Marks: **+4** If only the bubble(s) corresponding to all the correct options(s) is (are) darkened.
Partial Marks: **+1** For darkening a bubble corresponding **to each correct option,** provided NO incorrect option is darkened.
Zero Marks: **0** If none of the bubbles is darkened. *Negative Marks*: **–1** In all other cases.
For example, if **(A), (C) and (D)** are all the correct options for a question, darkening all these three will result in **+4 marks**; darkening only **(A) and (D)** will result in **+2 marks**; and darkening **(A) and (B)** will result in **–1** marks, as a wrong option is also darkened.

(ii) **Part -B (01 – 02)** contains 2 Matrix Match Type questions containing statements given in 2 columns. Statements in the first column have to be matched with statements in the second column. Each question carries **+8 marks** for all correct answer. For each correct row **+2 marks** will be awarded. No negative marks will be awarded in this section.

(iii) **Part -C (01 – 06)** contains 6 Numerical based questions with single digit integer as answer, ranging from 0 to 9 and each question carries **+4 marks** for correct answer and – 1 mark for wrong answer.

Name of the Candidate: _____

Batch: _____ **Date of Examination:** _____

Enrolment Number: _____

BATCHES – NWCM820X1R-X4R, NWTR820C01,D01,CAMP820, NWCM820G1W, NWCM820X1W - X11W, NWTW820D01-D02, PANINI820-XII G1, PANINI820-XII1 - XII7, PIN820-XII B

Section – I (Physics)

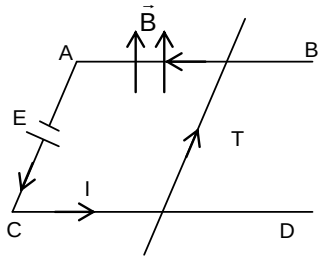
PART – A

(Single Correct Choice Type)

This section contains 8 **multiple choice questions**. Each question has four choices (A), (B), (C) and (D) out of which **ONLY ONE is correct.**

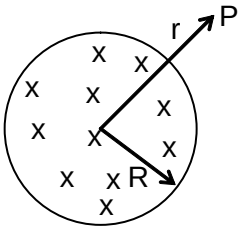
1. A metallic rod falls under gravity with ends pointing in the direction east and west then:
   (A) an e.m.f. is induced in it as it cuts horizontal component of earth'.
   (B) an e.m.f. is induced in it as it cuts vertical component of earth's magnetic field.
   (C) no e.m.f. is induced at all.
   (D) two e.m.f. of equal but opposite signs.

2. AB and CD are smooth, parallel, horizontal rails on which a conductor T can slide. A cell, E, drives current I through the rails and T.
   (A) T will experience a force towards right
   (B) T will experience a force toward left
   (C) T will experience a force upward
   (D) T will not experience any force

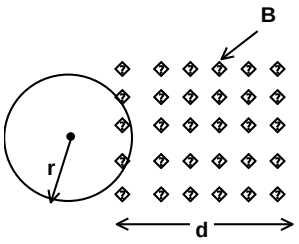


3. In a long straight solenoid with cross – sectional radius a and number of turns per unit length n, the current varies with the rate I A/s. The magnitude of the induced current field strength as a function of distance r from the solenoid axis is
   (A) $\frac{1}{2}\frac{nIa^2}{\mu_0 r}$ (B) $\frac{1}{2}\frac{Ia^2}{\mu_0 r}$ (C) $\frac{nIa^2}{\mu_0 r}$ (D) $\frac{1}{2}\frac{\mu_0 nIa^2}{r}$

4. The uniform but time varying magnetic field B(t) exists in a circular region of radius a and is directed into one of the paper as shown in the figure. The magnitude of the induced electric field at point P at a distance r from the centre of the circular region.
   (A) is zero (B) decreases as 1/r
   (C) increases as r (D) decreases as $1/r^2$

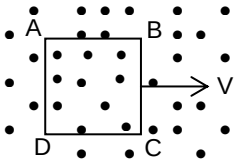


5. A conducting loop is placed is pulled with constant velocity towards a region of constant (steady) magnetic field of induced B as shown in the figure. Then the induced electric field in the loop is (d > r)
   (A) clockwise. (B) anticlockwise
   (C) zero (D) All of these.



space for rough work

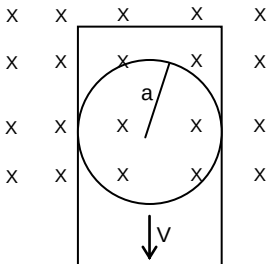
6. A metallic square loop is moving in its own plane with velocity v in a uniform magnetic field perpendicular to its plane as shown in the figure. An electric field is induced



(A) in AD, but not in BC (B) in BC, but not in AD
(C) neither in AD nor in BC (D) in both AD and BC

7. A copper rod of length l is rotated about one end perpendicular to the uniform magnetic field B with constant angular velocity ω. The induced emf between the ends is
(A) $(1/2)B\omega l^2$ (B) $(3/2)B\omega l^2$ (C) $B\omega l^2$ (D) $2B\omega l^2$

8. As situation shown in figure a conducting ring of radius 'a' and resistance 2R in contact with two vertical conducting rails which are joined at the top with wire of resistance R. If the ring falls uniformly with speed V, then current passes through the wire of ring will be



(A) $\frac{2BVa}{3R}$ (B) $\frac{2BVa}{R}$
(C) $\frac{BVa}{3R}$ (D) none of these

(Multi Correct Choice Type)

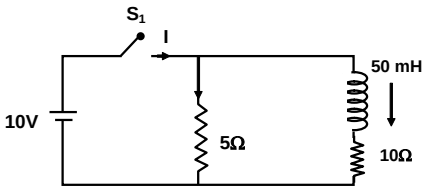
This section contains 4 **multiple choice questions.** Each question has four choices (A), (B), (C) and (D) out of which **ONE OR MORE** may be correct.

9. A circular coil of n turns and radius r is placed in a uniform magnetic field B. Initially the plane of the coil is perpendicular to the field. The coil is rotated through 180° in time T about one of its diameter such that its plane is still perpendicular to the field. If the resistance of the coil is R. Then
(A) the average emf induced in the coil = $\frac{2n\pi r^2B}{T}$
(B) the average current induced in the coil = $\frac{2n\pi r^2B}{RT}$
(C) the charge passing through the coil = $\frac{2n\pi r^2B}{R}$
(D) none of these

10. A conducting circular loop of radius 5.0 cm is placed perpendicular to a magnetic field of 0.50 T. It is removed from the field in 0.5 sec.
(A) The change of magnetic flux = 3.927 m weber.
(B) The change of magnetic flux = 7.854 m weber.
(C) The average emf induced in the loop during this time = 3.927 mV.
(D) The average emf induced in the loop during this time = 7.854 mV.

space for rough work

11. In the given circuit, key S_1 is closed at t = 0, then the current I is



(A) at t = 0, I = 3A
(B) at t = 0, I = 2A
(C) at t = ∞, I = 3A
(D) at t = ∞, I = 2A

12. In an oscillating LC circuit, the maximum charge present on capacitor is Q_0, ω is angular frequency of oscillation. The time at which energy stored in the capacitor is equal to 3 times of energy stored in inductor is (At t = 0, I = 0 in the circuit)

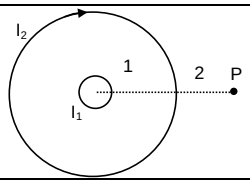
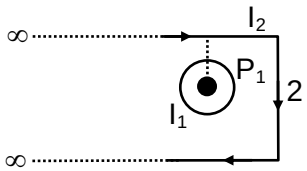
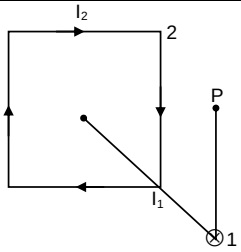
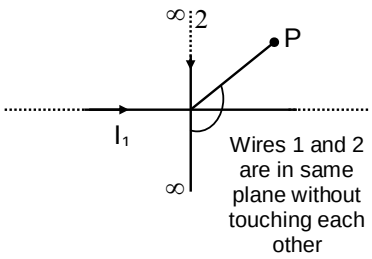
(A) $\frac{\pi}{6\omega}$ (B) $\frac{5\pi}{6\omega}$ (C) $\frac{\pi}{2\omega}$ (D) $\frac{\pi}{3\omega}$

PART – B
(*Matrix Match Type*)

1. Match the Columns:

	Column – I		**Column – II**
(A)	A metallic loop rotating about an axis parallel to the magnetic field.	(P)	Conservation of energy
(B)	Lenz's law explains	(Q)	Direction of magnetic field
(C)	If a current in the loop decrease	(R)	No emf is induced in the loop
(D)	Fleming's rule explains	(S)	Emf is induced in the loop

2. Match the Columns:

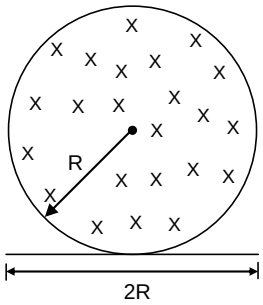
	Column – I		Column – II
(A)		(P)	1 and 2 attract each other
(B)		(Q)	1 and 2 repel each other
(C)		(R)	1 and 2 do not exert any force on each other
(D)	 Wires 1 and 2 are in same plane without touching each other	(S)	Magnetic field at point P due to wires 1 and 2 are perpendicular to each other.
		(T)	Magnetic field at point P due to wires 1 and 2 are in same direction.

space for rough work

PART – C
(Numerical Based)

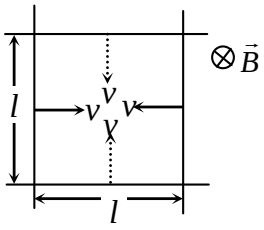
This section contains 06 **multiple choice questions**. The answer to each question is a single digit integer, ranging from 0 to 9 (both inclusive)

1. A uniform but time varying magnetic field is present in a circular region of radius R = 4 m. The magnetic field is perpendicular and into the plane of the paper and the magnitude of the field is increasing at a constant rate $\alpha = \frac{1}{\pi}$ T sec^{-1}. There is a straight conducing rod of length 2R placed as shown in the figure. Find the magnitude of induced emf (in volt) across the rod.

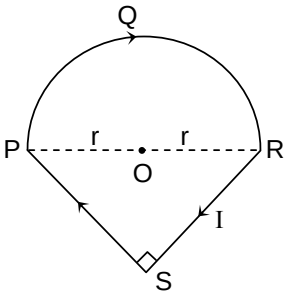


2. A steady current I goes through a wire loop PQR having shape of a right angle triangle with PQ = 3x, PR = 4x and QR = 5x. If the magnitude of the magnetic field at P due to this loop is $k\left(\frac{\mu_0 I}{48\pi x}\right)$, find the value of k.

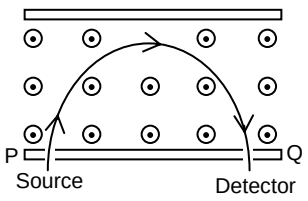
3. In the figure shown the four rods have λ = 0.5 Ω/m resistance per unit length. The arrangement is kept in a magnetic field of constant magnitude B = 0. 2T and directed perpendicular to the plane of the figure and directed inwards. Initially the rods form a square of side length l = 15m as shown. Now each wire starts moving with constant velocity v = 5 m/s towards opposite wire. Find the magnetic force (in newton) at t = 1 sec.



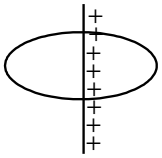
4. A steady current I = 10 A goes through a wire loop PQRS. Part PQR is semi-circle of radius r = 1 m. RS = SP and ∠RSP = 90°. Find the magnetic field at O in 10^{-6}T to the nearest integer.



5. A uniform magnetic field with a slit system as shown in the figure is to be used as a momentum filter for high energy charged particles (enter and exit perpendicular to PQ) . With a field of 1T, it is found that the filter transmits α particle each of energy 2.2 MeV. The magnetic field is increased to 2.13T and deuteron ions are passed into the filter. What is the approximate energy (In MeV) of each deuteron ions transmitted by the filter?



6. A very long uniformly charged rod falls with a constant velocity V = 5 m sec^{-1} through the center of a circular loop of radius R = 2 m. Find the magnitude of induced emf (in volt) in the loop. (charge per unit length of rod = 2 C m^{-1})



space for rough work

Section – II (Chemistry)

PART – A

(Single Correct Choice Type)

This section contains 8 **multiple choice questions**. Each question has four choices (A), (B), (C) and (D) out of which **ONLY ONE is correct.**

1. When SO_2 is passed into $Ba(OH)_2$ solution, a precipitate(P) is first formed, which turns into a new precipitate(Q) when the reaction mixture is exposed to air.
Which of the following is used to distinguish between(P) and (Q)?
(A) colour (B) NaOH
(C) neutral $KMnO_4$ solution (D) HCl

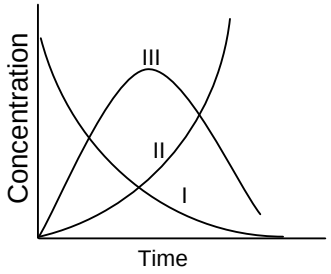
2. The half-life of a zero order reaction is 40 seconds. Then
(A) 75% of the reaction is completed in 80 seconds
(B) 100% of the reaction is completed in 80 seconds
(C) the half life increases on increasing temperature
(D) the rate of reaction is independent of half-life

3. Which of the following substance can form a black spot on silver foil?
(A) Na_2SO_4 (B) Na_2S (C) Na_2SO_3 (D) All are correct

4. $OCl^- + I^- \underset{}{\overset{OH^-}{\rightleftharpoons}} OI^- + Cl^-$
The rate of reaction is expressed as
$$\text{Rate} = \frac{d\left[Cl^-\right]}{dt} = \frac{k\left[OCl^-\right]\left[I^-\right]}{\left[OH^-\right]}$$
In the above reaction OH^- behaves as a/an
(A) catalyst (B) inhibitor (C) accelerator (D) reactant

5. Which of the following salt solution produces a violet colour when treated with conc. H_2SO_4?
(A) KNO_3 (B) KBr (C) KI (D) K_2SO_3

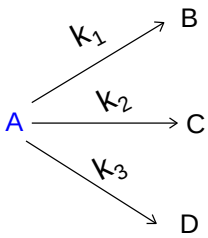
6. $A(g) \xrightarrow{k_1} B(g) \xrightarrow{k_2} C(g)$
The variation of the concentration of A, B and C in the above first order consecutive reaction is given below:



Which of the following curves represent A, B and C if $k_1 > k_2$?
(A) (I = C), (II = A), (III = B) (B) (I = A), (II = C), (III = B)
(C) (I = C), (II = B), (III = A) (D) (I = A), (II = B), (III = C)

space for rough work

7. Which of the following anion cannot decolourize acidified $KMnO_4$ solution, but evolve a gas in the reaction?
(A) SO_3^{2-} (B) CO_3^{2-} (C) NO_2^- (D) S^{2-}

8. 

In the above first order parallel reaction, the rate of formation of B is 40% of the rate of decay of A. Calculate the partial half-life of A if it's overall half life is 30 hour?
(A) 10 hr (B) 75 hr (C) 20 hr (D) 90 hr

(Multi Correct Choice Type)

This section contains 4 **multiple choice questions.** Each question has four choices (A), (B), (C) and (D) out of which **ONE OR MORE** may be correct.

9. With NH_4SCN solution, Fe^{3+} forms a deep-red colouration due to formation of a non-dissociated iron(III) thiocyanate complex, Choose correct statement(s)
(A) The complex is formed by the following reaction

$$6NH_4SCN + FeCl_3 \longrightarrow (NH_4)_3\left[Fe(SCN)_6\right] + 3NH_4Cl$$

(B) Fe^{3+} is bonded with nitrogen atom of the ligand $SCN^-\left(Fe^{3+} \longleftarrow NCS\right)$
(C) This test is used to distinguish between Fe^{3+} and Fe^{2+} ion
(D) Addition of F^- ions results in bleaching of the red colour

10. An aqueous solution contains CO_3^{2-} and HCO_3^- ions. Addition of excess of $CaCl_2$ to the solution, results in the formation of white precipitate(P). After filtration of the solution in order to separate ppt(P), again $CaCl_2$ is added to the filtrate. Under which of the following condition the solution can form the same precipitate again?
(A) Boiling of the solution (B) Addition of HCl
(C) Addition of NH_3 (D) Addition of conc. H_2SO_4

11. I_2 is liberated from iodide(I^-) solution when it is acidified and treated with H_2O_2. The following results are obtained from experiment.

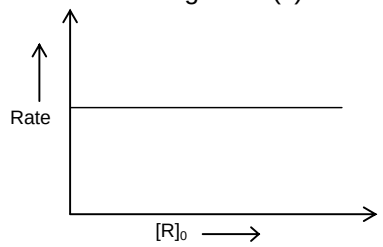
Experiment	$[H_2O_2]_0$ in mol L^{-1}	$[I^-]_0$ in mol L^{-1}	$[H^+]_0$ in mol L^{-1}	Initial rate of formation of I_2 in mol L^{-1} s^- unit
1	0.01	0.01	0.3	2×10^{-6}
2	0.03	0.01	0.3	6×10^{-6}
3	0.03	0.02	0.1	1.2×10^{-5}
4	0.03	0.02	0.2	1.2×10

Which statement(s) is/are correct with respect to the result?
(A) The rate equation of the reaction is
Rate = $k[H_2O_2][I^-]$
(B) The molecularity of the reaction is three
(C) The rate constant is 2×10^{-1} mol^{-2} L^2s^{-1}
(D) The rate is zero order with respect to the acid

space for rough work

12. Which of the following curve(s) is/are correct for zero order reaction?

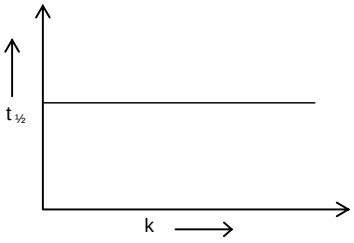
(A)



(B)

(C)

(D)



PART – B
(*Matrix Match Type*)

1. Match the anions mentioned in Column-I with their reactions mentioned in Column-II.

Column – I		Column – II	
(A)	CO_3^{2-}	(P)	Produces gas with dil. HCl
(B)	SO_4^{2-}	(Q)	Forms precipitate with $BaCl_2$
(C)	Cl^-	(R)	Forms red vapour with acidified $K_2Cr_2O_7$ solution
(D)	S^{2-}	(S)	Forms black precipitate with lead acetate solution
		(T)	Confirmed by sodium nitroprusside test

2. Match the characteristic(s) of chemical reactions mentioned in Column-I with their factors and other dependent quantities mentioned in Column-II.

Column – I		Column – II	
(A)	Rate	(P)	Concentration
(B)	Order	(Q)	Temperature
(C)	Activation energy	(R)	Can be negative
(D)	Molecularity	(S)	Catalyst
		(T)	Always positive

PART – C
(Numerical Based)

This section contains 06 **multiple choice questions**. The answer to each question is a single digit integer, ranging from 0 to 9 (both inclusive)

1. Reaction of $Fe(NO_3)_3$ with potassium ferrocyanide $K_4[Fe(CN)_6]$ results in the formation of a blue precipitate(X). If the number of moles of NaOH consumed by one mole of (X) is expressed as (2a + 2), the value of 'a' is

space for rough work

2. The half-life of a second order reaction is 4 min if it is carried out with 0.2 M concentration of reactant. What will be the half-life in min unit if the same reaction is carried out with 0.1 M concentration of the reactant?

3. The nitrate of a 3d-series metal 'M' forms a single white zelatinous precipitate(P) with NaOH. (P) is soluble in dil. HCl as well as in NaOH solution. It can also form the same precipitate with ammonia solution and the precipitate is readily soluble in excess of the reagent due to formation of a complex of M^{2+}. How many maximum number of electrons with $\ell = 2$ and s = +½ are present in metal(M?)

4. $aA(g) \longrightarrow bB(g)$

For the above reaction, $\log\left[\frac{-d[A]}{dt}\right] = \log\left[\frac{d[B]}{dt}\right] + 0.301$. If the ratio of a : b is expressed as x : y, then the value of (x + y) is

5. The sodium salt of the monocarboxylic acid(P) forms a white precipitate(Q) when treated with mercuric chloride. This precipitate turns grey when excess of (P) is added. How many carbon atom(s) is/are present in the acid(P)?

6. The half-life ($t_{½}$) period of a radioactive decay is 3.469 seconds. What is the average life of the radioactive element in second unit?

space for rough work

Section – III (Mathematics)

PART – A

(Single Correct Choice Type)

This section contains 8 **multiple choice questions**. Each question has four choices (A), (B), (C) and (D) out of which **ONLY ONE is correct.**

1. Identify the differential equation in which the degree is 1.

(A) $x - 2y = \ell n\left(\frac{dy}{dx}\right)$ (B) $\frac{dy}{dx} + \left(\frac{dy}{dx}\right)^2 - \sin\left(\frac{dy}{dx}\right) = 3$

(C) $e^{\frac{dy}{dx}} = \ell n\left|\frac{d^2y}{dx^2}\right|$ (D) $\sin\left(\frac{dy}{dx}\right) = \left(\frac{d^2y}{dx^2}\right)$

2. Equation of the curve passing through the origin and satisfying $dy = (\sec x + y\tan x)dx$ is

(A) $y\sin x = x$ (B) $y\cos x = x$ (C) $y\tan x = x$ (D) none of these

3. If $x\frac{dy}{dx} = y(\ln y - \ln x + 1)$, then the solution of the equation is

(A) $\ln\frac{x}{y} = cy$ (B) $\ln\frac{y}{x} = cy$ (C) $\ln\frac{x}{y} = cx$ (D) $\ln\frac{y}{x} = cx$

4. The differential equation of all the circles passing through the origin and having centre on the *x*-axis, is

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

5. The area bounded by the curve $y = \sin x$ and the x-axis, for $0 \le x \le 2\pi$ is

(A) 2 sq. units (B) 1 sq. units (C) 6 sq. units (D) 4 sq. units

6. The area bounded by the curve $y = x^2 + 2x + 1$, the tangent to it at (1, 4) and the y-axis is

(A) 1 (B) $\frac{1}{2}$ (C) $\frac{1}{3}$ (D) none of these

7. The area enclosed by the curves y = cos x, y = 1 + sin 2x between x = 0 and x = $\frac{3\pi}{2}$ equals

(A) $\frac{3\pi}{2} - 2$ (B) $\frac{3\pi}{2}$ (C) $2 + \frac{3\pi}{2}$ (D) $1 + \frac{3\pi}{2}$

8. The value of 'a' (a > 0) for which the area bounded by the curves $y = \frac{x}{6} + \frac{1}{x^2}$, y = 0, x = a and x = 2a has the least value is

(A) 2 (B) $\sqrt{2}$ (C) $2^{1/3}$ (D) 1

space for rough work

(Multi Correct Choice Type)

This section contains 4 **multiple choice questions.** Each question has four choices (A), (B), (C) and (D) out of which **ONE OR MORE** may be correct.

9. Consider the differential equation $\frac{dy}{dx} + y = e^{2x}$

(A) The given differential equation is a linear differential equation in y.

(B) The integrating factor of the given equation is e^x.

(C) The general solution of the given equation is $ye^x = \frac{e^{3x}}{3} + c$.

(D) The general solution of the given equation is $y = \frac{e^{2x}}{3} + ce^x$.

10. The differential equation $\frac{dy}{dx} = \frac{x+y+2}{3x+3y+1}$ can be transformed into variable – separable form by the substitution

(A) $x + y = t$ (B) $3x + 3y = t$ (C) $x + y - 1 = t$ (D) $3x + 3y + 1 = t$

11. Consider a function $y = f(x)$ which is defined at all points in the interval [a, b]. The area bound by $y = f(x)$ and x – axis between x = a and x = b is

(A) $\int_a^b f(x)dx$ if $f(x) \geq 0 \forall x \in [a,b]$ (B) $-\int_a^b f(x)dx$ if $f(x) < 0 \forall x \in [0, b]$

(C) $\left|\int_a^b f(x)dx\right|$ (D) $\int_a^b |f(x)|dx$

12. If the area of region bounded by $y^2 = x$ and $y = x - 2$ is $\frac{p}{q}$ (where p and q are co – prime positive integers) then

(A) p = 9 (B) p = 8 (C) q = 2 (D) q = 3

PART – B
(*Matrix Match Type*)

1. Match the following

Column-I		Column-II	
(A)	The area bounded by the curve $x = 3y^2 - 9$ and the lines x = 0, y = 0 and y = 1 in square units is equal to	(P)	1
(B)	If a curve $f(x) = a\sqrt{x} + bx$, $(f(x) \geq 0 \forall x \in [0,9])$ passes through the point (1, 2) and the area bounded by the curve, line x = 4 and x – axis is 8 square units, then $2a + b$ is equal to	(Q)	4
(C)	The area enclosed between the curves $y = \sin^2 x$ and $y = \cos^2 x$ in the interval $0 \leq x \leq \pi$ in square units in equal to	(R)	8
(D)	The area bounded by the curve $y^2 = 16x$ and line $y = mx$ is $\frac{2}{3}$ square units, then m is equal to	(S)	5

space for rough work

2. Find the solution of the following differential equation

Column-I		Column-II	
(A)	$(\sin x+\cos x)dy+(\cos x-\sin x)dx=0$	(P)	$\sec y+\tan y=c(\operatorname{cosec} x+\cot x)$
(B)	$\sin x\,dy+\cos y\,dx=0$	(Q)	$2(x^2+y^2)+2(x\sin 2x+y\sin 2y)+(\cos 2x+\cos 2y)=c$
(C)	$x^{-1}\cos^2 y\,dy+y^{-1}\cos^2 x\,dx=0$	(R)	$y=c-\log\lvert\sin x+\cos x\rvert$
(D)	$\tan x\,\sec^2 y\,dy+\tan y\,\sec^2 x\,dx=dx$	(S)	$\tan x\tan y=x+c$

PART – C
(Numerical Based)

This section contains 06 **multiple choice questions**. The answer to each question is a single digit integer, ranging from 0 to 9 (both inclusive)

1. The line $y=mx$ bisects the area enclosed by $y=1+4x-x^2, y=0, x=0$ and $x=\frac{3}{2}$. The value of $[m]$ is (where [.] represents Greatest Integer Function)

2. The area contained by the ellipse $\frac{x^2}{9}+\frac{y^2}{4}=1$ is $k\pi$ sq. units, where k is

3. If the order and degree of the differential equations $\left(\frac{d^2y}{dx^2}\right)^5+\frac{4\left(\frac{d^2y}{dx^2}\right)^2}{\left(\frac{d^3y}{dx^3}\right)^5}+\frac{d^3y}{dx^3}=x^2-1$ are m and n respectively then m + n is equal to

4. The area of the region bounded by $y=x^2-2x+2, y=0, x=-1$ and $x=2$ is

5. If the solution of the differential equation $\frac{dy}{dx}=\frac{1-3x-3y}{1+x+y}$ is $\ell x+y+m\ell n\lvert 1-x-y\rvert=c$ (c is an arbitrary constant), then $\ell+m$ is equal to

6. For the differential equation $ydx+y^2dy=x\,dy\,(x\in R, y>0)$, if $y(1)=1$, find $y(-3)$.

space for rough work