SAMPLE PAPERS

JEE Advanced

Paper-02

Time: 3 Hours ***Maximum Marks: 183***

Topics Covered:

Physics	**:**	*Units & Measurements, Kinematics (1 & 2-D Motion), NLM (Including Friction), Electrostatics, Capacitance*
Chemistry	**:**	*Atomic Structure, Redox Reaction, Periodic Properties, General Organic Chemistry, Solutions, p-Block Elements*
Mathematics	**:**	*Sets, Relation & Functions, Binomial Theorem, Matrices & Determinants, Relations, Functions, Inverse Trigonometry*

Read the Important Instructions Carefully:

1. *You are allowed to take away the Question Paper at the end of the examination.*
2. *Do not tamper with or mutilate the OMR. Do not use the OMR for rough work.*
3. *Use a **BLACK BALL POINT PEN** to darken the bubbles on the OMR.*
4. *The OMR is machine-gradable. Ensure that the bubbles are darken in the correct way.*
5. *Darken the bubbles **ONLY IF** you are sure of the answer. There is **NO WAY** to erase or "un-darken" a darkened bubble.*

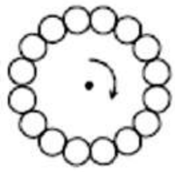
PART-I : PHYSICS

SECTION-1 (MAXIMUM MARKS : 21)

- *This section contains **SEVEN** questions*
- *Each question has **FOUR** options (A), (B), (C) and (D). **ONLY ONE** of these four options is correct*
- *For each question, darken the bubble corresponding to all the correct option in the OMR*
- *For each question, marks will be awarded in <u>one of the following categories</u>:*

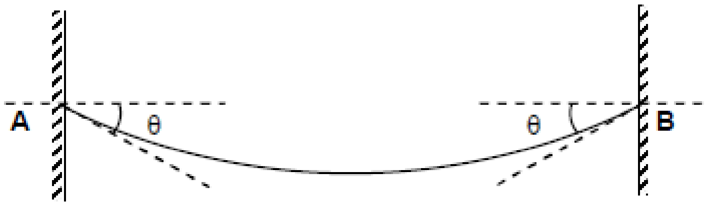
Full Marks	***:***	***+3***	***If only the bubble corresponding to all the correct option is darkened***
Zero Marks	***:***	***0***	***If none of the bubbles is darkened***
Negative Marks	***:***	***–1***	***In all other cases***

1. A metallic chain with a length ℓ and whose ends are joined together is fitted onto a wooden disc as shown in the figure. The disc rotates with a speed of n revolutions per second. Then the tension of the chain T, if its mass is m, is



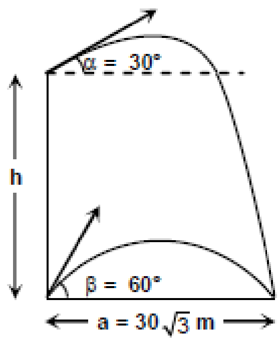
(A) $m\ell n$ (B) $2m\ell n$ (C) $2m\ell n^2$ (D) $m\ell n^2$

2. A heavy string of mass m hangs between two fixed points A and B at the same level. The tangents to the string at A and B are at an angle θ with the horizontal as shown in the figure. The tension in the string at lowest point is



(A) $\frac{mg}{2\sin\theta}$ (B) $\frac{mg}{2\cos\theta}$ (C) $\frac{mg}{2\tan\theta}$ (D) $\frac{mg}{2\cot\theta}$

3. Shots are fired simultaneously from the top and bottom of a vertical cliff with elevation $\alpha = 30°$ and $\beta = 60°$ respectively and strikes the object simultaneously at the same point. If $a = 30\sqrt{3}\text{m}$ is the horizontal distance of the object from the cliff, then the height of the cliff is

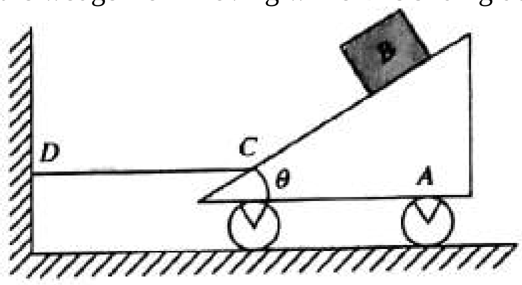


(A) 30 m (B) 45 m (C) 60 m (D) 90 m

4. A quantity x is defined as $x = \frac{a^3 - b^2}{\sqrt{c+d}}$. Value of a, b, c and d are reported as a = 3 ± 0.001, b = 5 ± 0.0013, c = 6 ± 0.24 and d = 10 ± 0.4. Percentage error in x will be

(A) 2 (B) 4 (C) 6 (D) 7

5. Block B has mass m and is released from rest when it is on top of wedge A, which has a mass 3m. Determine the tension in cord CD needed to hold the wedge from moving while B is sliding down A. Neglect friction.



(A) 2mg cosθ (B) $\frac{mg}{2}\cos 2\theta$ (C) $\frac{mg}{2}\sin 2\theta$ (D) mg sin2θ

6. In the relation $P = \frac{\alpha}{\beta} e^{\frac{\alpha x}{nR\theta}}$, P is power, x is distance, n is number of moles, R is gas constant and θ is temperature. The dimensional formula of β is

(A) $[M^0L^0T^0]$ (B) $[M^1L^0T^1]$ (C) $[M^0L^{-1}T^1]$ (D) $[M^0L^{-1}T^{-1}]$

7. The acceleration of a particle is given by the a = x where x is a constant. If the particle starts at origin from rest, its distance from origin after time t is given by

(A) $\frac{xt^2}{2}$ (B) $\frac{x^2t^2}{2}$ (C) $\frac{\sqrt{x}t^2}{2}$ (D) $\frac{x^3t^3}{6}$

SECTION-2 (MAXIMUM MARKS : 28)

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- *For each question, marks will be awarded in one of the following categories:*

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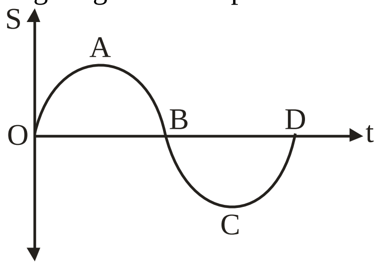
Partial Marks	:	***+1***	***For darkening a bubble corresponding to each correct option, provided NO incorrect option is darkened***
Zero Marks	:	***0***	***If none of the bubbles is darkened***
Negative Marks	:	***–2***	***In all other cases***

- *For example, if (A), (C) and (D) are all the correct options for a question, darkening all these three will results in +4 marks; darkening only (A) and (D) will result in +2 marks; and darkening (A) and (B) results in –2 marks, as a wrong option is also darkened*

Space for Rough Work

8. A particle has a rectilinear motion and the figure gives its displacement as a function of time.



Which of the following statement(s) is/are true with respect to the motion?
(A) In the motion between O and A, the velocity is positive and the acceleration is negative.
(B) Between A and B, the velocity and acceleration are positive.
(C) Between B and C, the velocity is negative and acceleration is positive.
(D) Between C and D, the acceleration is positive.

9. A positive charge Q is located at the centre O of a thin metallic neutral spherical shell. Select the correct statement(s) from the following.
(A) The electric field at any point outside the shell is zero.
(B) The charge on the outer surface of the shell is –Q.
(C) The outer surface of the spherical shell is an equipotential surface.
(D) The electric field at any point inside the shell other than O, is zero.

10. Which of the following is/are correct?
(A) Dimensional formula of Boltzmann constant is $\left[ML^2T^{-2}K^{-1}\right]$
(B) Dimensional formula of coefficient of viscosity is $\left[ML^{-1}T^{-1}\right]$
(C) Dimensional formula of Planck's constant is $\left[ML^2T^{-3}\right]$
(D) Dimensional formula of thermal conductivity is $\left[MLT^{-3}K^{-1}\right]$

11. At an instant particle A is at origin and moving with constant velocity $\left(3\hat{i}+4\hat{j}\right)$ m/s and particle B is at (4, 4)m and moving with constant velocity $\left(4\hat{i}-3\hat{j}\right)$ m/s. Then at this instant
(A) Relative velocity of B w.r.t. A is $\left(\hat{i}-7\hat{j}\right)$ m/s
(B) Approach velocity of A & B is $3\sqrt{2}$ m/s
(C) Relative velocity of B w.r.t. A remains constant.
(D) Approach velocity of A & B remains constant.

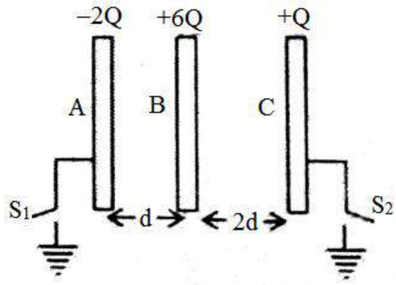
Space for Rough Work

12. The electric potential inside a charged sphere varies with the distance 'r' from its centre as $V = a - br^3$, where 'a' and 'b' are positive constant. Then select the correct statement(s) from the following.

(A) $E \propto r$ (B) $E \propto r^2$ (C) $\rho \propto r$ (D) $\rho \propto r^2$

(where E = Electric field inside the sphere at a distance 'r' from its centre, ρ = volume charge density inside the sphere at a distance 'r' from its centre)

13. Three identical metallic plates are kept at small separations as shown. Initially charge –2Q, +6Q and +Q are given to the plates A, B and C respectively. Now both the switches S_1 and S_2 are closed simultaneously, then



(A) Charge flown through S_1 is 2Q
(B) Charge flown through S_1 is 6Q
(C) Charge flown through S_2 is 5Q
(D) Charge flown through S_2 is 3Q

14. A projectile is required to hit a target whose co-ordinates relative to horizontal and vertical axes through the point of projection are (α, β). If the gun velocity is $\sqrt{2g\alpha}$. Then the condition when it is impossible to hit the target.

(A) $3\alpha > 4\beta$ (B) $4\beta > 3\alpha$ (C) $3\beta > 4\alpha$ (D) $4\alpha > 3\beta$

SECTION-3 (MAXIMUM MARKS : 12)

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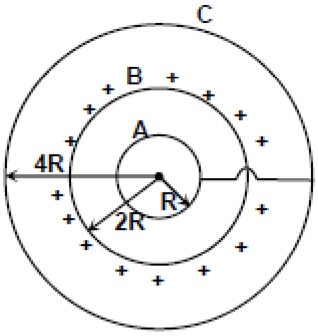
Zero Marks : ***0*** ***If none of the bubbles is darkened***

Space for Rough Work

PARAGRAPH-01

Three concentric spherical conductors A, B and C of radii R, 2R and 4R respectively. A and C is shorted and B is uniformly charged (charge +Q)

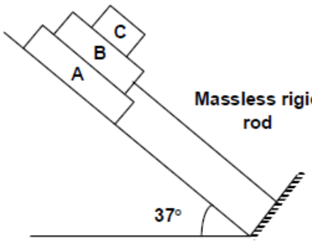


15. Charge on conductor A is
(A) Q/3 (B) –Q/3 (C) 2Q/3 (D) None of these

16. Potential at B is
(A) $\frac{Q}{4\pi\varepsilon_0 R}$ (B) $\frac{Q}{16\pi\varepsilon_0 R}$ (C) $\frac{5Q}{48\pi\varepsilon_0 R}$ (D) None of these

PARAGRAPH-02

In the shown figure m_A, m_B and m_C are the masses of the three blocks, the incline is frictionless $m_A = 5$ kg, $m_B = 10$ kg, $m_C = 2$ kg. coefficient of friction between A and B is 0.5 and between B and C is 0.1 (Take $g = 10$ m/s^2) On the basis of above data answer the following questions.



17. What is the frictional force on block A
(A) 30 N (B) 48 N (C) 18 N (D) 78 N

18. What is the tension in the rod
(A) 91.6 N (B) 31.6 N (C) 8.4 N (D) 90 N

Space for Rough Work

PART-II : CHEMISTRY

SECTION-1 (MAXIMUM MARKS : 21)

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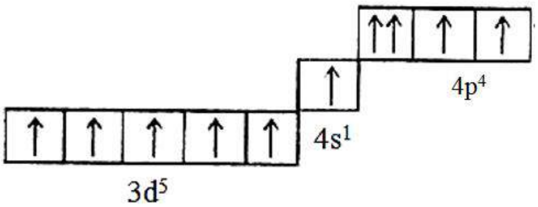
Negative Marks **:** ***–1*** ***In all other cases***

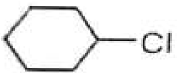
19. In the following electronic configuration, some rules have been violated:

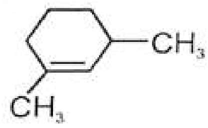


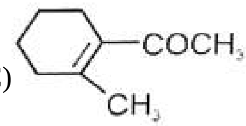
I:Hund   II: Pauli's exclusion   III: Aufbau

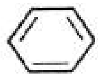
(A) I and II   (B) I and III   (C) II and III   (D) I, II and III

20. In which of the following molecules all the effects namely inductive, mesomeric and hyperconjugation operate:

(A) 

(B) 

(C) 

(D) 

21. 25 mL of an aqueous solution of KCl was found to require 20 mL of 1 M $AgNO_3$ solution when titrated using a K_2CrO_4 as indicator. The depression in freezing point of KCl solution with 100% ionization will be:
[$K_t = 2°C.kg\ mol^{-1}$ and molarity = molality]

(A) 5.0°C   (B) 3.2°C   (C) 1.6°C   (D) 0.8°C

22. Select the correct relation.

(A) I.E.$_1$ (Cu) < I.E.$_1$ (Zn) but I.E.$_2$ (Cu) > I.E.$_2$ (Zn)   (B) I.E.$_1$ (Cu) < I.E.$_1$ (Zn) and I.E.$_2$ (Cu) < I.E.$_2$ (Zn)

(C) I.E.$_1$ (Cu) > I.E.$_1$ (Zn) and I.E.$_2$ (Cu) > I.E.$_2$ (Zn)   (D) I.E.$_1$ (Cu) > I.E.$_1$ (Zn) and I.E.$_2$ (Cu) > I.E.$_2$ (Zn)

23. Which one of the following is wrong?

(A) Oxygen and sulphur belong to the same group of periodic table.
(B) Oxygen is a gas while sulphur is solid.
(C) Both oxygen and sulphur show +2, +4 and +6 oxidation states.
(D) H_2S has no hydrogen bonding.

24. If λ_1 and λ_2 are respectively the wavelengths of the series limit of Lyman and Balmer series of Hydrogen atom, then the wavelength of the first line of the Lyman series of the H-atom is:

(A) $\lambda_1 - \lambda_2$ (B) $\sqrt{\lambda_1\lambda_2}$ (C) $\frac{\lambda_2 - \lambda_1}{\lambda_1\lambda_2}$ (D) $\frac{\lambda_1\lambda_2}{\lambda_2 - \lambda_1}$

Space for Rough Work

25. A mole of N_2H_4 loses 10 mol of electrons to form a new compound Y. Assuming that all the nitrogen appears in the new compound, what is the oxidation state of nitrogen in Y? (There is no change in the oxidation number of hydrogen.)
(A) –1 (B) –3 (C) +3 (D) +5

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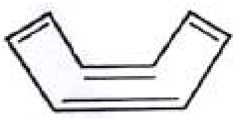
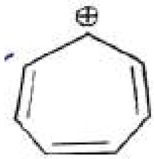
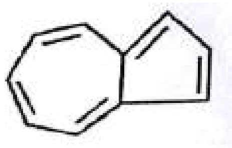
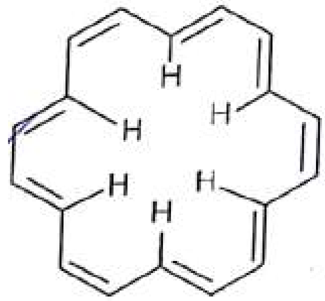
26. Which of the following is/are acceptable resonating structures of Buta-1, 2, 3-triene.
(A) $\overset{\ominus}{\ddot{C}}H_2 - C \equiv C - \overset{\oplus}{C}H_2$
(B) $CH_2 = C = C = CH_2$
(C) $\overset{\oplus}{C}H_2 - C \equiv C - \overset{\ominus}{\ddot{C}}H_2$
(D) $\dot{C}H_2 - C \equiv C - \dot{C}H_2$

27. When photons of energy 4.25 eV strike the surface of a metal A, the ejected photoelectrons have maximum kinetic energy $(KE)_A$ and de-Broglie wavelength is λ_A. The maximum kinetic energy of photoelectrons liberated from another metal B by photons of energy 4.7 eV is $(KE)_B$, where $(KE)_B = (KE)_A - 1.5$ eV. If the de-Broglie wavelength of these photoelectrons is λ_B $(=2\lambda_A)$, then:
(A) The work function of metal A is 2.25 eV
(B) The work function of metal B is 4.20 eV
(C) $(KE)_A = 2$ eV
(D) $(KE)_B = 2.75$ eV

28. Which of the following statement(s) is/are correct regarding inter-halogen compounds of ABx types?
(A) x may be 1, 3, 5 and 7.
(B) A is a more electronegative halogen than B.
(C) FBr_3 cannot exit.
(D) The structures of ClF_3 and IF_7 show deviation from normal structures and could be explained on the basis of VSEPR theory.

Space for Rough Work

29. Which of the following are Aromatic in nature.

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

30. Two liquids A and B form an ideal solution. The solution has a vapour pressure of 700 torr at 90°C. It is distilled till 2/3rd of the solution is collected as condensate. The composition of the condensate is $X'_A = 0.75$ and that of the residue is $X''_A = 0.3$. If the vapour pressure of the residue at 90°C is 600 torr, which of the following option(s) is/are correct.
(A) The composition of the original liquid was $X_A = 0.6$
(B) The composition of the original liquid was $X_A = 0.4$
(C) $P_A^0 = \frac{2500}{3}$ torr
(D) The composition of the original liquid was $X_B = 0.4$

31. 250 ml of 1M I_2 is separately reacted with 0.5 M Cu_2 S solution, 0.5 M CuS solution and 0.5 M $S_2O_3^{2-}$ solution, causing production of Cu^{+2} and SO_4^{2-} in the first two and $S_4O_6^{2-}$ in the last case along with iodide ions. Which of the following option(s) is/are correct assuming 100% completion of the reaction?
(A) 100 ml of Cu_2S solution will be consumed.
(B) 125 ml of CuS solution will be consumed.
(C) 500 ml of $S_4O_6^{2-}$ solution will be consumed.
(D) Equivalent weight of I_2 in each of the reactions will be 127.

32. Amongst the following statements, which is/are correct?
(A) Electronegativity of sulphur is greater than that of oxygen.
(B) Electron affinity of oxygen is smaller than that of sulphur.
(C) Electron gain enthalpy of fluorine is most negative.
(D) Electron gain enthalpy of chlorine is most negative.

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Space for Rough Work

PARAGRAPH-01

The oxides of chlorine, bromine and iodine are well known. They have various compositions. The oxides of chlorine are thermally unstable and dangerously explosive. They react with alkali. The bromine oxides are thermally more stable than chlorine oxides. The structure of halogen oxides is explained on the basis of VSEPR theory.

33. Which oxide of chlorine is colourless?
(A) Cl_2O (B) ClO_2 (C) Cl_2O_6 (D) Cl_2O_7

34. The structure of Cl_2O_7 is $O_3Cl - O - ClO_3$. The Cl – O – Cl bond angle is:
(A) 180° (B) 119° (C) 109°28′ (D) 108.7°

PARAGRAPH-02

An isotope of hydrogen atom is represented as X which follows Bohr's model and exists as diatomic gaseous molecule X_2. Also the normal boiling point of a compound X_2O liquid is found to be 101°C and that of a solution obtained on dissolving 0.1 moles of NaCl in 1 kg of X_2O liquid is 101.4°C. It is also known that the ionization energy of X is equal to 14 eV.

35. The value of ebullioscopic constant of X_2O is:
(A) 4 K kg mol^{-1} (B) 2 K kg mol^{-1} (C) 0.4 K kg mol^{-1} (D) 1 K kg mol^{-1}

36. The energy required to excite electron from ground state to II^{nd} excited state is:
(A) 10.2 eV/atom (B) 12.1 eV/atom (C) 12.44 eV/atom (D) 10.5 eV/atom

Space for Rough Work

PART-III : MATHEMATICS

SECTION-1 (MAXIMUM MARKS : 21)

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Negative Marks	:	***–1***	***In all other cases***

37. If $f(x) = \sin^2 x$, $g(x) = \sqrt{x}$ and $h(x) = \cos^{-1}x$, $0 \le x \le 1$, then
(A) $hogof(x) = gofoh(x)$ (B) $gofoh(x) = fohog(x)$ (C) $fohog(x) = hogof(x)$ (D) None of these

38. Let $f(x) = [x] + \sqrt{\{x\}}$, where $[x]$ denotes the greatest integer part of x and $\{x\}$ denotes the fractional part of x. Then $f^{-1}(x)$ is
(A) $[x] + \sqrt{\{x\}}$ (B) $[x]^2 + \{x\}$ (C) $[x] + \{x\}^2$ (D) $\{x\} + \sqrt{\{x\}}$

39. $\tan^{-1}\left[\frac{3\sin 2\alpha}{5 + 3\cos 2\alpha}\right] + \tan^{-1}\left[\frac{\tan\alpha}{4}\right] = \frac{\lambda\alpha}{4}$ where $-\frac{\pi}{2} < \alpha < \frac{\pi}{2}$, then λ is________.
(A) 1 (B) 2 (C) 3 (D) 4

40. The set of values of x satisfying $[\tan^{-1} x] + [\cot^{-1} x] = 2$, where $[\cdot]$ is greatest integer function, is
(A) $(\cot 3, \cot 2)$ (B) $(\cot 3, -\cot 1)$ (C) $(\cot 3, 0)$ (D) ϕ

41. The value of $\sum_{r=1}^{n+1}\left(\sum_{k=1}^{n} {}^{k}C_{r-1}\right)$, where $r, k, n \in N$ is equal to
(A) 2^{n+1} (B) $2^{n+1} - 1$ (C) $2^{n+1} - 2$ (D) None of these

42. The greatest coefficient in the expansion of $(x + y + z + t)^{15}$ is
(A) $\frac{15!}{3!(4!)^2}$ (B) $\frac{15!}{3!4!}$ (C) $\frac{5!}{3!(4!)^3}$ (D) $\frac{15!}{3!(4!)^3}$

43. If A and B are square matrices of same order and A is non-singular, then for a positive integer n, $(A^{-1}BA)^n$ is equal to
(A) $A^{-n} B^n A^n$ (B) $A^n B^n A^{-n}$ (C) $A^{-1}B^n A$ (D) $n\,(A^{-1}BA)$

SECTION-2 (MAXIMUM MARKS : 28)

- *This section contains **SEVEN** questions*
- *Each question has **FOUR** options (A), (B), (C) and (D). **ONE OR MORE THAN ONE** of these four options is correct*
- *For each question, darken the bubble(s) corresponding to the correct option(s) in the OMR.*
- *For each question, marks will be awarded in one of the following categories:*

Full Marks	:	***+4***	***If only the bubble(s) corresponding to all the correct option(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	:	***–2***	***In all other cases***

- *For example, if (A), (C) and (D) are all the correct options for a question, darkening all these three will results in +4 marks; darkening only (A) and (D) will result in +2 marks; and darkening (A) and (B) results in –2 marks, as a wrong option is also darkened*

44. Let $R = \{(x, y): x, y \in \mathbf{R}, x^2 + y^2 \le 25\}$ $R' = \{(x, y): x, y \in \mathbf{R}, y \ge \frac{4}{9}x^2\}$ then

(A) Domain $R \cap R' = [-3, 3]$
(B) Range $R \cap R' \supset [0, 4]$
(C) Range $R \cap R' = [0, 5]$
(D) $R \cap R'$ defines a function

45. Let $f(x) = e^{\cos^{-1}\sin\left(x+\frac{\pi}{3}\right)}$, then

(A) $f\left(\frac{8\pi}{9}\right) = e^{\frac{5\pi}{18}}$
(B) $f\left(\frac{8\pi}{9}\right) = e^{\frac{13\pi}{18}}$
(C) $f\left(-\frac{7\pi}{4}\right) = e^{\frac{\pi}{12}}$
(D) $f\left(-\frac{7\pi}{4}\right) = e^{\frac{11\pi}{12}}$

46. The value/s of θ lying between 0 and π/2 and satisfying the equation

$$\begin{vmatrix} 1+\sin^2\theta & \cos^2\theta & 4\sin 4\theta \\ \sin^2\theta & 1+\cos^2\theta & 4\sin 4\theta \\ \sin^2\theta & \cos^2\theta & 1+4\sin 4\theta \end{vmatrix} = 0, \text{ are}$$

(A) 7π/24
(B) 5π/24
(C) 11π/24
(D) π/24

47. If the equation $\sin^{-1}(x^2 + x + 1) + \cos^{-1}(ax + 1) = \frac{\pi}{2}$ has exactly two solutions, then a can not have the integral value/s

(A) – 1
(B) 0
(C) 1
(D) 2

48. Let $(1+x^2)^2(1+x)^n = A_0 + A_1x + A_2x^2 + \ldots\ldots.$ If A_0, A_1, A_2 are in A.P., then the value of n is

(A) 2
(B) 3
(C) 5
(D) 7

49. If n be a positive integer, then in the trinomial expansion of $(x^2 + 2x + 2)^n$, the coefficient of

(A) x is $2^n.n$
(B) x is 2^n
(C) x^2 is $n^2.\ 2^{n-1}$
(D) x^3 is $2^n.\ {}^{n+1}C_3$

50. If $A(\alpha, \beta) = \begin{bmatrix} \cos\alpha & \sin\alpha & 0 \\ -\sin\alpha & \cos\alpha & 0 \\ 0 & 0 & e^{\beta} \end{bmatrix}$, then

(A) $A(\alpha, \beta)' = A(-\alpha, \beta)$
(B) $A(\alpha, \beta)^{-1} = A(-\alpha, -\beta)$
(C) adj $(A(\alpha, \beta)) = e^{-\beta} A(-\alpha, -\beta)$
(D) $A(\alpha, \beta)' = A(\alpha, -\beta)$

Space for Rough Work

SECTION-3 (MAXIMUM MARKS : 12)

- *This section contains **TWO** paragraphs*
- *Based on each paragraph, there are **TWO** questions*
- *Each question has **FOUR** options (A), (B), (C), and (D). **ONLY ONE** of these four options is correct*
- *For each question, darken the bubble corresponding to the correct option in the OMR*
- *For each question, marks will be awarded in one of the following categories:*

Full Marks : +3 If only the bubble corresponding to the correct option is darkened.

Zero Marks : 0 If none of the bubbles is darkened

PARAGRAPH-01

If $f : (0, \infty) \to (0, \infty)$ satisfy
$f(xf(y)) = x^2y^a$ $(a \in R)$, then

51. $\sum_{r=1}^{n} f(r)\,{}^nC_r$ is

(A) $n.2^{n-1}$ (B) $n(n-1)\,2^{n-2}$ (C) $n.2^{n-1} + n(n-1)\,2^{n-2}$ (D) 0

52. Number of solutions of $2\,f(x) = e^x$ is

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

PARAGRAPH-02

If $(1 + x)^n = C_0 + C_1 x + C_2x^2 + \ldots\ldots C_{n4}x^n$ ....(i)
then sum of series $C_0 + C_k + C_{2k} + \ldots..$ can be obtained by putting all roots of equation $x^k-1 = 0$ in (i) & then adding vertically :
for example: sum of $C_0 + C_2 + C_4\ldots.$can be obtained by putting all roots of equation $x^2 = 1$
i.e. $x = \pm 1$ in (i)
At $x = 1$ $C_0 + C_1 + C_2 \ldots\ldots..C_n = 2^n$
$x = -1$ $C_0 - C_1 + C_2 - C_3\ldots\ldots.. = 0$
Adding we get $C_0 + C_2 + C_4 \ldots\ldots.. = 2^{n-1}$
Now answer the following

53. If n is a multiple of 3, then $C_0 + C_3 + C_6 + \ldots\ldots\ldots.$ equals

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

54. Sum of values of x which should be substituted in (i) to get the sum of $C_0 + C_4 + C_8 + C_{12}\ldots\ldots..$is

(A) $2(1 + i)$ (B) $2(1-i)$ (C) 2 (D) 0

Space for Rough Work