Time: 3Hours

(JEE ADVANCED PAPER – 2)

Maximum Marks: 180

Important Instruction:

Please read the instructions carefully. INSTRUCTIONS

A. General:

1. This booklet is your Question Paper.
2. Blank papers, clipboards, log tables, slide rules, calculators, cameras, cellular phones, pagers and electronic gadgets are NOT allowed inside the examination hall.
3. Using a black ball point pen to darken the bubbles .

B. Question Paper Format :

4. The question paper consists of three parts (Physics, Chemistry and Mathematics). Each part consists of three sections.

Section 1 contains 8 multiple choice questions. Each question has four choices (A), (B), (C) and (D) out of which ONE OR MORE are correct

5. Section 2 contains 4 paragraphs each describing theory, experiment, data etc. Eight questions relate to four paragraphs with two questions on each paragraph. Each question of a paragraph has ONLY ONE correct answer among the four choices (A), (B), (C) and (D).

6. Section 3 contains 4 Matching type Questions.

Each question has ONLY ONE CORRECT ANSWER among the four choices (A), (B), (C) and (D).

C. Marking Scheme

7. For each question in Section 1, you will be awarded 3 marks if you darken all the bubble(s) corresponding to only the correct answer(s) and zero mark if no bubbles are darkened. In all other cases, minus one (–1) mark will be awarded.

8. For each question Section 2 and 3, you will be awarded 3 marks if you darken the bubble corresponding to only the correct answer and zero mark if no bubbles are darkened. In all other cases, minus one (–1) mark will be awarded.

Name of the Student: ……. Class: ……

Father's Name: ……. Signature: ……

Branch Name: …… Contact No: ……

ROUGH SPACE

PHYSICS ATS JEE ADVANCED

Section – I

This section contains eight questions. Each question has four choices, out of which one or more than one may be correct.

1. A projectile is fired with a constant speed at two different angles of projection, say α and β, that give it the same range. Then, α and β are such that,

(A) cosec α = sec β
(B) tan (α+β) → ∞
(C) $\sin^2\alpha - \cos^2\alpha = \sin^2\beta - \cos^2\beta$
(D) $\sin^2\alpha + \cos^2\alpha = \sin^2\beta + \cos^2\beta$

2. A photon moves vertically up in a region with gravitational field g downwards. The frequency of photon at an instant is ν. After it has moved up by a small height h,

(A) its speed decreases
(B) its energy decreases
(C) its frequency is $\nu\left(1-\frac{gh}{c^2}\right)$
(D) its frequency is $\nu e^{-\frac{gh}{c^2}}$

3. Two blocks, each of mass m, moving in opposite directions with the same speed u, on a horizontal frictionless surface collide with each other, stick together and come to rest. Then,

(A) Work done by external force on the system is zero.
(B) Work done by the external force on the system is mu^2.
(C) Work done by the internal force on the system is zero.
(D) Work done by the internal force on the system is $-mu^2$

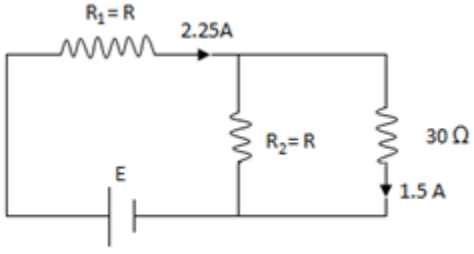
4. A small planet is revolving with a speed v around a very massive star in a circular orbit of radius r with a revolution period T. If the gravitational force between the planet and the star were inversely proportional to r, then,

(A) v is independent of r
(B) v decreases if r is increased.
(C) T increases if r is increased.
(D) T is independent of r.

5. Two equal resistances $R_1 = R_2 = R$ are connected with a 30 Ω resistor and a battery of terminal voltage E. The currents in two branches are 2.25A and 1.5A as shown in fig.

Then,

(A) $R_2 = 15\Omega$
(B) $R_2 = 60\Omega$
(C) E = 36 V
(D) E = 180 V



ROUGH SPACE

6. A convex lens made of glass of refractive index 1.5 has both surfaces of the same radius of curvature R. In case (i) the lens is immersed in a medium of refractive index 1.25 and in case (ii) it is immersed in a medium of refractive index 1.75. Then,

(A) in case (i) the lens will behave as a convergent lens of focal length 2.5 R.
(B) in case (ii) the lens will behave as a divergent lens of focal length 3.0 R.
(C) In case (ii) the lens will behave as a convergent lens of focal length 3 R.
(D) in case(ii) the lens will behave as a divergent lens of focal length 3.5 R.

7. In young's double slit experiment, the fringe width with light of wavelength λ_1 is β_1 and with light of wavelength λ_2 is β_2. Using light of wavelength λ_1 , the fringe width becomes β_3 if the entire apparatus is immersed in a transparent liquid of refractive index μ. Then,

(A) $\beta_2 = \beta_1\frac{\lambda_1}{\lambda_2}$ (B) $\beta_2 = \beta_1\frac{\lambda_2}{\lambda_1}$ (C) $\beta_3 = \frac{\beta_1}{\mu}$ (D)$\beta_3 = \mu\beta_1$

8. When a point light source, of power W emitting light of wavelength λ is kept at a distance a from a photosensitive surface of work function ϕ and area S, we will have

(A)no. Of photons striking the surface per unit time as $\frac{W\lambda S}{4\pi hca^2}$

(B) the maximum energy of the emitted photoelectrons as $\frac{1}{\lambda}(hc-\lambda\phi)$

(C) The stopping potential needed is $\frac{e}{\lambda}(hc-\lambda\phi)$ for most energetic emitted photoelectrons.

(D) Photoemission occurs only for range, $0 \le \lambda \le \frac{hc}{\phi}$

Section – II

Passage –I

A physicist wishes to eject electrons by shining light on a metal surface. The light source emits light of wavelength of 450 nm. The table lists the only available metal and their work functions.

Metal	$W_0(eV)$
Barium	2.5
Lithium	2.3
Tantalum	4.2
Tungsten	4.5

9. Which metal(s) can be used to produce electrons by the photoelectric effect from given source of light?

(A) Barium only (B) Barium or lithium
(C) Lithium, tantalum or tungsten (D) Tungsten or tantalum

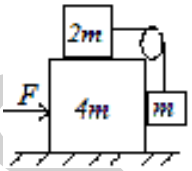
10. Which option correctly identifies the metal that will produce the most energetic electrons and their energies?

(A) Lithium, 0.45 eV (B) Tungsten, 1.75 eV
(C) Lithium, 0.15 eV (D) Tungsten, 2.75 eV

ROUGH SPACE

Passage – II

Two blocks of mass *m* and *2m* are connected as shown in figure. A force *F* is acting on the block of mass 4m. Pulley is massless and string is light and inextensible. All the surfaces are smooth.



11. Acceleration of 4*m* mass such that with respect to it 2*m* mass will remain stationary.

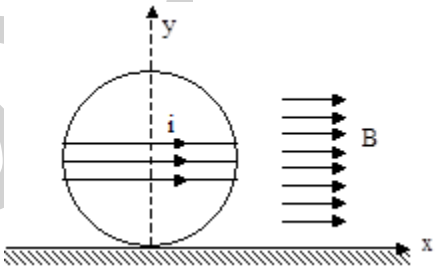
(A) $g/2$ (B) g (C) $3g/4$ (D) $2g$

12. Contact force between ground and the 4*m* mass under the previous problem condition is

(A) mg (B) $3mg$ (C) $5mg$ (D) $7mg$

Passage–III

A person wants to roll a solid non-conducting spherical ball of mass m and radius r on a surface whose coefficient of static friction is μ. He placed the ball on the surface wrapped with n turns of closely packed conducting coils of negligible mass at the diameter. By some arrangement he is able to pass a current i through the coils either in the clockwise direction or in the anti-clockwise direction. A constant horizontal magnetic field $\vec{B}$ is present throughout the space as shown in the figure. (Assume μ is large enough to help rolling motion)



13. The angular velocity of the ball when it has rotated through an angle θ is (θ< 180°), is

(A) $\sqrt{\frac{10}{7}\frac{\pi niB}{m}\sin\theta}$ (B) $\sqrt{\frac{5}{14}\frac{\pi niB}{m}\sin\theta}$

(C) $\sqrt{\frac{5}{14}\frac{\pi niB}{m}\cos\theta}$ (D) $\sqrt{\frac{5}{7}\frac{\pi niB}{m}\sin\theta}$

14. The minimum value of μ for which the rolling motion is possible, is

(A) $\left(\frac{14\pi}{5g}\right)\left(\frac{\text{niB}}{\text{m}}\right)\text{r}$ (B) $\left(\frac{5\pi}{7g}\right)\left(\frac{\text{niB}}{\text{m}}\right)\text{r}$

(C) 0 (D) $\left(\frac{7\pi}{5g}\right)\left(\frac{\text{niB}}{\text{m}}\right)\text{r}$

ROUGH SPACE

Passage – IV

15. A calorimeter of mass m contains an equal mass of water in it. The temperature of the water and calorimeter is $t_2>0^0C$. A block of ice of mass m and temperature $t_3<0^0C$ is gently dropped into the calorimeter. Let C_1, C_2 and C_3 be the specific heats of material of calorimeter, water and ice respectively and L be the Latent heat of ice. The whole mixture in the calorimeter becomes ice if

(A) $C_1t_1+ C_2t_2 + L + C_3t_3 > 0$ (B) $C_1t_2+ C_2t_2 + L + C_3t_3 < 0$

(C) $C_1t_2+ C_2t_2 + L - C_3t_3 < 0$ (D) None of these

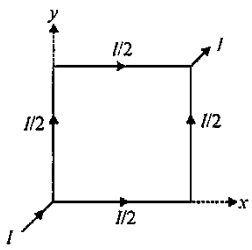
16. The whole mixture in the calorimeter becomes water, if,

(A) $(C_1 + C_2)t_2 - C_3|t_3| + L > 0$ (B) $(C_1 + C_2)t_2 + C_3|t_3| + L > 0$

(C) $(C_1 + C_2)t_2 - C_3|t_3| - L > 0$ (D) $(C_1 + C_2)t_2 + C_3|t_3| - L > 0$

Section - III

17. A square loop of uniform conducting wire is as shown in figure. A current-I (in amperes) enters the loop from one end and leaves the loop from opposite end as shown in figure. The length of one side of square loop is ℓ metre. The wire has uniform cross section area and uniform linear mass density. In four situations of column-I, the loop is subjected to four different uniform and constant magnetic field. Under the conditions of column I, match the column-I with corresponding results of column-II. (B_0 in column I is a positive non-zero constant).



Column I	Column II
(A) $\vec{B} = B_0 \hat{i}$ in tesla	(P) magnitude of net force on loop is $\sqrt{2}B_0I\ell$ newton
(B) $\vec{B} = B_0 \hat{j}$ in tesla	(Q) magnitude of net force on loop is zero
(C) $\vec{B} = B_0\left(\hat{i}+\hat{j}\right)$ in tesla	(R) magnitude of net torque on loop about its centre is zero
(D) $\vec{B} = B_0 \hat{k}$ in tesla	(S) Net force perpendicular to the plane of loop

(A) A-Q,R B-Q,R C-Q,R D-P,R
(B) A-R B-Q,S C-P D-P,R
(C) A-Q B-Q,R C-S D-Q
(D) A-Q B-Q C-Q,R D-P

ROUGH SPACE

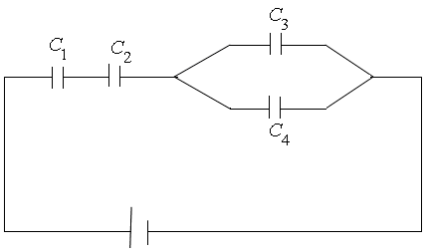
18. Match the column I with column II

Column I	Column II
A. When non- conservative forces are acting	P. Work done by force may be negative.
B. In the case of a pendulum, work done by tension	Q. Net Work done is zero
C. When there is friction	R. The only force acting is gravity
D. In Projectile motion	S. Work done by force in a roundtrip is not equal to zero.

(A) A-Q,R B-Q,R C-Q,R D-P,R
(B) A-P,S B-Q C-P,S D-R
(C) A-Q B-Q,R C-S D-Q
(D) A-Q B-Q C-Q,R D-P

19. Match the column I with column II

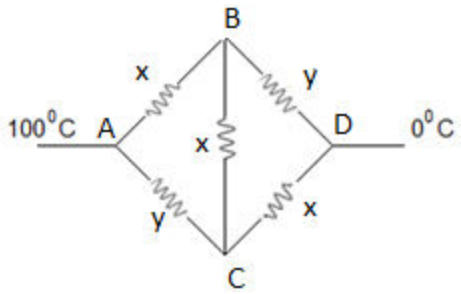
In the circuit shown in fig $C_1 = C,\ C_2 = 2C, C_3 = 3C$ and $C_4 = 4C$



Column – I	Column – II
(A) Maximum potential difference	(P) across C_1
(B) Minimum potential difference	(Q) across C_2
(C) Maximum potential energy	(R) across C_3
(D) Minimum potential energy	(S) across C_4

(A) A-P B-R C-P D-R
(B) A-P B-Q C-P,S D-R
(C) A-Q B-Q C-S D-Q
(D) A-Q B-Q C-Q,R D-P

20. Three rods of material x and two rods of material y are connected as shown in figure. All therods are of identical length and cross – sectional area. The end A is maintained at 100^0C and the junction C at 0^0C. It is given that resistance of rod of material x is R. Further, $K_x = 2K_y$.



Match the entries of column I and column II

Column I	Column II
A. Temperatureof junction B	P. Does not behave like a balanced wheatstone's bridge
B. Temperatureof junction C	Q. Is twice of the other.
C. This network is	R. $\frac{400}{7}$ degree celsius
D. Resistance of rod of material y	S. $\frac{300}{7}$ degree celsius

(A) A-P B-R C-P D-R
(B) A-P B-Q C-P D-R
(C) A-R B-S C-P D-Q
(D) A-Q B-Q C-Q D-P

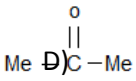
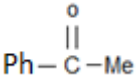
CHEMISTRYATS JEE ADVANCED
Section – I

This section contains eight questions. Each question has four choices, out of which one or more than one may be correct.

21. Which of the following statement (s) is /are correct
(A) For adiabatic expansion of an ideal gas $TV^{\gamma-1}$= constant
(B) work done in reversible isothermal expansion is greater than that done in rev adiabatic expansion for the same increase of volume
(C) Buffer capacity is maximum when concentration of weak acid and salt of its conjugate base is equal.
(D) Equilibrium constant of an exothermic reaction decreases with increase of temperature

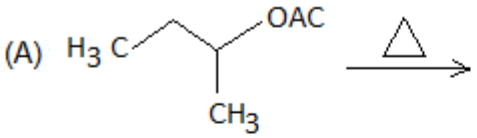
22. Thermal decomposition of which of the following does/do not give N_2 gas?
(A) NH_4NO_3 (B) $Ba(N_3)_2$ (C) $(NH_4)_2Cr_2O_7$ (D) NH_4NO_2

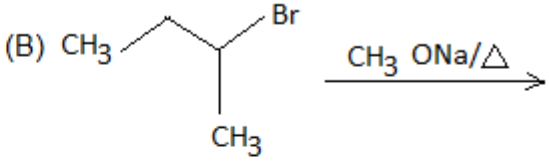
23. Which of the compound (s) does not respond for Fehling's test

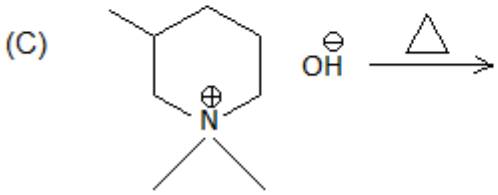
(A) Ph-CHO (B) Me-CHO (C)  

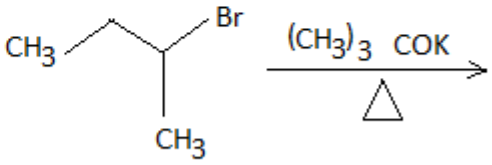
24) Select the incorrect statement (s):
(A) In N_2F_4, d-orbitals are contracted by electronegative fluorine atoms, but it is not possible in N_2H_4
(B) The N-N bond energy in N_2F_4 is more than N-N bond energy in N_2H_4
(C) The N-N bond length in N_2F_4 is more than that of N_2H_4
(D) The N-N bond length in N_2F_4 is less than that of N_2H_4

25. In which of the following reaction, product formation takes place by Hofmann rule?

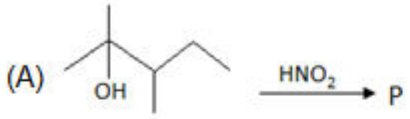
(A) 

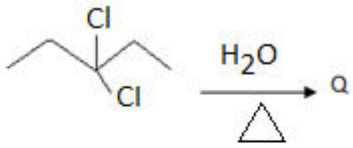
(B) 

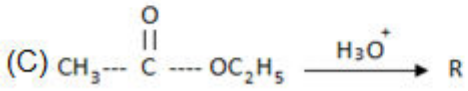
(C) 

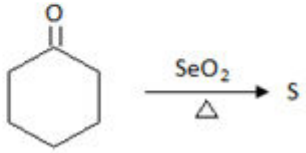
(D) 

26. Which of the following reaction products give haloform test?

(A) 

(B) 

(C) 

(D) 

27. A balloon blown with 1 mol of a gas, has a volume of 480 ml at 5^0 C. If the balloon is filled to $\frac{7}{8}$ the of its maximum capacity, then which of the following is/ are Correct?
(A) The balloon will burst at 30^0 C
(B) The pressure of the gas inside the balloon at 5^0 C is 47.5 atm
(C) The minimum temperature at which the balloon will burst is 44.71^0C
(D) The pressure of gas when balloon burst at minimum temperature is 50 atm.

28. For the cell:

$$Tl_{(s)} / Tl^{+}(0.001M) // Cu^{+2}(0.1M) / Cu_{(s)} :$$

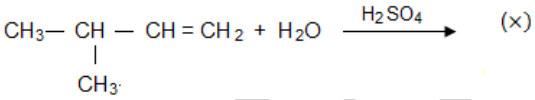
E_{cell} = 0.83V at 298K, The cell potential can be increased by
(A) increasing $[cu^{+2}]$ (B) increasing $[Tl^{+}]$
(C)decreasing $[Cu^{+2}]$ (D) decreasing $[Tl^{+}]$

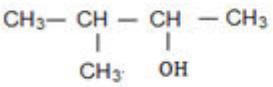
Section – II

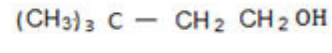
Passage – I

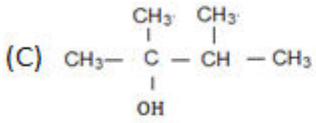
Acid catalysed hydration of alkenes gives alcohol accordingly Markownikoff's rule. Alcohols are also prepared from alkenes by oxy mercuration-de mercuration and hydro boration oxidation.

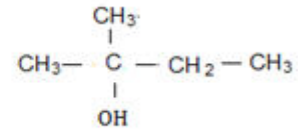
29. The Major product (x) of the following reaction is:

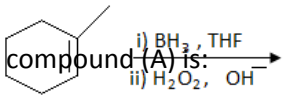


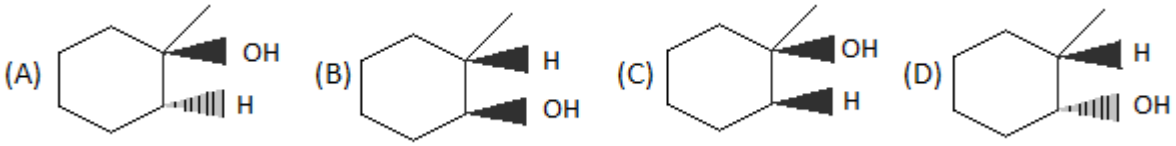
(A) 

(B) 

(C) 

(D) 

30)
(A)The compound (A) is: 



Passage - II

A solution is 0.1 M in each KCl, KBr and K_2CrO_4 to this solution solid $AgNo_3$ is gradually added. Assume there is no change in the volume of the solution given:
Ksp (Agcl) = 1.7×10^{-10}
Ksp (AgBr) = 5.0×10^{-13} and Ksp (K_2Cro_4) = 1.9×10^{-12}

31. The concentration of first ion when the second ion starts precipitating is about:
(A)0.1M (B) 0.03M (C) 0.003M (D) 0.0003M

32. The concentration of [Ag^+] required to start the precipitation of AgBr is:
(A) 5×10^{-12} M (B) 1.7×10^{-9} M (C) 6×10^{-11}M (D) 4×10^{-8} M

Passage - III

Lime stone is an ore of Calcium. On decomposition gives an oxide (A) and CO_2 gas. 'A' is reduced by Coke to give 'B' and Volatile gas.

$$B + N_2 \xrightarrow[1200^0 C]{CaCl_2} \text{Nitrolim}$$

Nitrolim is a fertilizer.

33. The total number of non bonded electrons present incyanamide ion is
(A) 4 (B) 2 (C) 8 (D) 0

34. The type of bonds present in compound (B) are:
(A) Ionic only (B) Both Ionic & Covalent (C) Dative bond (D) Ionic, Covalent & dative

Passage - IV

A solid crystal is composed of X, Y and Z atoms. Z atoms (radius 200 pm) form cubic closed packed structure where as X (radius 50 pm) and Y (radius 100 pm) occupy respective voids. Assume all the voids are occupied.

35. Which type of voids are occupied by 'x' atoms:
(A) Tetrahedral (B) Octahedral (C) Cubic (D) All of these

36. If all the atoms along one body diagonal are removed, then the formula of the compound becomes:
(A) $X_8Y_4Z_5$ (B) $X_8Y_4Z_4$ (C)$X_8Y_4Z_8$ (D) $X_8Y_6Z_7$

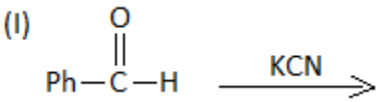
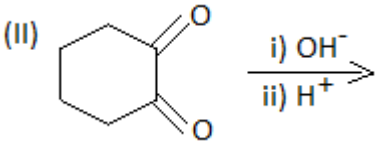
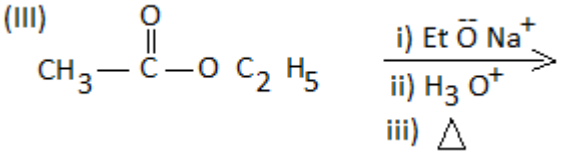
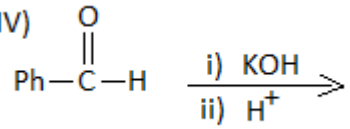
Section – III

37. Match the reactions of metal with dilHNO_3 (in Column - I) with nitrogen compounds obtained by oxidation/reduction (Column - II)

	Column - I		Column – II
(I)	Mg + dilHNO_3	(P)	NO
(II)	Zn + dilHNO_3	(Q)	H_2
(III)	Cu + dilHNO_3	(R)	N_2O
(IV)	Pb + Conc. HNO_3	(S)	NO_2

(A) I – R, II – Q, III – S, IV – P (B) I – Q , II – S, III – S, IV – R
(C) I – Q, II – R, III – P, IV – S (D) I – R, II – Q, III – P, IV – S

38. Match the following

Column – I	Column – II
(I) 	(P) Final product gives positive Tollen's Test
(II) 	(Q) Final product gives test with 2, 4 - DNP
(III) 	(R) Final product reacts with Na and liberates CO_2 gas
(IV) 	(S) Final product reacts with Na liberates H_2 gas

(A) I→ p, q, r II → q III → P, r, s IV → p (B) I→ p, q, s II → r, s III → q IV → r, s
(C) I→ p, r II → q, p III → q IV → q, s (D) I→ p, s II → q, s III → p IV → q, s

ROUGH SPACE

39. Match the following

Column – I	Column – II
(I) $(NH_4)_2SO_4$	(P) h = $\sqrt{\frac{K_H}{C}}$
(II) KCl	(Q) $P^H = \frac{1}{2}[P^{KW} + P^{Ka} + \log c]$
(III) CH_3 COOK	(R) $K_H = \frac{K_w}{K_a \times K_b}$
(IV) $(NH_4)_2S$	(S) $[H^+] = [O\bar{H}]$

(A) I→ P, S II → P, S, III → P, Q, IV → S
(B) I→ P, II → S, III → P, Q IV → R
(C) I→ P, Q, R II → S, III → P, S, IV → P, R
(D) I→ P, R II → S, III → P, Q, IV → S

40. Match the following

Column – I	Column – II
(I) Zns	(P) limiting ratio = 0.414
(II) Nacl	(Q) Frenkel defect
(III) CsCl	(R) Coordination number = 4
(IV) CaF_2	(S) 8 nearest neighbours of the cation

(A) I→ q, r, II → p III → s, IV → r, s
(B) I→ p, q, r, II → q, r III → q, s IV → r, s
(C) I→ p, r II → q III → q, s IV → s
(D) I→ q II → p, r III → r, s IV → q, s

MATHEMATICSATS JEE ADVANCED

Section – I

This section contains eight questions. Each question has four choices, out of which one or more than one may be correct.

41. Point of intersection of the lines $\sqrt{3}x - y - 4\sqrt{3}m = 0$ and $\sqrt{3}mx + my - 4\sqrt{3} = 0$ describes
(A) a hyperbola (B) a parabola (C) a conic of eccentricity 2 (D) a conic of eccentricity ½

42. A square is inscribed in the circle $x^2 + y^2 - 2x + 4y - 93 = 0$ with the sides parallel to the coordinate axes. The coordinate of the vertices are
(A) (8, 5) (B) (8, 9) (C) (–6, 5) (D) (–6, –9)

43. $\int_{-1}^{1} \frac{d}{dx}\left(\tan^{-1}\frac{1}{x}\right)dx$ is
(A) $\frac{\pi}{2}$ (B) $\frac{\pi}{4}$ (C) $-\frac{\pi}{2}$ (D) $-\frac{\pi}{4}$

ROUGH SPACE

44. If $f(x-y)$, $f(x)\,f(y)$ and $f(x+y)$ are in A.P for all $x, y \in R$ and $f(0) \neq 0$ then
(A) $f(x)$ is an even function (B) $f'(1)+f'(-1)=0$ (C) $f'(2)-f'(-2)=0$ (D) $f(3)+f(-3)=0$

45. If $f(x)=\dfrac{(1+x)^{1/x}-e}{x}$ then

(A) $\lim\limits_{x\to\infty} f(x)=\dfrac{e}{2}$ (B) $\lim\limits_{x\to 0} f(x)=-\dfrac{e}{2}$ (C) $\lim\limits_{x\to 0} f(x)>1$ (D) $\lim\limits_{x\to 0} f(x)<-1$

46. Let $f: R \to R$ be a function defined by $f(x) = \text{Max}\{x, x^3\}$ then
(A) $f(x)$ is discontinuous at 3 points (B) $f(x)$ is not differentiable at 3 points
(C) $f(x)$ is continuous at all points (D) $f(x)$ is not differentiable at $x = 0$

47. If $f(x+1/x) = x^3 + 1/x^3$ ($x \neq 0$) then
(A) $f(x)$ is increasing function (B) $f(x)$ has a local maximum at $x = -1$
(C) $f(x)$ is injective in its domain of definition (D) The equation $f(x) = 3$ has a unique real root

48. Solution of the equation $(1+x^2)dy = (1+y)\,dy$ is
(A) $y - x = c(1+xy)$ (B) $y - x = c(1-xy)$ (C) $\text{Tan}^{-1}y = \text{Tan}^{-1}x + c$ (D) $\text{Tan}^{-1}x + \text{Cot}^{-1}y = c$

SECTION – II

Passage – I

A square matrix A such that $A^{\theta}=A$ is called Hermitian matrix i.e. $a_{ij}=\overline{a_{ji}}$ for all values of i and j and a square matrix A such that $A^{\theta}=-A$ is called skew –Hermitian matrix i.e. $a_{ij}=-\overline{a_{ji}}$ for all values of i and j. where A^{θ} is conjugate transpose matrix.

Let $f: M \to \{1,-1\}$, M is set of all hermitian or Skew–hermitian matrixes, be a function defined as

$$f(A)=\begin{cases}1 & A\ is\ hermitian\\ -1 & A\ is\ \ skew\,hermitian\end{cases}$$

49. $f(A-A^{\theta})=$
(A) +1 (B) –1 (C) +1 any when f(A) >0 (D) –1 any when f(A) >0

50. Let $Y=A^n$
(A) if f(Y)=1 then f(A)=1 (B) if f(Y)= –1 then f(A) = –1 (C) f(Y).f(A)=1 if n is odd (D) f(Y).f(A)=1 if n is even

Passage – II

For any angle A, $\sqrt{1+\sin A}=\left|\cos\frac{A}{2}+\sin\frac{A}{2}\right|$, $\sqrt{1-\sin A}=\left|\cos\frac{A}{2}-\sin\frac{A}{2}\right|$

Use this information to answer the following.

51. $\sqrt{1+\sin A}-\sqrt{1-\sin A}=-2\cos\frac{A}{2}\Rightarrow$

(A) $\frac{\pi}{2}<A<\frac{3\pi}{2}$ (B) $\frac{3\pi}{2}<A<\frac{7\pi}{2}$ (C) $\frac{5\pi}{2}<A<\frac{7\pi}{2}$ (D) $\frac{7\pi}{2}<A<\frac{9\pi}{2}$

52. If $A=280^\circ$ then $\sqrt{1+\sin A}+\sqrt{1-\sin A}=$

(A) $2\sin 50^\circ$ (B) $2\cos 50^\circ$ (C) $2\sin 10^\circ$ (D) $2\cos 10^\circ$

Passage – III

Consider the function $f:R\to(0,\infty)$ defined by $f(x)=2^x+2^{|x|}$

53. $f(x)$ is

(A) One–One Onto (B) One–One Into (C) Many–One Onto (D) Many–One Into

54. The area of the region bounded by the curves $y=f(x), y=0, x=-1$ and $x=1$ is

(A) $\ln\left(2^{7/2}\right)$ sq.units (B) $\log_2\left(e^{7/2}\right)$ sq.units (C) $\frac{3}{\ln 2}$ sq.units (D) $\frac{2}{\ln 2}$ sq.units

Passage – IV

A JEE aspirant estimates that she will be successful with an 80% chance if she studies 10 hours per day, with a 60% chance if she studies 7 hours per day and with a 40% chance if she studies 4 hours per day. She further believes that she will study10 hours, 7 hours and 4 hours per day with probabilities 0.1, 0.2 and 0.7 respectively

55. Given that she is successful, the probability she studied for 4 hours is

(A) $\frac{6}{12}$ (B) $\frac{7}{12}$ (C) $\frac{8}{12}$ (D) $\frac{9}{12}$

56. Given that she does not achieve success, the probability she studied for 4 hours is

(A) $\frac{18}{26}$ (B) $\frac{19}{26}$ (C) $\frac{20}{26}$ (D) $\frac{21}{26}$

Section – III

57.These are three pots and four coins. All these coins are to be distributed into these pots where any pot can contain any number of coins.

Column – I		Column – II	
(A)	The number of ways in which all these coins can be distributed if all coins are identical but all pots are different	(P)	3
(B)	The number of ways in which all these coins can be distributed if all coins are different but all pots are identical	(Q)	6
(C)	The number of ways all these coins can be distributed such that no pot is empty if all coins are different but all pots are identical	(R)	15
(D)	The number of ways all these coins can be distributed such that no pot is empty is all coins are identical but all pots are different	(S)	14

58.Match the following

Column – I		Column - II	
(A)	The shortest distance between the lines $\frac{x-3}{3}=\frac{y-8}{-1}=\frac{z-3}{1}$ and $\frac{x+3}{-3}=\frac{y+7}{2}=\frac{z-6}{4}$ is	(P)	13
(B)	The distance of the point of intersection of the line $\frac{x-2}{3}=\frac{y+1}{4}=\frac{z-2}{12}$ and the plane x-y+z=5 from the point (-1,-5,-10) is	(Q)	$\sqrt{\frac{2109}{110}}$
(C)	The length of the perpendicular drawn from the point (5,4,-1) on the line $\frac{x-1}{2}=\frac{y}{9}=\frac{z}{5}$ is	(R)	2
(D)	The distance between the points P and Q is d and the length of the projection of PQ on the co-ordinate planes are d_1,d_2,d_3 then $d_1^2+d_2^2+d_3^2=kd^2$ when k is	(S)	$3\sqrt{30}$

ROUGH SPACE

59. Match the following :

	Column – I		**Column – II**
A)	$\arg\frac{z+1}{z-1}=\frac{\pi}{4}$	P)	Parabola
B)	$\lvert z-2\rvert=4$	Q)	Part of a circle
C)	$\arg z=\frac{\pi}{4}$	R)	Full circle
D)	$z=t+it^2 (t\in R)$	S)	Straight Line

60. 'n' whole numbers are randomly chosen and multiplied, then probability that

Column I	**Column II**
(A) the last digit is 1, 3, 7 or 9	(P) $\frac{8^n-4^n}{10^n}$
(B) the last digit 2, 4, 6, 8	(Q) $\frac{5^n-4^n}{10^n}$
(C) the last digit is 5	(R) $\frac{4^n}{10^n}$
(D) the last digit is zero	(S) $\frac{10^n-8^n-5^n+4^n}{10^n}$