JEE MAIN-2024-25 (Part Test-4)

(Physics, Chemistry and Mathematics)

SYLLABUS

Physics :- Ray Optics, Wave Optics
Chemistry :- Haloalkens & Haloarens, Alcohol Phenol Ether, Aldehyed Keton, Carboxylic acid
Mathematics :- Differential Equation, Probability

4
PART TEST

CLASS-XIIth

Date :- .... **Time :- 3:00 Hrs.** **Marks :- 300**

Important Instructions :

1. The test duration is of **3 hours**.
2. The Test Booklet consists of 90 questions. The maximum marks are 300.
3. There are **three** parts in the question paper consisting of **Physics, Chemistry** and **Mathematics** having 30 questions in each part of equal weightage. Each part (subject) has two sections.

   (i) **Section-A:** This section contains 20 multiple choice questions which have only one correct answer. Each question carries **4 marks** for correct answer and **–1 mark** for wrong answer.
   (ii) **Section-B:** This section contains 10 questions. In Section-B, attempt any **five questions out of 10.** The answer to each of the questions is a numerical value. Each question carries **4 marks** for correct answer and **–1 mark** for wrong answer. For Section-B, the answer should be rounded off to the nearest integer.

Student's Name :- ....
School Name :- ....

Student's Signature :- .... **Invigilator's Signature :- ....**

PE

SECTION-A

1. Two polaroids A and B are placed perpendicularly in the path of a beam of unpolarised light. In between these two a third polaroid C is placed at an angle of 30° with that of A. The percentage of intensity of incident unpolarised light that emerges from B:

(A) 2.8% (B) 9.4% (C) 15.3% (D) 10.2%

2. The focal length of a lens of refractive index 3/2 is 10 cm in air. The focal length of that lens in a medium of refractive index 7/5 is:

(A) – 70 cm (B) 10/7 cm

(C) 70 cm (D) none of these

3. In Young's double slit experiment, white light is used. The separation between the slit is b. The screen is at a distance d(d >> b) from the slits. Some wavelengths are missing exactly in front of one slit. Maximum wavelength of these wavelengths is :

(A) $\lambda = \frac{b^2}{d}$ (B) $\lambda = \frac{2b^2}{d}$

(C) $\lambda = \frac{b^2}{4d}$ (D) $\lambda = \frac{2b^2}{3d}$

4. Consider the following statements :

S1 : A plane mirror can form real image.

S2 : A concave mirror always forms a real image for all positions of object.

S3 : A concave mirror always forms a real image for all positions of virtual object.

S4 : A convex mirror always forms virtual image for all positions of real object.

State, in order, whether S1, S2, S3, S4 are true or false

(A) T F T T (B) F F T T

(C) T T T T (D) T T F F

5. In Young's double slit experiment, the intensity on the screen at a point where path difference is λ is K. What will be the intensity at the point where path difference is $\frac{\lambda}{4}$ [assume equal slit width]

(A) $\frac{K}{4}$ (B) $\frac{K}{2}$ (C) K (D) Zero

6. An object O is kept perpendicular to the principal axis of a spherical mirror. Each situation (P,Q,R and S) gives object coordinate u in centimeters with sign, the type of mirror, and then the distance (centimeters, without sign) between the focal point and the pole of the mirror. On the right side information regarding the image is given. Correctly match the situations on the left side with the images described on the right side.

List–I

Situation u	**Mirror**
(P) –18	Concave, 12
(Q) –12	Concave, 18
(R) –8	Convex, 10
(S) –10	Convex, 8

List–II

Image

(1) Real, Errect, Enlarged

(2) Virtual, Errect, Diminished

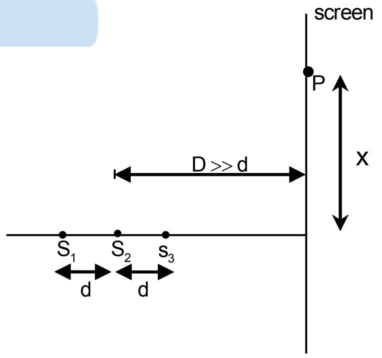
(3) Real, inverted, Enlarged

(4) Virtual, Erect, Enlarged

Codes :

	P	Q	R	S
(A)	3	1	2	4
(B)	3	4	2	2
(C)	4	2	1	3
(D)	4	1	2	3

7. Three identical coherent point sources S_1, S_2 and S_3 are placed on a line perpendicular to the screen as shown in the figure. The wavelength of light emitted by source is d = 3λ, the distance of S_2 from the screen is D (>>>λ). Find the minimum distance x of a point P on the screen at which complete darkness is obtained.



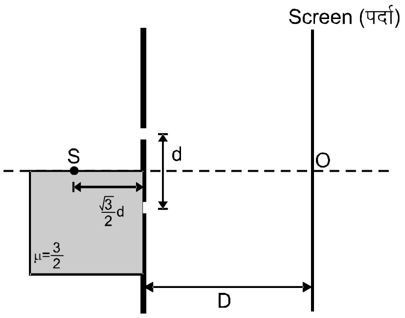
(A) $\frac{2\sqrt{2}D}{7}$ (B) $\frac{\sqrt{17}\,D}{8}$

(C) $4\sqrt{5}$ (D) $D\frac{4\sqrt{2}\,D}{7}$

8. A square glass slab thickness 15 cm. contains a small air bubble. Its apparent depth on looking through one face is 6 cm and when viewed through opposite face is 4 cm. The refractive index of glass slab is

(A) 3.5 (B) 2.5 (C) 1.5 (D) 1.33

9. In a YDSE arrangement a source S is placed symmetrically at a distance $\frac{\sqrt{3}d}{2}$ and some portion is filled with a medium of refractive index $\frac{3}{2}$ as shown in figure then distance of central maxima on the screen from point O in interference pattern (assume d << D) :



(A) $\frac{D}{2}$ (B) $\frac{D}{\sqrt{3}}$ (C) $\frac{D}{\sqrt{2}}$ (D) zero

10. A luminous point object is moving along the principal axis of a concave mirror of focal length 12 cm towards it. When its distance from the mirror is 20 cm its velocity is 4 cm/s. The velocity of the image in cm/s at that instant is
(A) 6, towards the mirror
(B) 6, away from the mirror
(C) 9, away from the mirror
(D) 9, towards the mirror.

11. A thin oil film of refractive index 1.2 floats on the surface of water ($\mu = \frac{4}{3}$). When a light of wavelength $\lambda = 9.6 \times 10–7$ m falls normally on the film from air, then it appears dark when seen normally. The minimum change in its thickness for which it will appear bright in normally reflected light by the same light is:
(A) 10–7 m (B) 2 x 10–7 m
(C) 3 x 10–7 m (D) 5 x 10–7 m

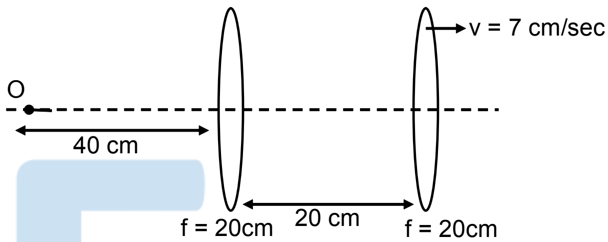
For minimum thickness increment $2\,\mu 1\,\Delta t = \frac{\lambda}{2}$

$$\Rightarrow (t2 - t1) = \frac{\lambda}{4\mu_1} = \frac{9.6\times10^{-7}}{4\times1.2} = 2 \times 10–7 \text{ m}$$

12. If a prism having refractive index, $\sqrt{2}$ has angle of minimum deviation equal to the angle of refraction of the prism, then the angle of refraction of the prism is:
(A) 30º (B) 45º (C) 60º (D) 90º

13. Two beams, A and B, of plane polarized light with mutually perpendicular planes of polarization are seen through a polaroid. From the position when the beam A has maximum intensity (and beam B has zero intensity), a rotation of polaroid through 30º makes the two beams appear equally bright. If the initial intensities of the two beams are I_A and I_B respectively, then $\frac{I_A}{I_B}$ equals
(A) 3 (B) $\frac{3}{2}$ (C) 1 (D) $\frac{1}{3}$

14. A point object O located 40 cm from the first of two converging lenses (each of focal length 20 cm), as shown in figure. If the speed of right lens is 7 cm/sec rightwards, speed of final image is $\frac{7k}{4}$ cm/sec at the instant shown. Find the value of k.



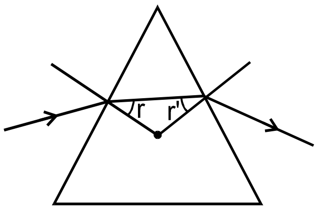
(A) 3 (B) 2 (C) 8 (D) 7

15. A single slit diffraction pattern is obtained using a beam of red light. What happens if the red light is replaced by blue light?
(A) There is no change in the diffraction pattern
(B) Diffraction fringes become narrower and crowded together
(C) Diffraction fringes become boarder and crowded together
(D) The diffraction pattern disappears

16. A lens of focal length 20.0 cm and aperture radius 2.0 cm is placed at a distance 30.0 cm from a point source of light. On the other side a screen is placed at a distance 50.0 cm from the lens. The radius of spot of light formed on screen is. (Neglect spherical abberation through lens)
(A) 0.5 cm (B) 0.3 cm
(C) 0.2 cm (D) 1.0 cm

17. A two slit Young's interference experiment is done with monochromatic light of wavelength 6000 Å. The slits are 2 mm apart. The fringes are observed on a screen placed 10 cm away from the slits. Now a transparent plate of thickness 0.5 mm is placed in front of one of the slits and it is found that the interference pattern shifts by 5 mm. The refractive index of the transparent plate is :
(A) 1.2 (B) 0.6 (C) 2.4 (D) 1.5

18. r and r' denote the angles inside an equilateral prism, as usual, in degrees. Consider that during some time interval from t = 0 to t = t, r' varies with time as r' = 10 + t2. During this time r will vary as : (Assume that r and r' are in degree) :



(A) 50 – t2 (B) 50 + t2
(C) 60 – t2 (D) 60 + t2

19. In a Young's double slit experiment the intensity at a point I where the corresponding path difference is one sixth of the wavelength of light used. If I_0 denotes the maximum intensity, the ratio $\frac{I}{I_0}$ is equal to

(A) $\frac{1}{4}$ (B) $\frac{1}{2}$ (C) $\frac{\sqrt{3}}{2}$ (D) $\frac{3}{4}$

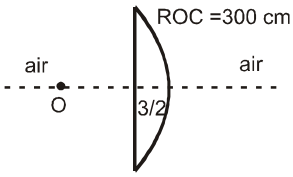
20. A lens is placed between a source of light and a wall. It forms images of area A1 and A2 on the wall, for its two different positions. The area of the source of light is (source and wall are fixed)-

(A) (A1A2)1/2 (B) $\frac{A_1 + A_2}{2}$

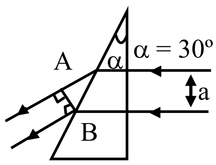
(C) $\left(\frac{1}{A_1} + \frac{1}{A_2}\right)^{-1}$ (D) $\left(\frac{\sqrt{A_1} + \sqrt{A_2}}{2}\right)^2$

SECTION-B

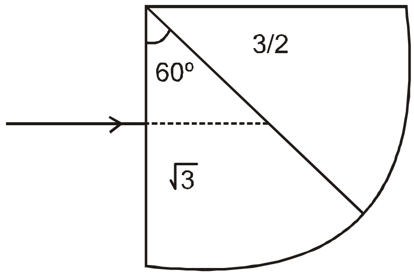
21. Plane surface of a thin planoconvex lens reflects 50% of light, while the curved surface is completely transparent, if final image of 'O' after refraction through lens coinsides with the image formed due to partial reflection from plane surface. If distance (in m) between 'O' and lens is x then find x/4.



22. A plane wavefront of monochromatic wave (λ = 500 nm) is falling on a glass Prism (n = $\sqrt{2}$) and emerge as shown. The distance between incident rays a = 2 cm. what is the difference of phase between the light wave at point A and B after exit from the prism.

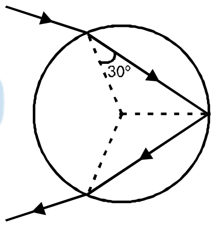


23. Two parts of long cylinder having refractive index $\sqrt{3}$ and $\frac{3}{2}$ are arranged as shown in figure. When a light ray is incident an one plane surface as shown, total deviation produced in the path of light ray is $\frac{\pi}{3x}$ rad. then calculate x.



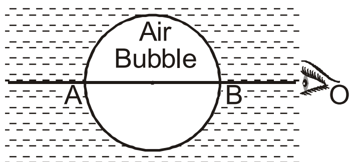
24. In Young's double slit experiment the two slits act as coherent sources of equal amplitude A & wavelength λ. In another experiment with the same set up the two slits are source of equal amplitude A & wavelength λ but are incoherent. The ratio of intensity of light at the mid point of the screen into the first case to that in second case.

25. A ray is incident on a sphere of refractive index $\sqrt{2}$ as shown in figure. Angle of refraction of the ray inside sphere is 30°. If total deviation suffered by the ray is 30x°, then find x.

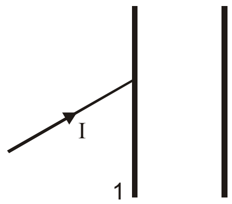


26. In a Young's double slit experiment, 12 fringes are observed to be formed in a certain segment of the screen when light of wavelength 600 nm is used. If the wavelength of light is changed to 400 nm, what will be number of fringes observed in the same segment of screen.

27. Inside water $\left(\mu = \frac{4}{3}\right)$ there is an air bubble of radius 4 cm as shown in figure. An observer O is looking into the diametrical axis AB of bubble. Find the distance in mm of a point object from point A on the axis in water which appears to be at point A as seen by observer.



28. A narrow monochromatic beam of light of intensity I is incident on a glass plate as shown in figure. Another identical glass plate is kept close to the first one & parallel to it. Each glass plate reflects 25 % of the light incident on it & transmits the remaining. The ratio of the minimum & the maximum intensities in the interference pattern formed by the two beams obtained after one reflection at each plate is 1:n find value of n.



29. Two plane mirrors are placed with reflecting surfaces parallel and facing to each other. A point object is placed between them at a distance 5cm from first mirror and 3 cm from second mirror. Find the distance (in cm) between the 3rd image behind first mirror and the 3rd image behind the second mirror.

30. Assuming human pupil to have a radius of 0.25 cm and a comfortable viewing distance of 25 cm, the minimum separation between two objects that human eye can resolve at 500 nm wavelength is :

CHEMISTRY

SECTION-A

31. Which of the following is 1° alkyl halide?

(A) $R\,CH_2-X$ (B) $R_2\,CHX$

(C) $R_3\,C-X$ (D) $R-H$

32. Lucas reagent reacts fastest with:

(A) 1 – butanol

(B) 2 – butanol

(C) 2 – methyl – 1- propanol

(D) 2 – methyl – 2 – Propanol

33. The IUPAC name of tertiary butyl chloride is:

(A) 2 – chloro – 2 – methyl propane

(B) 3 – chlorobutane

(C) 4 – chlorobutane

(D) 1, 2 – chloro – 3 – methyl propane

34. The common name for the molecule given below is

$CH_2=CH-CH_2-Cl$

(A) Vinyl chloride (B) Aryl chloride

(C) Allyl chloride (D) None of these

35. Benzaldehyde will be formed in the reaction –

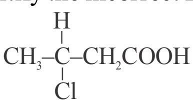
(A) Hydrolysis of $C_6H_5CHCl_2$

(B) Ozonolysis of $C_6H_5CH=CH_2$

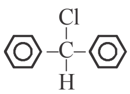
(C) Both the above

(D) None of the above

36. Identify the incorrect IUPAC name-

(A)  $\longrightarrow$ 3–Chlorobutanoic acid

(B)  $\longrightarrow$ 3–Chlorobut-1-ene

(C)  $\longrightarrow$ 1-Chloro-1, 1-diphenylmethane

(D) None of these

37. Which of the following forces correctly describes the boiling point of aldehydes & ketones?

(A) Hydrogen bond

(B) Vander waals force

(C) Dipole-dipole attraction

(D) None of these

38. What is the final product of the given reaction

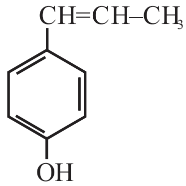
$CH_3-CH\equiv CH \xrightarrow{Na} \xrightarrow{CH_2-CH_2-I}$ Product

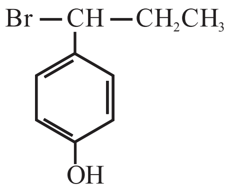
(A) $CH_2=CH-CH_2-CH_3$

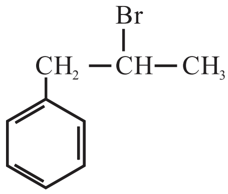
(B) $CH_3-CH_2-C\equiv C-CH_2-CH_3$

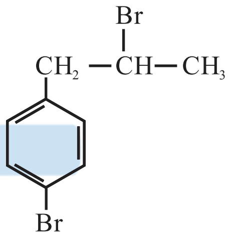
(C) $CH\equiv C-CH_2-CH_2-CH_3$

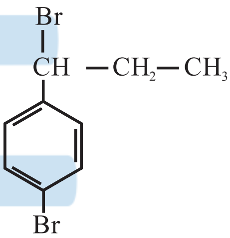
(D) $CH_3-C\equiv C-CH_2-CH_3$

39.  $+HBr \rightarrow$ X, here X in the reaction is

(A) 

(B) 

(C) 

(D) 

40. Which one of the following methods cannot yield alkyl halide?

(A) $CH_3COOAg + Br_2 \xrightarrow[A]{\text{anhyd. ZnCl}}$

(B) $CH_3COOAg + Br_2 \xrightarrow{CCl_4}$

(C) $CH_2=CH_2 \xrightarrow{SOCl_2}$

(D) $CH_3CH_2OH + HX_2 \xrightarrow[A]{\text{anhyd. ZnCl}}$

41. Identify B in the following scheme:

$CH_3CH_2CH_2OH \xrightarrow{PCl_5} A \xrightarrow{\text{alc.KOH}} B$

(A) Propyne (B) Propene

(C) Propanol (D) Propanone

42. The general order of reactivity of carbonyl compounds for nucleophilic addition reactions is -

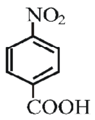
(A) $H_2C=O > RCHO > ArCHO > R_2C=O > Ar_2C=O$

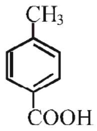
(B) $ArCHO > Ar_2C=O > RCHO > R_2C=O > H_2C=O$

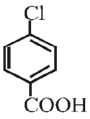
(C) $Ar_2C=O > R_2C=O > ArCHO > RCHO > H_2C=O$

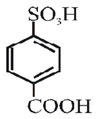
(D) $H_2C=O > R_2C=O > Ar_2C=O > RCHO > ArCHO$

43. Which of the following acids is weaker than benzoic acid ?

(A) 

(B) 

(C) 

(D) 

44. Br_2 dissolved in CS_2 reacts with phenol at 273K to give ..... as the major product
(A) o - Bromophenol
(B) m – Bromophenol
(C) p - Bromophenol
(D) 2,4,6 – Tribromophenol

45. The C – O – C angle in ether is about:
(A) 180° (B) 190°28 (C) 110° (D) 105°

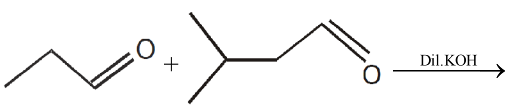
46. The most acidic compound among the following is
(A) Phenol (B) Ethanol
(C) 3,5-dinitrophenol (D) 4-methoxy phenol

47. Ethyl alcohol is the hydrolysis product of:
(A) C_2H_5Cl (B) CH_3CHO
(C) C_2H_4 (D) C_2H_5MgI

48. Tertiary butyl alcohol gives tertiary butyl chloride on treatment with:
(A) Conc. HCl/ anhydrous $ZnCl_2$
(B) KCN
(C) NaOCl
(D) Cl_2

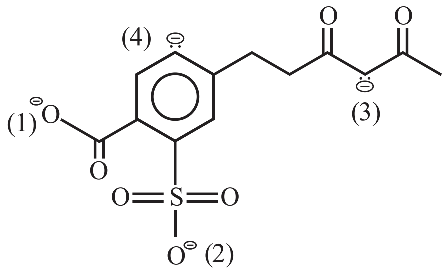
49. An example of a sigma bonded organometallic compound is:
(A) Cobaltocene (B) Ruthenocene
(C) Grignard's (D) Ferrocene

50. Which of the following will not be soluble in sodium hydrogen carbonate?
(A) Benzoic acid
(B) o-Nitrophenol
(C) Benzenesulphonic acid
(D) 2,4,6-trinitrophenol

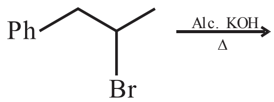
51. 

Total number of aldol condensation products are (excluding stereoisomer)

52. Which is the strongest nucleophilic site in the following species?



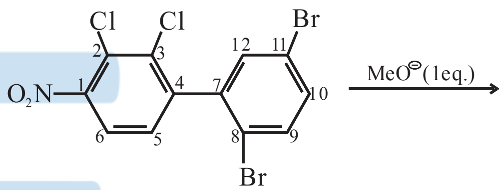
53. How many structural isomers are possible for a compound with molecular formula C_3H_7Cl.

54. 

X is

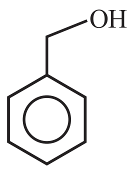
X is the total number of possible akenes in this elimination reaction.

55. In the following reaction the nucleophile (MeO.) will displace which of the halogen atom most readily.

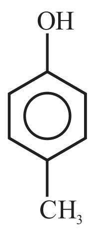


56. The total number of alkenes possible by dehydrobromination of 3-bromo-3- methylhexane using alcoholic KOH is:

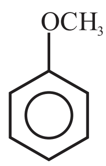
57. Number of compound that can give purple colour with neutral $FeCl_3$.



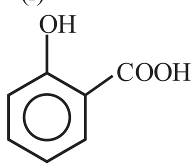
(i)



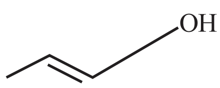
(ii)



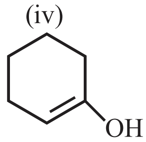
(iii)



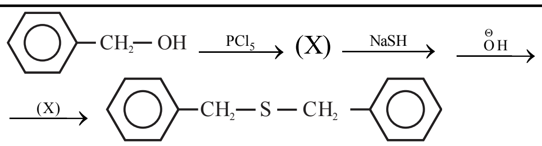
(iv)



(v)

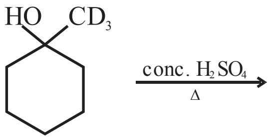


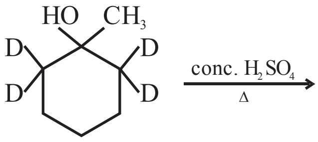
(vi)

58. 

The number of times SN_2 reaction has taken place is ………

59. If the starting material is labelled with deuterium as indicated, predict how many total deuterium atoms will be present in the major elimination product?

(a) 

(b) 

60. In the given reaction:

$$\begin{array}{c} \quad\quad\quad\quad\quad OH \\ \quad\quad\quad\quad\quad | \\ CH_3CH-CH-CH_3 \\ | \quad\quad\quad \\ Ph \quad\quad \end{array} \xrightarrow[\Delta]{\text{Conc. } H_2SO_4}$$

Total number of alkenes (including stereo isomers) formed will be

MATHEMATICS
SECTION-A

61. The solution curve of

$$\frac{dy}{dx} = \frac{y^2 - 2xy - x^2}{y^2 + 2xy - x^2}, \; y(-1) = 1 \text{ is-}$$

(A) a parabola (B) ellipse
(C) circle (D) straight line

62. Solution of differential equation
$(2x \cos y + y^2 .\ \cos x)dx +$
$(2y . \sin x - x^2 . \sin y)dy = 0$ is –
(A) $x^2.\cos y + y^2 . \sin x = C$
(B) $x . \cos y - y . \sin x = C$
(C) $x^2 . \cos^2 y + y^2 . \sin^2 x = C$
(D) $x \cos y + y \sin x = C$

63. Tangent to a curve intersect the y axis at a point P. A line perpendicular to this tangent through P passes through point (1, 0). The differential equation of the curves is

(A) $y.\dfrac{dy}{dx} - x\left(\dfrac{dy}{dx}\right)^2 = 0$

(B) $x\dfrac{d^2y}{dx^2} + \left(\dfrac{dy}{dx}\right)^2 = 1$

(C) $y.\dfrac{dx}{dy} + x = 1$

(D) None of these

64. Solution of $(xy^4 + y)\,dx - xdy = 0$ is

(A) $\dfrac{x^4}{4} + \left(\dfrac{x}{y}\right)^3 = c$ (B) $\dfrac{x^4}{4} + \dfrac{1}{3}\left(\dfrac{x}{y}\right)^2 = c$

(C) $\dfrac{x^4}{4} + 3\left(\dfrac{x}{y}\right)^2 = c$ (D) None of these

65. The real value of m for which the substitution $y = u^m$ will transform the differential equation $2x^4y\dfrac{dy}{dx} + y^4 = 4x^6$ in to a homogeneous equation is
(A) $m = 0$ (B) $m = 1$
(C) $m = 3/2$ (D) $m = 2/3$

66. The differential equation of the family of hyperbolas with asymptotes as the line $x + y = 1$ and $x - y = 1$ is:
(A) $yy' + x = 0$ (B) $yy' = (x - 1)$
(C) $yy'' + y' = 0$ (D) $y' + xy = 0$

67. The equation to the curve which is such that portion of the axis of x cut off between the origin and the tangent at any point is proportional to the ordinate of that point is
(A) $x = y\,(C - K \log y)$ (B) $\log x = Ky^2 + C$
(C) $x^2 = y\,(C - K \log y)$ (D) None of these
[K is constant of proportionality]

68. If f(x) and g(x) are two solutions of the differential equation $ay'' + x^2 y' + y = e^x$ then $f(x) - g(x)$ is solution of
(A) $a^2 y'' + y' + y = e^x$ (B) $ay'' + y = e^x$
(C) $ay'' + x^2 y' + y = 0$ (D) $y'' + x^2 y' + y = 0$

69. The general solution of $y.\dfrac{d^2y}{dx^2} = \left(\dfrac{dy}{dx}\right)^2$ is -

(A) $y = C_1x + C_2$ (B) $y = C_1 e^{C_2 x}$

(C) $y = C_1x + C_2e^x$ (D) $y = e^{C_1 x} + e^{C_2 x}$

70. The solution of $\dfrac{x^3dx + yx^2dy}{\sqrt{x^2 + y^2}} = ydx - xdy$ is:

(A) $\sqrt{x^2 + y^2} = Cx$ (B) $\sqrt{x^2 + y^2} + y/x = C$

(C) $\sqrt{x^2 + y^2} + y/x^2 = C$ (D) $(x^2 + y^2)^2 + xy^2 = C$

71. If the integer α and β are chosen at random between 1 and 100, then the probability that $7^\alpha + 7^\beta$ is divisible by 5, is

(A) $\dfrac{1}{4}$ (B) $\dfrac{1}{8}$ (C) $\dfrac{1}{7}$ (D) $\dfrac{1}{49}$

72. Probability when a fair die is thrown to get a prime number -

(A) $\dfrac{1}{2}$ (B) $\dfrac{3}{5}$ (C) $\dfrac{4}{5}$ (D) $\dfrac{5}{6}$

73. The probability that a particular day in the month of july is a rainy day is $\dfrac{3}{4}$. Two person whose credibility are $\dfrac{4}{5}$ and $\dfrac{2}{3}$ respectively claim that 15th july was a rainy day. The probability that it was real a rainy day.

(A) $\dfrac{3}{4}$ (B) $\dfrac{24}{25}$

(C) $\dfrac{8}{9}$ (D) none of these

74. Let the 9 different letters A, B, C.... I $\in$ {1, 2, 3,....9} then the probability that product (A – 1)(B – 1)..... (I – 9) is even number will be-

(A) $\frac{1}{2}$ (B) $\frac{1}{4}$ (C) 1 (D) 0

75. Three boxes are labelled A, B and C and each box contains four balls numbered 1, 2, 3 and 4. The balls in each box are well mixed. A child chooses one ball at random from each of the three boxes. If a, b and c are the numbers on the balls chosen from the boxes A, B and C resepctively, the child wins a toy helicopter when a = b + c. The odds in favour of the child to receive the toy helicopter are-

(A) 3 : 32 (B) 3 : 29 (C) 1 : 15 (D) 5 : 59

76. A box contains tickets numbered 1 to N. n tickets are drawn from the box with replacement. The probability that the largest number on the tickets is k is

(A) $\left(\frac{k}{N}\right)^n$ (B) $\left(\frac{k-1}{N}\right)^n$

(C) 0 (D) None of these

77. Let F denote the set of all onto functions from A = {a_1, a_2, a_3, a_4} to B = {x, y, z}. A function f is chosen at random from F. The probability that f^{-1} (x) consists of exactly two elements is

(A) 2/3 (B) 1/3 (C) 1/6 (D) 0

78. A letter is known to have come from either TATANAGAR or CALCUTTA. On the envelope, just two consecutive letters TA are visible . The probability that the letter has come from CALCUTTA is

(A) 4/11 (B) 1/3

(C) 5/12 (D) None of these

79. Probability that a randomly drawn card from a pack of playing cards is either a spade or a queen is $\frac{|a-3|}{13}$. Then -

(A) a = 0 (B) a = 7 (C) a = 4 (D) a = 5

80. There are 10 persons among whom are A and B who are made to stand in a row in random order. The probability that there is exactly one person between A and B is-

(A) $\frac{4}{45}$ (B) $\frac{8}{45}$ (C) $\frac{1}{5}$ (D) $\frac{1}{210}$

81. A five digit number is formed by digits 1, 2, 3, 4 and 5 without repetition. If probability that the number is divisible by 4 be k, then the integral part of ($\sqrt{2}$ + 1)$^{1/k}$ is.....

82. A person is known to speak truth 3 out of 4 times. He throws a dice and responds that it is a six. If the probability that it is actually a six is P, find 1000P.

83. 5 girls and 10 boys sit a random in a row having 15 chairs numbered as 1 to 15. If the probability that the end seats are occupied by the girls and odd number of boys takeseat between any two girls is $\frac{20}{n}$. then find the value of $\frac{3003n}{10}$

84. An urn contains 3 white balls 5 black balls and 2 red balls. Two persons draw balls in turn without replacement. The first person to draw a white ball wins the game. If a red ball is drawn the game is a tie. Suppose A1 = {the player who begins the game is the winner}, A2= {the second participant is the winner} and B = {the game is a tie}. Find 5P(A1) P(A2) P(B)

85. There are N + 1 identical boxes each containing N wall clocks. The first box contains zero defective clocks. The second box contains one defective and (N–1) effective clocks, in general rth boxcontains (r – 1) defective and (N – r + 1) effective clocks (1 $\le$ r $\le$ N +1). Thus, the (N + 1)th box contains all defective clocks. A wall clock is selected and found an effective one. The probability that it is from kth box is $\frac{\lambda N - \lambda K + \lambda}{N^2 + N}$ find λ.

86. The population of a country increases at a rate proportional to the number of inhabitants. If the population doubles in 30 years, find after how many years the population will triple–

87. The rate at which a substance cools in moving air is proportional to the difference between the temperatures of the substance and that of the air. If the temperature of the air is 290° K and the substance cools from 370° K to 330°K in 10 minutes, when will the temperature be 295°K -

88. If the population of a country doubles in 50 years in how many years will it triple under the assumption that the rate of increase is proportional to the number of inhabitants -

89. Family y = Ax + A^3 of curve represented by the differential equation of degree -

90. If y′ = y + 1 and y(0) = 1 then values of y(ℓn 2) is-