JEE

Sky Tutorials

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IIT-JEE | NEET | Foundation

Time: 3 Hours **M.M. 300**

ALL INDIA SKY TEST SERIES

TARGET BATCH – IIT - JEE

Date : 20/08/2023

SYLLABUS

PHYSICS	CHEMISTRY	MATHEMATICS
Ray Optics	Atomic Structure, Periodic table, Chemical Bonding, IUPAC, G.O.C.	Progression, Quadratic Equation, Binomial theorem, Complex number, Determinants & Matrices, Straight lines, Circle

Please read the instructions carefully. You are allotted **5** minutes specifically for this purpose.

INSTRUCTIONS:

1. This Question paper is divided in to three parts Physics, Chemistry and Mathematics each part is further divided into two sections.
   Section –A Contains 20 Questions Section B contains 10 questions. Please ensure that the Questions paper you have received contains **ALL THE QUESTIONS** in each Part.
2. **In Section A all the 20 Questions are compulsory and Section B Contain 10 Question, out of these 10 Questions**, candidates can choose to attempt any 5 Questions.
   Each Question has four choices (A), (B), (C), (D) out of which **only one is correct & Carry 4 marks each 1 mark** will be deducted for each wrong answer.

GENERAL INSTRUCTION

1. Use only **blue/black pen (avoid gel pen)** for darkening the bubble.
2. Indicate the correct answer for each question by filling appropriate bubble in your **OMR** answer sheet.
3. The answer sheet will be checked through computer hence, the answer of the question must be marked by –shading the circles against the question by dark **blue/black pen**
4. Blank papers, Clipboards, Log tables, Slide Rule, Calculator, Cellular Phones Papers and Electronic Gadgets in any form are **not** allowed to be carried inside the examination hall.

Name of the candidate:______________________________________

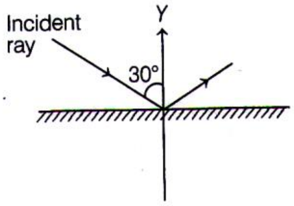
Signature of the candidate: ____________________ **Signature of the invigilator:**_______________

PHYSICS

Section - A

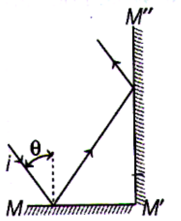
Single Choice Question

1. By what angle, mirror should be rotated to obtain reflected ray along +Y-axis?



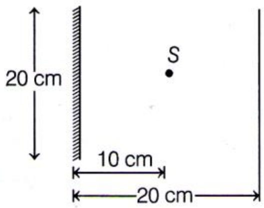
(a) 360^o clockwise (b) 15^o anti-clockwise
(c) 30^o anti-clockwise (d) 60^o anti-clockwise

2. A ray of light strikes a mirror M as shown in figure. As the angle of incidence θ is increased, the angle between the final reflected ray and the incident ray



(a) increases
(b) decreases
(c) remains the same
(d) information is insufficient to decide

3. A point source of light S is placed at a distance 10 cm in front of the centre of mirror of width 20 cm suspended vertically on a wall. A man walks with a speed 10 cm/s in front of the mirror along a line parallel to the mirror at a distance 20 cm from it as shown in figure. Find the maximum time during which he can see the image of the source S in the mirror.

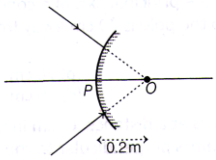


(a) 6 s (b) 3s (c) 2 s (d) 1 s

4. The largest distance of the image of a real object from a convex mirror of focal length 20 cm can be
(a) 20 cm
(b) infinite
(c) 10 cm
(d) depends on the position of the object

5. An object is placed in front of a convex mirror of radius of curvature 20 cm. Its image is formed 8 cm behind the mirror. The object distance is
(a) 20 cm (b) 40 cm (c) 60 cm (d) 80 cm

6. A convergent beam of light is incident on a convex mirror of radius of curvature R as shown in figure. A real image is formed at a distance 0.4 m from the mirror. The radius of curvature of the mirror is



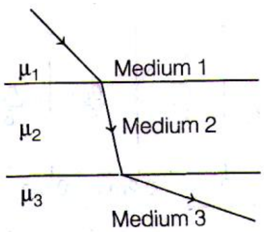
(a) 0.4 m (b) 1.4 m (c) 0.8 m (d) 1.8 m

7. A rod of length 20 cm lies along the principal axis of a concave mirror of focal length 20 cm in such a way that its end closer to the pole is 40 cm away from the mirror. The length of the image is
(a) 50 cm (b) 70 cm (c) 20 cm (d) 10 cm

8. A point object on the principal axis at a distance 15 cm in front of a concave mirror of radius of curvature 20 cm has velocity 2 mm/s perpendicular to the principal axis. The velocity of image at that instant will be
(a) 2 mm/s (b) 4 mm/s
(c) 8 mm/s (d) 16 mm/s

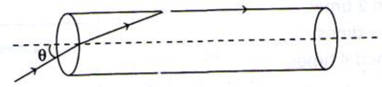
9. A ray of light passes from glass, having a refractive index of 1.6 to air. The angle of incidence for which the angle of refraction is twice the angle of incidence is
(a) $\sin^{-1}\left(\frac{4}{5}\right)$ (b) $\sin^{-1}\left(\frac{3}{5}\right)$
(c) $\sin^{-1}\left(\frac{5}{8}\right)$ (d) $\sin^{-1}\left(\frac{2}{5}\right)$

10. A beam of light passes from medium 1 to medium 3 as shown in figure. What may be concluded about the three indices of refraction, μ_1, μ_2 and μ_3?



(a) $\mu_3 > \mu_1 > \mu_2$ (b) $\mu_1 > \mu_3 > \mu_2$
(c) $\mu_2 > \mu_3 > \mu_1$ (d) $\mu_2 > \mu_1 > \mu_3$

11. A transparent solid cylindrical rod has a refractive index of $\frac{2}{\sqrt{3}}$. It is surrounded by air. A light ray is incident at the mid-point of one end of the rod as shown in the figure.



The incident angle θ for which the light ray grazes along the wall of the rod is

(a) $\sin^{-1}\left(\frac{1}{2}\right)$ (b) $\sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$

(c) $\sin^{-1}\left(\frac{2}{\sqrt{3}}\right)$ (d) $\sin^{-1}\left(\frac{1}{\sqrt{3}}\right)$

12. A slab of glass of refractive index 1.5 and thickness 3 cm is placed with the faces perpendicular to the principal axis of a concave mirror. If the radius of curvature of the mirror is 10 cm, the distance at which an object must be placed from the mirror, so that image coincides with object is

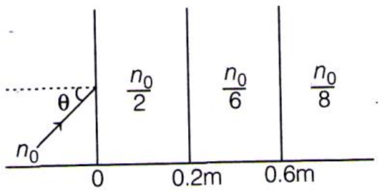
(a) 9 cm (b) 10 cm (c) 11 cm (d) 12 cm

13. The critical angle of light going from medium A to medium B is θ. The speed of light in medium A is v. The speed of light in medium B is

(a) $\frac{v}{\sin\theta}$ (b) $v\ \sin\theta$

(c) $v \cot\theta$ (d) $v\ \tan\theta$

14. A light beam is travelling from Region I to Region IV (refer figure). The refractive indices in Regions I. II, III and IV are $n_0, n_0/2, n_0/6$ and $n_0/8$, respectively. The angle of incidence θ for which the beam just misses entering Region IV is



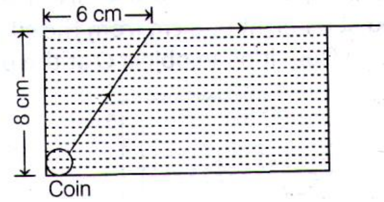
(a) $\sin^{-1}(3/4)$ (b) $\sin^{-1}(1/8)$

(c) $\sin^{-1}(3/5)$ (d) $\sin^{-1}(1/4)$

15. A convex lens of focal length 10 cm is in contact with a concave lens. The focal length of the combination is numerically equal to that of the concave lens. The focal length of the concave lens is

(a) 10 cm (b) 15 cm (c) 5 cm (d) 20 cm

16. A small coin is resting on the bottom is a beaker filled with a liquid. A ray of light from the coin upto the surface of the liquid moves along its surface (see figure)

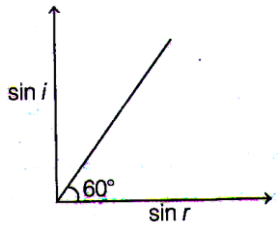


How fast is the light travelling in the liquid ?

(a) 1.2×10^8 m/s (b) 1.8×10^8 m/s

(c) 2.4×10^8 m/s (d) 3.0×10^8 m/s

17. A ray of light is incident on a medium with angle of incidence *i* and refracted into a second medium with angle of refraction *r*. The graph of sin *i* versus sin *r* is as shown in figure. Then, the velocity of light in the first medium is n times the velocity of light in the second medium. What should be the value of n ?



(a) $\sqrt{3}$ (b) $1/\sqrt{3}$ (c) $\sqrt{3}/2$ (d) $2/\sqrt{3}$

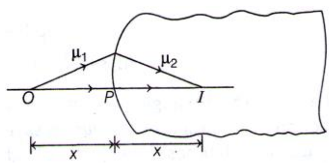
18. A layer of oil 3 cm thick is floating on a layer of coloured water 5 cm thick. Refractive index of coloured water is 5/3 and the apparent depth of the two liquids appears to be 36/7 cm. Find the refractive index of oil.

(a) 1.6 (b) 1.4 (c) 1.9 (d) 0.9

19. An illuminated object and a screen are placed 90 cm apart. What is the focal length of the lens, required to produce an image on the screen, twice the size of object ?

(a) 20 cm (b) 30 cm (c) 40 cm (d) 50 cm

20. A spherical surface of radius R separates two medium of refractive indices μ_1 and μ_2 as shown in figure. Where an object should be placed in the medium 1, so that a real image is formed in medium 2 at the same distance ?



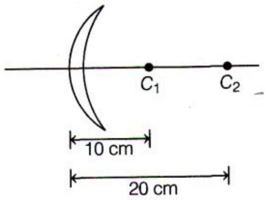
(a) $\left(\frac{\mu_2-\mu_1}{\mu_2+\mu_1}\right)R$ (b) $\left(\frac{\mu_2+\mu_1}{\mu_2-\mu_1}\right)R$

(c) $\left(\frac{\mu_2+\mu_1}{\mu_2}\right)\times R$ (d) $\left(\frac{\mu_2}{\mu_2+\mu_1}\right)R$

Section - B

Integer Type Questions

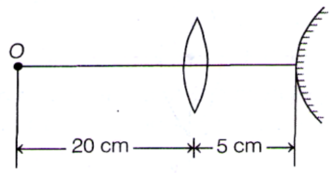
21. Figure shows a thin lens with centre of curvatures C_1 and C_2. Find its focal length (Take, $\mu = 1.5$) in cm.



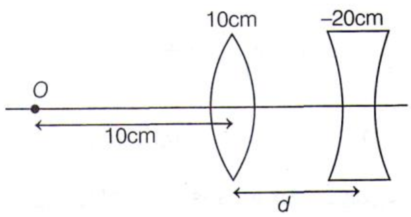
22. An object is placed at a distance of 5 cm from the first focus of a convex lens of focal length 10 cm. If a real image is formed, its distance (in cm) from the lens will be……….

23. A point object is placed at a distance of 25 cm from a convex lens of focal length 20 cm. If a glass slab of thickness t and refractive index 1.5 is inserted between the lens and object, then image is formed at infinity. The thickness of the slab (in cm) is……………

24. A convex lens of focal length 15 cm is placed in front of a convex mirror. When the object is placed at O. the image coincides with it. The radius of curvature of mirror (in cm) is…..



25. What should be the value of distance d (in cm), so that final image is formed on the object itself ? (Focal lengths of the lenses are as given in the figure)



26. Calculate the angle of minimum deviation for an equilateral triangular prism of refractive index $\sqrt{3}$.

27. A light ray incident normally on one face of an equilateral prism and emerges out grazingly at the other face. The refractive index of the prism is $\frac{2}{\sqrt{x}}$. Find x

28. The refracting angle of the prism is 60^o and minimum deviation of 30^o, then the angle of incidence (in degree) is……

29. Two lenses of power + 5D each and separated by a distance d will become sun glasses when the value of d(in cm) is…….

30. The radii of curvature of the faces of a double convex lens are 10 cm and 15 cm. Its focal length is 12 cm. The refractive index of glass is $\frac{x}{2}$. Find x

CHEMISTRY

Section - A

Single Choice Question

31. For a reaction at equilibrium

$$A_{(g)} \rightleftharpoons B_{(g)} + \frac{1}{2}C_{(g)}$$

the relation between dissociation constant (K), degree of dissociation (α) and equilibrium pressure (p) is given by

(a) $K = \dfrac{\alpha^{1/2}p^{3/2}}{\left(1+\frac{3}{2}\alpha\right)^{1/2}(1-\alpha)}$

(b) $K = \dfrac{\alpha^{3/2}p^{1/2}}{(2+\alpha)^{1/2}(1-\alpha)}$

(c) $K = \dfrac{(\alpha p)^{3/2}}{\left(1+\frac{3}{2}\alpha\right)^{1/2}(1-\alpha)}$

(d) $K = \dfrac{(\alpha p)^{3/2}}{(1+\alpha)(1-\alpha)^{1/2}}$

32. 5.1 g NH_4SH is introduced in 3.0 L evacuated flask at 327^0C. 30% of the solid NH_4SH decomposed to NH_3 and H_2S as gases. The K_p of the relation at 327^0C is
(R = 0.082 L atm $mol^{-1}K^{-1}$, Molar mass of S = 32 g mol^{-1}, molar mass of N = 14g mol^{-1}

(a) $0.242\times10^{-4}\,atm^2$ (b) $0.242\times10^{-3}\,atm^2$
(c) $1\times10^{-4}\,atm^2$ (d) $4.9\times10^{-3}\,atm^2$

33. The gas phase reaction, $2NO_{2(g)} \rightarrow N_2O_{4(g)}$ is an exothermic reaction. The decomposition of N_2O_4, in equilibrium mixture of $NO_{2(g)}$ and $N_2O_{4(g)}$, can be increased by
(a) addition of an inert gas at constant volume
(b) increasing the pressure
(c) lowering the temperature
(d) addition of an inert gas at constant pressure.

34. In which of the following reactions, an increase in the volume of the container will favour the formation of products?

(a) $2NO_{2(g)} \rightleftharpoons 2NO_{(g)} + O_{2(g)}$

(b) $3O_{2(g)} \rightleftharpoons 2O_{3(g)}$

(c) $H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$

(d) $4NH_{3(g)} + 5O_{2(g)} \rightleftharpoons 4NO_{(g)} + 6H_2O_{(l)}$

35. For the reaction,

$Fe_2N_{(s)} + \frac{3}{2}H_{2(g)} \rightleftharpoons 2Fe_{(s)} + NH_{3(g)}$

(a) $K_c = K_p(RT)$ (b) $K_c = K_p(RT)^{-1/2}$

(c) $K_c = K_p(RT)^{1/2}$ (d) $K_c = K_p(RT)^{3/2}$

36. The energy of one mole of photon of radiation of wavelength 300 nm is

(Given: h = $6.63\times10^{-34}\ J\ s$ $N_A = 6.02\times10^{23}\ mol^{-1}$, $c = 3\times10^8\ ms^{-1}$)

(a) 235 kJ mol^{-1} (b) 325 kJ mol^{-1}

(c) 399 kJ mol^{-1} (d) 435 kJ mol^{-1}

37. If the Thomson model of the atom was correct, then the result of Rutherford's gold foil experiment would have been,

(a) $\alpha-$particles pass through the gold foil deflected by small angles and with reduced speed.

(b) $\alpha-$particles are deflected over a wide range of angles.

(c) All $\alpha-$particles get bounced back by 180^0

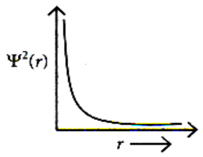
(d) All of the α -particles pass through the gold foil without decrease in speed.

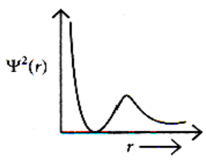
38. The de Broglie wavelength (λ) associated with a photoelectron varies with the frequency (υ) of the incident radiation as, [υ_0 is threshold frequency]

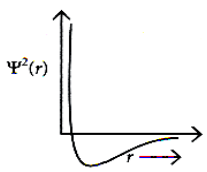
(a) $\lambda \propto \frac{1}{(\upsilon-\upsilon_0)}$ (b) $\lambda \propto \frac{1}{(\upsilon-\upsilon_0)^{\frac{1}{2}}}$

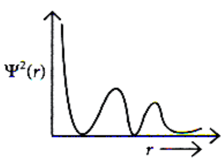
(c) $\lambda \propto \frac{1}{(\upsilon-\upsilon_0)^{3/2}}$ (d) $\lambda \propto \frac{1}{(\upsilon-\upsilon_0)^{1/4}}$

39. Which of the following is the correct plot for the probability density $\psi^2(r)$ as a function of distance 'r' of the electron from the nucleus for 2s orbital?

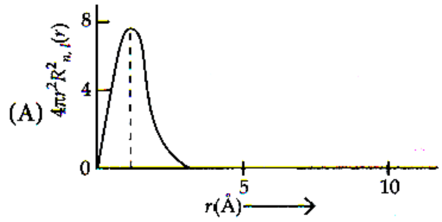
(a) 

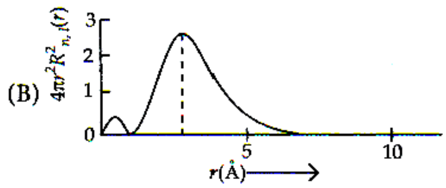
(b) 

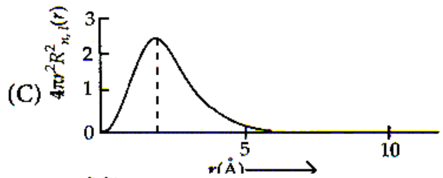
(c) 

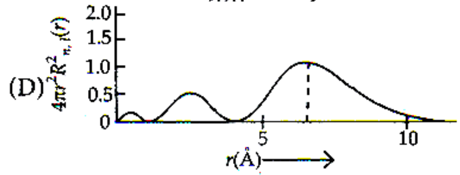
(d) 

40. The plots of radial distribution functions for various orbitals of hydrogen atom against 'r' are given below:









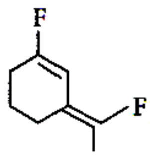
The correct plot for 3s-orbital is

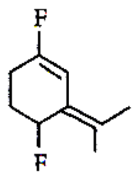
(a) (C) (b) (A) (c) (B) (d) (D)

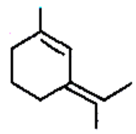
41. The number of orbitals associated with quantum numbers n = 5, $m_s = +\frac{1}{2}$ is

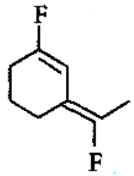
(a) 25 (b) 11 (c) 15 (d) 50

42. The most polar compound among the following is

(a) 

(b) 

(c) 

(d) 

43. $H - N \overset{(I)}{---} N \overset{(II)}{---} N$

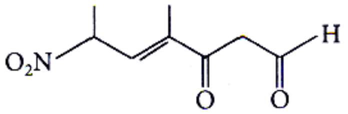
In hydrogen azide (above) the bond orders of bonds (I) and (II) are

	(I)	(II)
(a)	> 2	<2
(b)	<2	<2
(c)	<2	>2
(d)	>2	>2

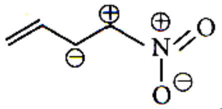
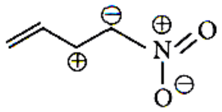
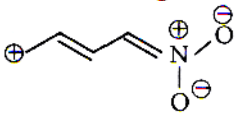
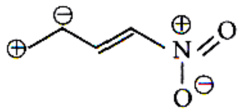
44. If the magnetic moment of a dioxygen species is 1.73 B.M. it may be
(a) O_2, O_2^- or O_2^+ (b) O_2^- or O_2^+
(c) O_2 or O_2^- (d) O_2 or O_2^+

45. According to molecular orbitals theory, which of the following will not be a viable molecule?
(a) He_2^{2+} (b) He_2^+ (c) H_2^- (d) H_2^{2-}

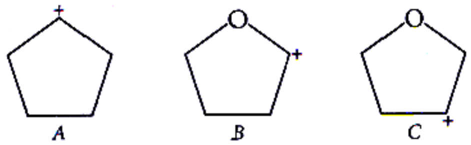
46. The correct IUPAC name of the following compound is



(a) 4-methyl-2-nitro-5-oxohept-3-enal
(b) 4-methyl-5-oxo-2- nitrohept-3-enal
(c) 4-methyl-6-nitro-3-oxohept-4-enal
(d) 6-formyl-4-methyl-2-notrohex-3-enal

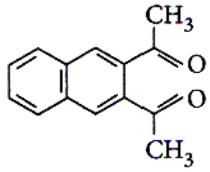
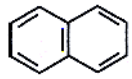
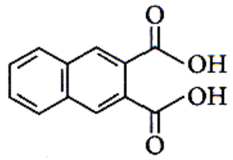
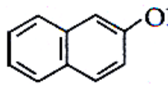
47. Which one among the following resonating structures is not correct?
(a)  (b) 
(c)  (d) 

48. Arrange the following carbocations in decreasing order of stability.



(a) A > C > B (b) A > B > C
(c) C > B > A (d) C > A > B

49. The increasing order of basicity for the following intermediates is (from weak to strong)
(i) $H_3C-\overset{CH_3}{\underset{CH_3}{\overset{|}{\underset{|}{C^-}}}}$ (ii) $H_2C=CH-\bar{C}H_2$
(iii) $HC\equiv\bar{C}$ (iv) $\bar{C}H_3$ (v) $\bar{C}N$
(a) (v) < (iii) < (ii) < (iv) < (i)
(b) (iii) < (i) < (ii) < (iv) < (v)
(c) (v) < (i) < (iv) < (ii) < (iii)
(d) (iii) < (iv) < (ii) < (i) < (v)

50. Among the following four aromatic compounds, which one will have the lowest melting point?
(a)  (b) 
(c)  (d) 

Section - B

Integer Type Questions

51. At 298 K, the equilibrium constant is 2×10^{15} for the reaction :
$Cu_{(s)} + 2Ag^+_{(aq)} \rightleftharpoons Cu^{2+}_{(aq)} + 2Ag_{(s)}$
The equilibrium constant for the reaction
$\frac{1}{2}Cu^{2+}_{(aq)} + Ag_{(s)} \rightleftharpoons \frac{1}{2}Cu_{(s)} + Ag^+_{(aq)}$
is $x\times10^{-8}$. The value of x is _______. (Nearest Integer)

52. When 5.1 g of solid NH_4HS is introduced into a two litre evacuated flask at 27^0C, 20% of the solid decomposes into gaseous ammonia and hydrogen sulphide. The K_p for the reaction at 27^0C is $x \times10^{-2}$. The value of x is ________. (Integer answer)

53. Consider the following set of quantum numbers

	n	l	m_l
A.	3	3	–3
B.	3	2	–2
C.	2	1	+1
D.	2	2	+2

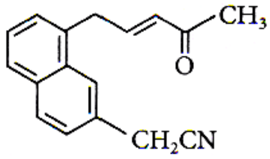
The number of correct sets of quantum numbers is _______.

54. Ge (Z = 32) in its ground state electronic configuration has x completely filled orbitals with $m_l = 0$. The value of x is _______ .

55. AX is a covalent diatomic molecule where A and X are second row elements of periodic table. Based on molecular orbital theory, the bond order of AX is 2.5. The total number of electron in AX is ______.
(Round off to the Nearest Integer).

56. The total number of electron in all bonding molecular orbitals of O_2^{2-} is _____. (Round off to the Nearest Integer).

57. Number of electrophilic centres in the given compound is ______.



58. The volume, in mL, of 0.02 M $K_2Cr_2O_7$ solution required to react with 0.288 g of ferrous oxalate in acidic medium is _____.
(Molar mass of Fe = 56 g mol^{-1})

59. The number of atoms in 8 g of sodium is $x \times 10^{23}$. The value of x is _____. (Nearest integer) [Given : $N_A = 6.02 \times 10^{23}\ mol^{-1}$, atomic mass of Na = 23.0 u]

60. 2L of 0.2 M H_2SO_4 is reacted with 2L of 0.1 M NaOH solution, the molarity of the resulting product Na_2SO_4 in the solution is _____ millimolar. (Nearest integer)

MATHEMATICS

Section - A

Single Choice Question

31. If a and b are two arbitrary constants, then the straight line $(a-2b)x+(a+3b)y+3a+4b=0$ will pass through
(a) $(-1,-2)$ (b) $(1,2)$
(c) $(-2,-3)$ (d) $(2,3)$

62. The straight line passes through the point of intersection of the straight lines $x+2y-10=0$ and $2x+y+5=0$, is
(a) $5x-4y=0$ (b) $5x+4y=0$
(c) $4x-5y=0$ (d) $4x+5y=0$

63. The opposite vertices of a square are (1, 2) and (3, 8), then the equation of a diagonal of the square passing through the point (1, 2) is
(a) $3x-y-1=0$ (b) $3y-x-1=0$
(c) $3x+y+1=0$ (d) None of these

64. A straight line makes an angle of 135^o with the x-axis and cuts y-axis at a distance –5 from the origin. The equation of the line is
(a) $2x+y+5=0$ (b) $x+2y+3=0$
(c) $x+y+5=0$ (d) $x+y+3=0$

65. The equation of the bisector of the acute angle between the lines $2x-y+4=0$ and $x-2y=1$ is
(a) $x+y+5=0$ (b) $x-y+1=0$
(c) $x-y=5$ (d) None of these

66. Distance between the lines $5x+3y-7=0$ and $15x+9y+14=0$ is
(a) $\frac{35}{\sqrt{34}}$ (b) $\frac{1}{3\sqrt{34}}$ (c) $\frac{35}{3\sqrt{34}}$ (d) $\frac{35}{2\sqrt{34}}$

67. The equation of the line with gradient $-3/2$ which is concurrent with the lines $4x+3y-7=0$ and $8x+5y-1=0$ is
(a) $3x+2y-2=0$ (b) $3x+2y-63=0$
(c) $2y-3x-2=0$ (d) None of these

68. The coordinate of the foot of perpendicular from the point (2, 3) on the line $x+y-11=0$ are
(a) (– 6, 5) (b) (5, 6)
(c) (–5, 6) (d) (6, 5)

69. A circle has radius 3 units and its centre lies on the line $y=x-1$. Then the equation of this circle if it passes through point (7, 3), is
(a) $x^2+y^2-8x-6y+16=0$
(b) $x^2+y^2+8x+6y+16=0$
(c) $x^2+y^2-8x-6y-16=0$
(d) None of these

70. The equation of circle whose diameter is the line joining the points (– 4, 3) and (12, –1) is
(a) $x^2+y^2+8x+2y+51=0$
(b) $x^2+y^2+8x-2y-51=0$
(c) $x^2+y^2+8x+2y-51=0$
(d) $3x+4y-7=0$.

71. If the lines $2x+3y+1=0$ and $3x-y-4=0$ lie along diameters of a circle of circumference 10π, then the equation of the circle is
(a) $x^2+y^2+2x-2y-23=0$
(b) $x^2+y^2-2x-2y-23=0$
(c) $x^2+y^2+2x+2y-23=0$
(d) $x^2+y^2-2x+2y-23=0$

72. If the centroid of an equilateral triangle is (1, 1) and its one vertex is (– 1, 2) then the equation of its circumcircle is
(a) $x^2+y^2-2x-2y-3=0$
(b) $x^2+y^2+2x-2y-3=0$
(c) $x^2+y^2+2x+2y-3=0$
(d) None of these

73. If (2, 4) is a point interior to the circle $x^2+y^2-6x-10y+\lambda=0$ and the circle does not cut the axes at any point, then λ belongs to the interval
(a) (25, 32) (b) (9, 32)
(c) $(32, +\infty)$ (d) None of these

74. If the line $3x-4y=\lambda$ touches the circle $x^2+y^2-4x-8y-5=0$, then λ is equal to
(a) – 35, – 15 (b) – 35, 15
(c) 35, 15 (d) 35, – 15

75. The length of the tangent from (0, 0) to the circle $2(x^2+y^2)+x-y+5=0$ is
(a) $\sqrt{5}$ (b) $\frac{\sqrt{5}}{2}$ (c) $\sqrt{2}$ (d) $\sqrt{\frac{5}{2}}$

76. The coordinates of the point from where the tangents are drawn to the circles $x^2+y^2=1$, $x^2+y^2+8x+15=0$ and $x^2+y^2+10y+24=0$ are of same length, are
(a) $\left(2, \frac{5}{2}\right)$ (b) $\left(-2, -\frac{5}{2}\right)$
(c) $\left(-2, \frac{5}{2}\right)$ (d) $\left(2, -\frac{5}{2}\right)$

77. The coefficient of x^3 in $\left(\sqrt{x^5}+\frac{3}{\sqrt{x^3}}\right)^6$ is
(a) 0 (b) 120
(c) 420 (d) 540

78. The coefficient of the term independent of x in the expansion of $(1+x+2x^3)\left(\frac{3}{2}x^2-\frac{1}{3x}\right)^9$ is
(a) $\frac{1}{3}$ (b) $\frac{19}{54}$ (c) $\frac{17}{54}$ (d) $\frac{1}{4}$

79. The coefficient of x^{65} in the expansion of $(1+x)^{131}(x^2-x+1)^{130}$ is
(a) ${}^{130}C_{65}+{}^{129}C_{66}$ (b) ${}^{130}C_{65}+{}^{129}C_{55}$
(c) ${}^{130}C_{65}+{}^{129}C_{66}$ (d) None of these

80. If m, n, r are positive integers such that $r < m, n$, then
${}^{m}C_r+{}^{m}C_{r-1}\,{}^{n}C_1+{}^{m}C_{r-2}\,{}^{n}C_2+\ldots\ldots+{}^{m}C_1\,{}^{n}C_{r-1}+{}^{n}C_r$
equals
(a) $({}^{n}C_r)^2$ (b) ${}^{m+n}C_r$
(c) ${}^{m+n}C_r+{}^{m}C_r+{}^{n}C_r$ (d) None of these

Section - B

Integer Type Questions

81. Let $P=\begin{pmatrix}1&0&0\\3&1&0\\9&3&1\end{pmatrix}$ and $Q=[q_{ij}]$ be two 3 × 3 matrices such that $Q-P^5=I_3$. Then $\frac{q_{21}+q_{31}}{q_{32}}$ is equal to

82. If x, y, z are in arithmetic progression with common difference $d, x\neq 3d$, and the determinant of the matrix $\begin{bmatrix}3&4\sqrt{2}&x\\4&5\sqrt{2}&y\\5&k&z\end{bmatrix}$ is zero, then the value of k^2 is

83. If $\begin{vmatrix}x^2+x&x+1&x-2\\2x^2+3x-1&3x&3x-3\\x^2+2x+3&2x-1&2x-1\end{vmatrix}=ax-12$, then $'a'$ is equal to

84. The number of point of intersection of $|z-(4+3i)|=2$ and $|z|+|z-4|=6, z\in C$, is

85. Let z_1 and z_2 be two complex complex number satisfying $|z_1|=9$ and $|z_2-3-4i|=4$. Then the minimum value of $|z_1-z_2|$ is

86. The number of real solution of the equation, $x^2-|x|-12=0$ is

87. The number of real roots of the equation, $e^{4x}+e^{3x}+e^x+1=0$ is

88. The total number of irrational terms in the binomial expansion of $(7^{1/5}-3^{1/10})^{60}$ is

89. The coefficient of x^{10} in the expansion of $(1+x)^2(1+x^2)^3(1+x^3)^4$ is equal to

90. Five number are in A.P. whose sum is 25 and product is 2520. If one of these five numbers is $-\frac{1}{2}$, then the greatest number amongst them is