RAVI MATHS TUITION CENTER , WHATSAPP - 8056206308

ANNUAL MINIMUM MATERIALS 2 MARKS

12th Standard

Maths

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DO DAILY 15 QUESTIONS. IN 10 DAYS YOU CAN FINISH 2 MARKS ONE TIME REVISION. 150 x 2 = 300

1) If A = $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$ is non-singular, find A^{-1}.

2) If adj(A) = $\begin{bmatrix} 2 & -4 & 2 \\ -3 & 12 & -7 \\ -2 & 0 & 2 \end{bmatrix}$, find A.

3) If adj(A) = $\begin{bmatrix} 0 & -2 & 0 \\ 6 & 2 & -6 \\ -3 & 0 & 6 \end{bmatrix}$, find A^{-1}.

4) Find adj(adj (A)) if adj A = $\begin{bmatrix} 1 & 0 & 1 \\ 0 & 2 & 0 \\ -1 & 0 & 1 \end{bmatrix}$.

5) Find the rank of the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 1 & 4 \\ 3 & 0 & 5 \end{bmatrix}$ by reducing it to a row-echelon form.

6) Find the inverse of the non-singular matrix A = $\begin{bmatrix} 0 & 5 \\ -1 & 6 \end{bmatrix}$, by Gauss-Jordan method.

7) Solve the following system of linear equations, using matrix inversion method: $5x + 2y = 3$, $3x + 2y = 5$.

8) Solve, by Cramer's rule, the system of equations $x_1 - x_2 = 3$, $2x_1 + 3x_2 + 4x_3 = 17$, $x_2 + 2x_3 = 7$.

9) Test for consistency of the following system of linear equations and if possible solve: $x - y + z = -9$, $2x - 2y + 2z = -18$, $3x - 3y + 3z + 27 = 0$.

10) Find the rank of the following matrices by minor method:
$\begin{bmatrix} 1 & -2 & -1 & 0 \\ 3 & -6 & -3 & 1 \end{bmatrix}$

11) Find the rank of the following matrices which are in row-echelon form :
$\begin{bmatrix} 6 & 0 & -9 \\ 0 & 2 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$

12) Simplify the following

$i^{1947} + i^{1950}$

13) If z_i = 2− i and z_2 = -4+3i , find the inverse of z_1z_2 and $\frac{z_1}{z_2}$

14) Find the following $\left|\frac{2+i}{-1+2i}\right|$

15) Which one of the points i, −2 + i, and 3 is farthest from the origin?

16) Find the square root of 6−8i .

17) If |z| = 3, show that $7 \leq |z+6-8i| \leq 13$.

18) Write in polar form of the following complex numbers

$2+i2\sqrt{3}$

19) Simplify the following

$\sum_{n=1}^{12} i^n$

20) Simplify the following

$i\, i^2 i^3 \ldots i^{2000}$

21) Simplify the following

$\sum_{n=1}^{10} i^{n+50}$.

22) Evaluate the following if z = 5−2i and w = −1+3i

$z^2 + 2zw + w^2$

23) Write the following in the rectangular form:

$\overline{3i} + \frac{1}{2-i}$.

24) Find the modulus of the following complex number $\frac{2-i}{1+i} + \frac{1-2i}{1-i}$

25) Find the square roots of −6+8i

26) Find the square roots of

−5 −12i .

27) Write in polar form of the following complex numbers

-2 - i2

28) Write in polar form of the following complex numbers

$\frac{i-1}{cos\frac{\pi}{3}+isin\frac{\pi}{3}}$

29) Find the following $\left|\overline{(1+i)}(2+3i)(4i-3)\right|$

30) Findthe polar form of $-3\sqrt{2}+3\sqrt{2}i$

31) Simplify: $\left[\frac{1-\cos\frac{\pi}{10}+i\sin\frac{\pi}{10}}{1-\cos\frac{\pi}{10}-i\sin\frac{\pi}{10}}\right]^{10}$

32) Construct a cubic equation with roots 1, 2 and 3

33) If α, β and γ are the roots of the cubic equation $x^3+2x^2+3x+4 = 0$, form a cubic equation whose roots are, 2α, 2β, 2γ

34) If $x^2+2(k+2)x+9k = 0$ has equal roots, find k.

35) Obtain the condition that the roots of $x^3+ px^2+ qx + r = 0$ are in A.P.

36) If α, β and γ are the roots of the cubic equation $x^3+ 2x^2+ 3x + 4 = 0$, form a cubic equation whose roots are $\frac{1}{\alpha}, \frac{1}{\beta}, \frac{1}{\gamma}$

37) If α, β and γ are the roots of the cubic equation $x^3+ 2x^2+ 3x + 4 = 0$, form a cubic equation whose roots are −α, -β, -γ

38) Construct a cubic equation with roots $2, \frac{1}{2}$ and 1

39) Find the principal value of
$Sin^{-1}\left(\frac{1}{\sqrt{2}}\right)$

40) Find the period and amplitude of y = sin 7x

41) Sketch the graph of y = $\sin(\frac{1}{3}x)$ for $0\leq x < 6\pi$.

42) For what value of x does sinx = $\sin^{-1}x$?

43) Find the principal value of $\cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$

44) Find all values of x such that $-6\pi \leq x \leq 6\pi$ and cos x = 0

45) State the reason for $\cos^{-1}[cos(-\frac{\pi}{6})] \neq \frac{\pi}{6}$.

46) Is $\cos^{-1}(-x) = \pi-\cos^{-1}(x)$ true? Justify your answer.

47) Find the value of
$2cos^{-1}\left(\frac{1}{2}\right) + sin^{-1}\left(\frac{1}{2}\right)$

48) Find the principal value of $\tan^{-1}(\sqrt{3})$

49) Find the value of
$tan(tan^{-1}(\frac{7\pi}{4}))$

50) Find the value of $tan^{-1}\left(\sqrt{3}\right) - sec^{-1}(-2)$

51) Prove that $\frac{\pi}{2} \leq sin^{-1}x + 2cos^{-1}x \leq \frac{3\pi}{2}$

52) Prove that
$\tan^{-1}\frac{1}{2} + tan^{-1}\frac{1}{3} = \frac{\pi}{4}$

53) Solve $\tan^{-1}\left(\frac{1-x}{1+x}\right) = \frac{1}{2}tan^{-1}$ x for x > 0

54) Solve $\tan^{-1} 2x + \tan^{-1} 3x = \frac{\pi}{4}$, if $6x^2 < 1$

55) Solve $tan^{-1}\left(\frac{x-1}{x-2}\right) + tan^{-1}\left(\frac{x+1}{x+2}\right) = \frac{\pi}{4}$

56) Find the value of
$cos^{-1}\left(\frac{1}{2}\right)+sin^{-1}(-1)$

57) Find the value of $cos^{-1}\left(cos\frac{\pi}{7}cos\frac{\pi}{17}-sin\frac{\pi}{7}sin\frac{\pi}{17}\right)$.

58) Find the value, if it exists. If not, give the reason for non-existence
$tan^{-1}\left(sin\left(-\frac{5\pi}{2}\right)\right)$

59) Find the value of $cos\left[\frac{1}{2}cos^{-1}\left(\frac{1}{8}\right)\right]$

60) Prove that $2\tan^{-1}\frac{1}{2}+tan^{-1}\frac{1}{7}=tan^{-1}\frac{31}{17}$

61) Prove that $tan^{-1}\left(\frac{1}{7}\right)+tan^{-1}\left(\frac{1}{13}\right)=tan^{-1}\left(\frac{2}{9}\right)$

62) Find the general equation of a circle with centre (-3, -4) and radius 3 units.

63) Determine whether $x + y - 1 = 0$ is the equation of a diameter of the circle $x^2 + y^2 - 6x + 4y + c = 0$ for all possible values of c .

64) Examine the position of the point (2, 3) with respect to the circle $x^2 + y^2 - 6x - 8y + 12 = 0$.

65) Find the centre and radius of the circle $3x^2 + (a + 1)y^2 + 6x - 9y + a + 4 = 0$.

66) Find the equation of the circle with centre (2, -1) and passing through the point (3, 6) in standard form.

67) Find the equation of the circle with centre (2, 3) and passing through the intersection of the lines $3x - 2y - 1 = 0$ and $4x + y - 27 = 0$.

68) If $y = 2\sqrt{2}x + c$ is a tangent to the circle $x^2 + y^2 = 16$, find the value of c.

69) Find the equation of the parabola with focus $\left(-\sqrt{2},0\right)$ and directrix $x =\sqrt{2}$.

70) Find the equation of the ellipse with foci (±2, 0), vertices (±3, 0)

71) Find the vertices, foci for the hyperbola $9x^2-16y^2 = 144$.

72) Find the vertex, focus, equation of directrix and length of the latus rectum of the following:
$y^2 = 16x$

73) Identify the type of the conic for the following equations:
(1) $16y^2=-4x^2+64$
(2) $x^2+y^2=-4x-y+4$
(3) $x^2-2y=x+3$
(4) $4x^2-9y^2-16x+18y-29 = 0$

74) Find centre and radius of the following circles.
$x^2+y^2+6x-4y+4=0$

75) Find centre and radius of the following circles.
$2x^2+2y^2-6x+4y+2 = 0$

76) Find the equation of the parabola in each of the cases given below:
vertex (1, -2) and focus(4,-2)

77) A particle is acted upon by the forces $(3\hat{i} - 2\hat{j} + 2\hat{k})$ and $(2\hat{i} + \hat{j} - \hat{k})$ is displaced from the point (1, 3, -1) to the point (4, 1, -λ). If the work done by the forces is 16 units, find the value of λ.

78) Prove by vector method that if a line is drawn from the centre of a circle to the midpoint of a chord, then the line is perpendicular to the chord.

79) Prove by vector method that the median to the base of an isosceles triangle is perpendicular to the base.

80) Prove by vector method that an angle in a semi-circle is a right angle.

81) Using vector method, prove that if the diagonals of a parallelogram are equal, then it is a rectangle

82) If $\vec{a} = -\hat{3i} - \hat{j} + \hat{5k}$, $\vec{b} = \hat{i} - \hat{2j} + \hat{k}$, $\vec{c} = \hat{4i} - \hat{4k}$ *and* find $\vec{a}.(\vec{b} \times \vec{c})$

83) Find the volume of the parallelepiped whose coterminous edges are represented by the vectors $-6\hat{i} + 14\hat{j} + 10\hat{k}, 14\hat{i} - 10\hat{j} - 6\hat{k}$ and $2\hat{i} + 4\hat{j} - 2\hat{k}$

84) For any vector $\vec{a}$, prove that $\hat{i} \times (\vec{a} \times \hat{i}) + \hat{j} \times (\vec{a} \times \hat{j}) + \hat{k} \times \vec{a} \times \hat{k} = 2\vec{a}$.

85) Prove that $[\vec{a} - \vec{b}, \vec{b} - \vec{c}, \vec{c} - \vec{a}]$ = 0

86) Find the vector and Cartesian equations of the plane passing through the point with position vector $4\hat{i} + 2\hat{j} - 3\hat{k}$ and normal to vector $2\hat{i} - \hat{j} + \hat{k}$

87) Verify whether the line $\frac{x-3}{-4} = \frac{y-4}{-7} = \frac{z+3}{12}$ lies in the plane 5x-y+z = 8.

88) Find the angle between the planes $\vec{r}.(\hat{i} + \hat{j} - 2\hat{k})$ = 3 and 2x - 2y + z =2

89) Forces $2\hat{i} + 7\hat{j}$, $2\hat{i} - 5\hat{j} + 6\hat{k}$, $-\hat{i} + 2\hat{j} - \hat{k}$ act at a point P whose position vector is $4\hat{i} - 3\hat{j} - 2\hat{k}$. Find the vector moment of the resultant of these forces acting at P about this point Q whose position vector is $6\hat{i} + \hat{j} - 3\hat{k}$

90) For what value of m the vectors $\vec{a}$ and $\vec{b}$ perpendicular to each other.
$(i)\ \vec{a} = m\hat{i} + 2\hat{j} + \hat{k}\ and\ \vec{b} = 4\hat{i} - 9\hat{j} + 2\hat{k}$
$(ii)\ \vec{a} = 5\hat{i} - 9\hat{j} + 2\hat{k}\ and\ \vec{b} = m\hat{i} + 2\hat{j} + \hat{k}$

91) Find the projection of the vector $7\hat{i} + \hat{j} - 4\hat{k}$ on $2\hat{i} + 6\hat{j} + 3\hat{k}$

92) If $\vec{a} \times (\vec{b} \times \vec{c}) = (\vec{a} \times \vec{b}) \times \vec{c}$ prove that $(\vec{c} \times \vec{a}) \times \vec{b} = \vec{0}$

93) If the volume of a cube of side length x is v = x^3. Find the rate of change of the volume with respect to x when x = 5 units.

94) Find the absolute extrema of the following function on the given closed interval
f(x) = x^2 -12x + 10; [1, 2]

95) Find the absolute extrema of the following functions on the given closed interval.

$f(x) = 6x^{\frac{3}{4}} - 3x^{\frac{1}{3}}; [-1, 1]$

96) Find the absolute extrema of the following functions on the given closed interval.

$f(x) = 2cosx + sin2x; \left[0, \frac{\pi}{2}\right]$

97) Find the asymptotes of the following curve $f(x) = \frac{x^2}{x^2-1}$

98) Compute the limit $\lim_{x \to a}(\frac{x^n - a^n}{x-a})$

99) Evaluate the limit $\lim_{x \to 0}(\frac{\sin mx}{x})$

100) $\lim_{\theta \to 0}(\frac{1-\cos m\theta}{1-\cos n\theta})$ =1, then prove that, $m = \pm n$

101) Use the linear approximation to find approximate values of $(123)^{\frac{2}{3}}$

102) Use the linear approximation to find approximate values of $\sqrt[4]{15}$

103) Use the linear approximation to find approximate values of $\sqrt[3]{26}$

104) Let w(x, y) = xy+$\frac{e^y}{y^2+1}$ for all (x, y) ∈ R^2. Calculate $\frac{\partial^2 w}{\partial y \partial x}$ and $\frac{\partial^2 w}{\partial x \partial y}$

105) Find the partial derivatives of the following functions at the indicated point.

f(x, y) = $3x^2 - 2xy + y^2 + 5x + 2$, (2,-5)

106) If U(x, y, z) = log ($x^3 + y^3 + z^3$), find $\frac{\partial U}{\partial x} + \frac{\partial U}{\partial y} + \frac{\partial U}{\partial z}$

107) If v(x, y, z) = $x^3 + y^3 + z^3 + 3xyz$, show that $\frac{\partial^2 v}{\partial y \partial z} = \frac{\partial^2 v}{\partial z \partial y}$

108) If u(x, y, z) = xy^2z^3, x = sin t, y = cos t, z = 1+ e^{2t}, find $\frac{du}{dt}$

109) If w(x, y) = $6x^2 - 3xy + 2y^2$, x = e^x, y = cos s, s ∈ R find $\frac{dw}{ds}$, and evaluate at s = 0

110) If u(x, y) = $\frac{x^2+y^2}{\sqrt{x+y}}$, prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = \frac{3}{2}u$

111) If f (x, y) = $2x^3 - 11x^2y + 3y^3$, prove that $x\frac{\partial f}{\partial x} + y\frac{\partial f}{\partial y} = 3f$

112) Evaluate $\int_1^2 \frac{x}{(x+1)(x+2)}dx$

113) Evaluate: $\int_{\frac{\pi}{2}}^{\frac{\pi}{2}}$ x cos x dx.

114) Evaluate the following definite integrals:

$\int_{-1}^{1} \frac{dx}{x^2+2x+5}$

115) Evaluate $\int_0^{\frac{\pi}{2}}$ ($\sin^2$ x + $\cos^4$ x) dx

116) Find the values of the following:

$\int_0^{\frac{\pi}{2}}$ sin ^{5}x $\cos^4$xdx

117) Find the values of the following:

$\int_0^{\frac{\pi}{2}} sin^4 x x cos^6 x \quad dx$

118) Evaluate the following

$\int_0^{\pi/2} sin^{10}x \quad dx$

119) Evaluate the following

$\int_0^{\frac{\pi}{2}} sin^2xcos^4xdx$

120) Show that Γ(n) = $2\int_0^{\infty} e^{-x^2}x^{2n-1}dx$

121) Find, by integration, the volume of the solid generated by revolving about y-axis the region bounded by the curves y = log x, y = 0, x = 0 and y = 2.

122) Evaluate $\int_0^{\pi} \frac{x \sin x}{1+\cos^2 x}dx$

123) Prove that $\int_0^{\frac{\pi}{2}} \frac{f(\sin x)}{f(\sin x)+f(\cos x)}dx = \frac{\pi}{4}$

124) For each of the following differential equations, determine its order, degree (if exists)

$\left(\frac{d^2y}{dx^2}\right)^2 + \left(\frac{dy}{dx}\right)^2 = xsin\left(\frac{d^2y}{dx^2}\right)$

125) For each of the following differential equations, determine its order, degree (if exists)

$y\left(\frac{dy}{dx}\right) = \frac{x}{\left(\frac{dy}{dx}\right)+\left(\frac{dy}{dx}\right)^3}$

126) For each of the following differential equations, determine its order, degree (if exists)

$x^2\frac{d^2y}{dx^2} + \left[1+\left(\frac{dy}{dx}\right)^2\right]^{\frac{1}{2}} = 0$

127) Find the differential equation corresponding to the family of curves represented by the equation y = Ae^{8x} + Be^{-8x}, where A and B are arbitrary constants.

128) Find the differential equation of the curve represented by xy = ae^x + be^{-x} + x^2.

129) Show that each of the following expressions is a solution of the corresponding given differential equation.

y = ae^x + be^{-x}; y − y = 0

130) Find the differential equation for the family of all straight lines passing through the origin.

131) Form the differential equation by eliminating the arbitrary constants A and B from y = A cos x + B sin x.

132) Show that y = mx + $\frac{7}{m}$, m ≠ 0 is a solution of the differential equation xy'+7$\frac{1}{y'}$-y = 0.

133) Show that y = a cos(log x) + bsin (log x), x > 0 is a solution of the differential equation x^2 y" + xy'+y = 0.

134) Solve: $\frac{dy}{dx}$ = $(3x+y+4)^2$.

135) solve: x dy + y dx = xy dx

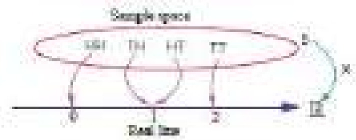
136) Three fair coins are tossed simultaneously. Find the probability mass function for number of heads occurred.

137) Suppose two coins are tossed once. If X denotes the number of tails,

(i) write down the sample space

(ii) find the inverse image of 1

(iii) the values of the random variable and number of elements in its inverse images



A mapping $X(.)$ from S to $\mathbb{R}$

138) The probability distribution of a random variable X is given below.

X	0	1	2	3
P(X)	K	$\frac{k}{2}$	$\frac{k}{4}$	$\frac{k}{8}$

i) Find k

ii) P(X > 2)

139) Is it possible that the mean of a binomial distribution is 15 and its standard deviation is 5?

140) Let X be a continuous random variable with p.d.f

$$f(x) = \begin{cases} 2x, 0 \leq x \leq 1 \\ 0, otherwise \end{cases}.$$

Find E(X)

141) Compute P(X = k) for the binomial distribution, B(n, p) where

$n = 10, p = \frac{1}{5}, k = 4$

142) The mean of a binomial distribution is 6 and its standard deviation is 3. Is this statement true or false?

143) Examine the binary operation (closure property) of the following operations on the respective sets (if it is not, make it binary)

$a*b = a + 3ab - 5b^2; \forall a,b \in Z$

144) Let A = $\begin{bmatrix} 0 & 1 \\ 1 & 1 \end{bmatrix}, B = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$ be any two boolean matrices of the same type. Find A∨B and A∧B.

145) How many rows are needed for following statement formulae?

$p \vee \neg t \wedge (p \vee \neg s)$

146) How many rows are needed for following statement formulae?

$((p \wedge q) \vee (\neg r \vee \neg s)) \wedge (\neg t \wedge v))$

147) Construct the truth table for the following statements.

$(p \vee q) \vee \neg q$

148) Construct the truth table for the following statements.

$(\neg p \longrightarrow r) \wedge (p \leftrightarrow q)$

149) Show that p v (~p) is a tautology.

150) Show that p v (q ∧ r) is a contingency.

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