RAVI MATHS TUITION CENTER , CHENNAI- 82. WHATSAPP - 8056206308

QUARTERLY MINIMUM STUDY MATERIAL

11th Standard

Business Maths

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45 x 2 = 90

1) The technology matrix of an economic system of two industries is $\begin{bmatrix} 0.50 & 0.30 \\ 0.41 & 0.33 \end{bmatrix}$.

Test whether the system is viable as per Hawkins Simon conditions.

2) The technology matrix of an economic system of two industries is $\begin{bmatrix} 0.6 & 0.9 \\ 0.20 & 0.80 \end{bmatrix}$

.Test whether the system is viable as per Hawkins-Simon conditions.

3) Evaluate: $\begin{vmatrix} 1 & 2 & 4 \\ -1 & 3 & 0 \\ 4 & 1 & 0 \end{vmatrix}$

4) Solve $\begin{vmatrix} x-1 & x & x-2 \\ 0 & x-2 & x-3 \\ 0 & 0 & x-3 \end{vmatrix} = 0$

5) Resolve into partial fractions for the following

$\frac{3x+7}{x^2-3x+2}$

6) Resolve into partial fractions for the following:

$\frac{4x+1}{(x-2)(x+1)}$

7) a) In how many ways can 8 identical beads be strung on a necklace?
b) In how many ways can 8 boys form a ring?

8) Find the rank of the word 'CHAT' in dictionary.

9) Verify that $8C_4+8C_3=9C_4$

10) Find n, if $\frac{1}{9!}+\frac{1}{10!}=\frac{n}{11!}$

11) If $nP_r = 360$, find n and r.

12) If $15C_{3r} = 15C_{r+3}$, find r

13) A point moves so that it is always at a distance of 4 units from the point (3, -2)

14) Find the equation of the following circles having the center (3,5) and radius 5 units

15) Find the equation of the circle having (4,7) and (-2,5) as the extremities of a diameter

16) Find the cartesian equation of the circle whose parametric equation are x = 3 $\cos\theta$, y = 3 $\sin\theta$ $0 \le \theta \le 2\pi$

17) Find the length of the tangent from (1,2) to the circle $x^2 + y^2 - 2x + 4y + 9 = 0$

18) Find the acute angle between the lines 2x - y + 3 = 0 and x + y + 2 = 0.

19) Find the locus of the point which is equidistant from (2, –3) and (3, –4).

20) Find the centre and radius of the circle $x^2+y^2-8x+6y-24 = 0$

21) Find the parametric equations of the circle $x^2+y^2=25$

22) Prove that $\tan^{-1}\left(\frac{4}{3}\right) - \tan^{-1}\left(\frac{1}{7}\right) = \frac{\pi}{4}$

23) Find the values of the following trigonometric ratios. $\sin 300^o$

24) Find the values of the following trigonometric ratios. $\tan\left(-855^o\right)$

25) Prove that $\tan^{-1}\left(\frac{m}{n}\right) - \tan^{-1}\left(\frac{m-n}{m+n}\right) = \frac{\pi}{4}$

26) Find the value of sin 75°

27) Find the value of tan 15°

28) Find the values of the following. sin 76° cos 16° + cos 76° sin 16°

29) If $\sin A = \frac{3}{5}$ $0 < A < \frac{\pi}{2}$ and $\cos B = \frac{-12}{13}$, $\pi < B < \frac{3\pi}{2}$ find the values of the following $\cos(A + B)$

30) Express each of the following as the sum or difference of sine or cosine: $\cos(60^0+A)\sin(120^0+A)$

31) Prove that: $\frac{\cos 2A - \cos 3A}{\sin 2A - \sin 3A} = \tan\frac{A}{12}$

32) Prove that $\frac{\sin(-\theta)\tan(90^o-\theta)\sec\left(180^o-\theta\right)}{\sin(180+\theta)\cot(360-\theta)\operatorname{cosec}(90^o-\theta)} = 1$

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

34) Find $\frac{dy}{dx}$ of the following functions: x=ct, y=$\frac{c}{t}$

35) Find $\frac{dy}{dx}$ of the following functions: x=log t, y=sin t

36) Find $\frac{dy}{dx}$ of the following functions: $x=a\cos^3\theta$, $y=a\sin^3\theta$

37) Differentiate the following with respect to x. $(x^2-3x+2)(x+1)$

38) Differentiate the following with respect to x. $\left(\sqrt{x}+\frac{1}{\sqrt{x}}\right)^2$

39) Evaluate: $lim_{x\to 2}\frac{x^2-4x+6}{x+2}$

40) Evaluate: $lim_{x\to \frac{x}{4}}\frac{5\sin 2x-2\cos 2x}{3\cos 2x+2\sin 2x}$

41) Evaluate: $lim_{x\to 0}\frac{\sqrt{2+x}-\sqrt{2}}{x}$

42) Differentiate the following functions with respect to x, $x^2 \sin x$

43) Find $\frac{dy}{dx}$ if $x = at^2$, $y = 2at$

44) If $x = a\,\theta$ and $y = \frac{a}{\theta}$, then prove that $\frac{dy}{dx}+\frac{y}{x}=0$

45) If $y = A \sin x + B \cos x$, then prove that, $y_2 + y = 0$

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46) Solve: $\begin{vmatrix} 7 & 4 & 11 \\ -3 & 5 & x \\ -x & 3 & 1 \end{vmatrix} = 0$

47) Show that $\begin{vmatrix} 0 & ab^2 & ac^2 \\ a^2b & 0 & bc^2 \\ a^2c & b^2c & 0 \end{vmatrix} = 2a^3b^3c^3.$

48) If $A = \begin{bmatrix} 1 & -1 \\ 2 & 3 \end{bmatrix}$ show that $A^2 - 4A + 5I_2 = 0$ and also find A^{-1}.

49) Solve by matrix inversion method: $2x + 3y - 5 = 0$, $x - 2y + 1 = 0$.

50) Find the inverse of the following matrices $\begin{bmatrix} -3 & -5 & 4 \\ -2 & 3 & -1 \\ 1 & -4 & -6 \end{bmatrix}$

51) Evaluate $\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix}$ = (a–b) (b–c) (c–a)

52) If $A = \begin{bmatrix} 2 & 4 \\ -3 & 2 \end{bmatrix}$ then, find A^{-1}.

53) Expand the following by using binomial theorem. $\left(x + \frac{1}{y}\right)^7$

54) Evaluate the following using binomial theorem: $(101)^4$

55) Evaluate the following using binomial theorem: $(999)^5$

56) Find the middle terms in the expansion of $\left(3x + \frac{x^2}{2}\right)^8$

57) Find the term independent of x in the expansion of $\left(x^2 - \frac{2}{3x}\right)^9$

58) If (n + 2)! = 60 (n - 1)! find n.

59) If $nP_4 = 12(nP_2)$ find n.

60) Find the number of arrangements that can be made out of the letters of the word "ASSASSINATION".

61) If $nP_r = 1680$ and $nC_r = 70$, find n and r.

62) Find the 5^{th} term in the expansion of $\left(x - \frac{3}{x^2}\right)^{10}$

63) Find the Coefficient of x^{10} in the binomial expansion of $\left(2x^2 - \frac{3}{x}\right)^{11}$

64) How many distinct words can be formed using all the letters of the following words.
MISSISSIPPI

65) If $nP_r = 720$; $nC_r = 120$, find r

66) If $(n + 2)C_n = 45$, find n

67) If the distance of a point from the points (2,1) and (1, 2) are in the ratio 2:1 then find locus of the point

68) Show that the straight lines x + y -4 = 0, 3x + 2 = 0 and 3x -3y + 16 = 0 are concurrent

69) Find the value of 'a' for which the straight lines 3x +4y = 13; 2x -7y = -1 and ax - y -14 = 0 are concurrent

70) Find the center and radius of the circle $5x^2 + 5y^2 + 4x - 8y - 16 = 0$

71) Find the center and radius of the circle (x + 2) (x - 5) + (y -2) (y -1) = 0

72) Find the equation of the circle whose centre is (-3, -2) and having circumferences 16π

73) Find the equation of the circle whose centre is (2,3) and which passes through (1 , 4)

74) Find the value of P if the line 3x +4y -P = 0 is tangent to the circle $x^2 + y^2 = 16$

75) Find the vertex, focus, axis directrix and the length of latus rectum of the parabola $y^2 - 8y - 8x + 24 = 0$

76) For what value of k does $2x^2+5xy+2y^2+15x+18y+k=0$ represent a pair of straight lines.

77) Show that the equation $2x^2+5xy+3y^2+6x+7y+4=0$ represents a pair of straight lines. Also find the angle between them.

78) Show that the pair of straight lines $4x^2-12xy+9y^2+18x-27y+8=0$ represents a pair of parallel straight lines and find their separate equations.

79) Show that $\tan^{-1}\left(\frac{1}{2}\right)+\tan^{-1}\left(\frac{2}{11}\right)=\tan^{-1}\left(\frac{3}{4}\right)$

80) Solve: $\tan^{-1}2x+\tan^{-1}3x=\frac{\pi}{4}$

81) Prove that $\tan\left(-225^o\right)\cot\left(-405^o\right)-\tan\left(-765^o\right)\cot\left(675^o\right)=0$

82) If $\cos A=\frac{13}{14}$ and $\cos B=\frac{1}{7}$ where A, B are acute angles, prove that A-B=$\frac{\pi}{3}$

83) If A+B=45° , Prove that (1 + tan A) (1+ tan B) = 2 and hence deduce the value of $\tan 22\frac{1}{2}^\circ$

84) If tan A - tan B = x and cot B - cot A = y, prove that cot (A - B) = $\frac{1}{x}+\frac{1}{y}$

85) Prove that $\frac{\sin(B-C)}{\cos B(\cos C)}+\frac{\sin(C-A)}{\cos C(\cos A)}+\frac{\sin(A-B)}{\cos A(\cos B)}=0$

86) If $\tan\alpha=\frac{1}{2}$ and $\tan\beta=\frac{1}{7}$ then prove that $(2\alpha+\beta)=\frac{\pi}{4}$.

87) Prove that $\cos^2 A+\cos^2(A+120^o)+\cos^2(A-120^o)=\frac{3}{2}$

88) Show that $\sin 20^o \sin 40^o \sin 60^o \sin 80^o=\frac{3}{16}$

89) Solve $\tan^{-1}(x+2)+\tan^{-1}(2-x)=\tan^{-1}(\frac{2}{3})$

90) Evaluate the following $\lim_{x\to 0}\frac{\sqrt{1+x}-\sqrt{1-x}}{x}$

91) If $\lim_{x\to\infty}\frac{x^9-a^9}{x-a}=\lim_{x\to 3}(x+6)$,find the values of a

92) If $\lim_{x \leftarrow 2} \frac{x^n - 2^n}{x-2} = 448$,then find the least positive integer n

93) Find y_2 of the following function x = a cos θ, y = a sin θ

94) If y = 500 e^{7x} + 600 e^{-7x} then show that y_2 - 49y = 0.

95) If y = 2 + log x, then show that $xy_2 + y_1 = 0$.

96) Evaluate: $lim x \to 0 \frac{\sin 3x}{\sin 5x}$

97) If $ax^2 + 5hxy + by^2 + 2gx + 2fy + c = 0$ then find $\frac{dy}{dx}$.

98) If sin y = x sin(a + y), then prove that $\frac{dy}{dx} = \frac{sin^2(a+y)}{sin\ a}$.

99) If $x^y = e^{x-y}$, prove that $\frac{dy}{dx} = \frac{log\ x}{(1+log\ x)^2}$

100) Find the second order derivative of the following functions with respect to x, x = at^2, y = 2at

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101) Evaluate: $\begin{vmatrix} 1 & a & a^2 - bc \\ 1 & b & b^2 - ca \\ 1 & c & c^2 - ab \end{vmatrix}$

102) Prove that $\begin{vmatrix} \frac{1}{a} & bc & b+c \\ \frac{1}{b} & ca & c+a \\ \frac{1}{c} & ab & a+b \end{vmatrix} = 0$

103) Prove that $\begin{vmatrix} -a^2 & ab & ac \\ ab & -b^2 & bc \\ ac & bc & -c^2 \end{vmatrix} = 4a^2b^2c^2$

104) If A = $\begin{bmatrix} 1 & 1 & 1 \\ 3 & 4 & 7 \\ 1 & -1 & 1 \end{bmatrix}$ verify that A (adj A) = (adj A) A = |A| I_3.

105) The cost of 2 Kg of Wheat and 1 Kg of Sugar is Rs.70. The cost of 1 Kg of Wheat and 1 Kg of Rice is Rs.70 The cost of 3 Kg of Wheat, 2 Kg of Sugar and 1 Kg of rice is Rs.170. Find the cost of per kg each item using matrix inversion method.

106) If $A = \begin{bmatrix} 1 & 3 & 3 \\ 1 & 4 & 3 \\ 1 & 3 & 4 \end{bmatrix}$ then verify that A (adj A) = |A| I and also find A^{-1}.

107) Solve by matrix inversion method: 3x - y + 2z = 13 ; 2x + Y - z = 3 ; x + 3y - 5z = - 8.

108) Show that the matrices $A=\begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$ and $B=\begin{bmatrix} \frac{4}{5} & -\frac{2}{5} & -\frac{1}{5} \\ -\frac{1}{5} & \frac{3}{5} & -\frac{1}{5} \\ -\frac{1}{5} & -\frac{2}{5} & \frac{4}{5} \end{bmatrix}$ are inverses of each other.

109) If $A=\begin{bmatrix} 3 & 7 \\ 2 & 5 \end{bmatrix}$ and $B=\begin{bmatrix} 6 & 8 \\ 7 & 9 \end{bmatrix}$ then, verify that $(AB)^{-1}=B^{-1}A^{-1}$

110) In an economy, there are two industries P and Q and the following table give the supply and demand positions in corers of rupees.

Producer	User		Final Demand	Total output
	P	Q		
P	10	25	15	50
Q	20	30	10	60

Determine the outputs when the final demand changes to 35 for P and 42 for Q.

111) The cost of 4 kg onion, 3 kg wheat and 2 kg rice is Rs.320. The cost of 2kg onion, 4 kg wheat and 6 kg rice is Rs.560. The cost of 6 kg onion, 2 kg wheat and 3 kg rice is `380. Find the cost of each item per kg by matrix inversion method.

112) Resolve into partial fractions for the following:

$$\frac{1}{(x-1)(x+2)^2}$$

113) Resolve into partial fractions for the following:

$$\frac{2x^2-5x-7}{(x-2)^3}$$

114) Resolve into partial fractions for the following:

$$\frac{x^2-3}{(x+2)(x^2+1)}$$

115) Prove that the term independent of x in the expansion of

$\left(x+\frac{1}{x}\right)^{2n}$ *is* $\frac{1.3.5.....,(2n-1)2^n}{n!}$

116) Show that the middle term in the expansion of $(1+x)^{2n}$ is $\frac{1.3.5....(2n-1)2^n.x^n}{n!}$

117) In how many ways can a cricket team of 11 players be chosen out of a batch of 15 players?

(i) There is no restriction on the selection.

(ii) A particular player is always chosen.

(iii)A particular player is never chosen

118) A Committee of 5 is to be formed out of 6 gents and 4 ladies. In how many ways this can be done when

(i) atleast two ladies are included

(ii) atmost two ladies are included

119) By the principle of mathematical induction, prove the following.

$1^3+2^3+3^3+.....+n^3=\frac{n^2(n+1)^2}{4}$ for all $n \in N$.

120) By the principle of mathematical induction, prove the following.

$3^{2n}-1$ is a divisible by 8, for all $n \in N$.

121) By the principle of mathematical induction, prove the following.

a^n-b^n is divisible by a-b, for all $n \in N$.

122) Resolve into partial fraction : $\frac{x+1}{(x^2-4)(x+1}$

123) By Mathematical Induction, prove that $1^2+2^2+3^2+.....+n^2=\frac{n(n+1)(2n+1)}{6}$, for all n∈N.

124) Show that the equation $12x^2-10xy+2y^2+14x-5y+2=0$ represents a pair of straight lines also find the separate equations of the straight lines

125) Show that the pair of straight lines $4x^2+12xy+9y^2-6x-9y+2=0$ represents two parallel straight lines and also find the separate equations of the straight lines..

126) Find the equation of the circle passing through the points (0, 1) , (4 ,3) and (1, -1)

127) Find the equation of the circle on the line joining the points (1,0), (0,1) and having its centre on the line x + y= 1

128) As the number of units produced increases from 500 to 1000 and the total cost of production increases from. Rs 6000 to Rs 9000. Find the relationship

between the cost (y) and the number of units produced (x) if the relationship is linear

129) Determine whether the points p(1,0), Q(2,1) and R(2,3) lie outside the circle, on the ciircle or inside the circle $x^2 + y^2 - 4x - 6y + 9 = 0$

130) A private company appointed a clerk in the year 2012, his salary was fixed as Rs.20,000. In 2017 his salary raised to Rs.25,000.
(i) Express the above information as a linear function in x and y where y represent the salary of the clerk and x-represent the year.
(ii) What will be his salary in 2020?

131) Find the equation of the circle passing through the points (0,0), (1, 2) and (2,0).

132) Solve: $\tan^{-1}(x+1) + \tan^{-1}(x-1) = \tan^{-1}\left(\frac{4}{7}\right)$

133) Prove that $\frac{\cos 4x + \cos 3x + \cos 2x}{\sin 4x + \sin 3x + \sin 2x} = \cot 3x$

134) Prove that $\frac{\sin\left(180^o + A\right)\cos\left(90^o - A\right)\tan\left(270^o - A\right)}{\sec\left(540^o - A\right)\cos\left(360^o + A\right)\,cosec\left(270^o + A\right)} = -\sin A\cos^2 A$

135) Prove that: $(cos\alpha - cos\beta)^2 + (sin\alpha - sin\beta)^2 = 4sin^2\left(\frac{\alpha-\beta}{2}\right)$

136) Prove that cos 20° cos 40° cos 60° cos $80^0 = \frac{1}{16}$

137) If cosA+cosB = $\frac{1}{2}$ and sinA+sinB=$\frac{1}{4}$, prove that $\tan\left(\frac{A+B}{2}\right) = \frac{1}{2}$

138) Prove that $(\cos\alpha + \cos\beta)^2 + (\sin\alpha + \sin\beta)^2 = 4\cos^2\left(\frac{\alpha-\beta}{2}\right)$

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

140) If $y = \left(x + \sqrt{1+x^2}\right)^m$, then show that $(1 + x)^2\, y_2 + xy_1 - m^2 = 0$.

141) If y = sin (log x), then show that $x^2y_2 + xy_1 + y = 0$.

142) If $x\sqrt{1+y} + y\sqrt{1+x} = 0$ and x≠y, then prove that $\frac{dy}{dx} = \frac{-1}{(x+1)^2}$.

143) Differentiate the following with respect to x $\sqrt{\frac{(x-1)(x-2)}{(x-3)(x^2+x+1)}}$

144) If $x^m.y^n = (x+y)^{(m+n)}$,then show that $\frac{dy}{dx} = \frac{y}{x}$

145) Differentiate: $\sqrt{\frac{(x-3)(x^2+4)}{3x^2+4x+5}}$

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