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

MINIMUM STUDY MATERIAL FOR QUARTERLY EXAM

12th Standard

Business Maths

40 x 2 = 80

1) Find the rank of the matrix $\begin{pmatrix} -5 & -7 \\ 5 & 7 \end{pmatrix}$

2) Find the rank of the matrix A = $\begin{pmatrix} 1 & -3 & 4 & 7 \\ 9 & 1 & 2 & 0 \end{pmatrix}$

3) Evaluate $\int \frac{dx}{(2x+3)^2}$

4) Evaluate $\int \left(x + \frac{1}{x}\right)^2 dx$

5) Evaluate $\int \frac{2}{3x+5} dx$

6) Evaluate $\int 3^{2x+3} dx$

7) Evaluate $\int \frac{e^x+7}{e^x} dx$

8) Evaluate $\int \frac{cos2x}{sin^2 x cos^2 x} dx$

9) Evaluate $\int \sqrt{1 + sin2x} \quad dx$

10) Integrate the following with respect to x.
$\sqrt{1 - sin2x}$

11) Integrate the following with respect to x.
$\frac{2x+5}{x^2+5x-7}$

12) Integrate the following with respect to x
$\frac{6x+7}{\sqrt{3x^2+7x-1}}$

13) Integrate the following with respect to x.
$\frac{1}{x \log x}$

14) Evaluate $\int \frac{dx}{1-25x^2}$

15) Evaluate $\int \frac{dx}{4x^2-1}$

16) Evaluate $\int \sqrt{x^2 - 16}\, \mathrm{dx}$

17) Evaluate $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} sinx \ \mathrm{dx}$

18) Evaluate $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \cos x dx \ \mathrm{dx}$

19) Evaluate $\int_{-1}^{1} (x^2 + x) dx$

20) Evaluate the following
$\Gamma\left(\frac{9}{2}\right)$

21) Evaluate the following
$\int_0^\infty e^{-4x} x^4 dx$

22) Find the area of the region bounded by the line x − 2y − 12 = 0 , the y-axis and the lines y = 2, y = 5.

23) Find the area of the region bounded by the parabola $y = 4-x^2$, x −axis and the lines x = 0, x = 2.

24) If MR = 20 − 5x + $3x^2$, find total revenue function.

25) Find the differential equation of the following
y = cx + c − c^3

26) Solve: (x^2 + x + 1)dx + (y^2− y + 3)dy = 0

27) Solve: ydx − xdy = 0

28) Solve (D^2−3D−4)y = 0

29) Solve the following differential equations
$\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 4y = 0$

30) Find the differential equation of the following
xy = c^2

31) Solve: $\frac{dy}{dx}$ + e^x+ye^x = 0

32) Find (i) Δe^{ax}
(ii) $\Delta^2 e^x$
(iii) Δ log x

33) Evaluate $\Delta^2\left(\frac{1}{x}\right)$ by taking '1' as the interval of differencing.

34) Suppose, the life in hours of a radio tube has the following p.d.f

$$f(x) = \begin{cases} \frac{100}{x^2}, & \text{when } x \geq 100 \\ 0, & \text{when } x < 100 \end{cases}$$

Find the distribution function.

35) The discrete random variable X has the probability function

X	1	2	3	4
P(X=x)	k	2k	3k	4k

Show that k = 0.1.

36) Two coins are tossed simultaneously. Getting a head is termed as success. Find the probability distribution of the number of successes.

37) The following information is the probability distribution of successes.

No. of Successes	0	1	2
Probability	$\frac{6}{11}$	$\frac{9}{22}$	$\frac{1}{22}$

Determine the expected number of success.

38) Let X be a continuous random variable with probability density function

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

Find the expected value of X.

39) Let X be a random variable and Y = 2X + 1. What is the variance of Y if variance of X is 5 ?

40) The time to failure in thousands of hours of an important piece of electronic equipment used in a manufactured DVD player has the density function

$$f(x) = \begin{cases} 2e^{-2x}, & x > 0 \\ 0, & \text{otherwise} \end{cases}$$

Find the expected life of this piece of equipment.

70 x 3 = 210

41) Find the rank of the matrix $\begin{pmatrix} 1 & 2 & -1 & 3 \\ 2 & 4 & 1 & -2 \\ 3 & 6 & 3 & -7 \end{pmatrix}$

42) Show that the equations x + y = 5, 2x + y = 8 are consistent and solve them.

43) Show that the equations 2x + y = 5,4x + 2y = 10 are consistent and solve them.

44) If A= $\begin{pmatrix} 1 & 1 & -1 \\ 2 & -3 & 4 \\ 3 & -2 & 3 \end{pmatrix}$ and B= $\begin{pmatrix} 1 & -2 & 3 \\ -2 & 4 & -6 \\ 5 & 1 & -1 \end{pmatrix}$, then find the rank of AB and the rank of BA.

45) Show that the following system of equations have unique solution:
x + y + z = 3, x + 2y + 3z = 4, x + 4y + 9z = 6 by rank method.

46) Solve the equations 2x + 3y = 7, 3x + 5y = 9 by Cramer's rule.

47) Consider the matrix of transition probabilities of a product available in the market in two brands A and B.

$$\begin{matrix} \\ A \\ B \end{matrix} \begin{pmatrix} \overset{A}{0.9} & \overset{B}{0.1} \\ 0.3 & 0.7 \end{pmatrix}$$

Determine the market share of each brand in equilibrium position.

48) Parithi is either sad (S) or happy (H) each day. If he is happy in one day, he is sad on the next day by four times out of five. If he is sad on one day, he is happy on the next day by two times out of three. Over a long run, what are the chances that Parithi is happy on any given day?

49) Akash bats according to the following traits. If he makes a hit (S), there is a 25% chance that he will make a hit his next time at bat. If he fails to hit (F), there is a 35% chance that he will make a hit his next time at bat. Find the transition probability matrix for the data and determine Akash's long- range batting average.

50) The subscription department of a magazine sends out a letter to a large mailing list inviting subscriptions for the magazine. Some of the people receiving this letter already subscribe to the magazine while others do not. From this mailing list, 45% of those who already subscribe will subscribe again while 30% of those who do not now subscribe will subscribe. On the last letter, it was found that 40% of those receiving it ordered a subscription. What percent of those receiving the current letter can be expected to order a subscription?

51) Evaluate $\int \frac{ax^2+bx+c}{\sqrt{x}}dx$

52) Evaluate $\int \frac{2x^2-14x+24}{x-3}dx$

53) Evaluate $\int \frac{x+2}{\sqrt{2x+3}}dx$

54) Evaluate $\int \frac{1}{\sqrt{x+2}-\sqrt{x-2}}dx$

55) Evaluate $\int \frac{7x-1}{x^2-5x+6}dx$

ANSWERS UPLOAD SOON IN MY YOUTUBE CHANNEL NAME RAVI MATHS TUITION CENTER WHATSAPP - 8056206308

56) Integrate the following with respect x.

$\frac{x^3+3x^2-7x+11}{x+5}$

57) Evaluate $\int \frac{5+5e^{2x}}{e^x+e^{-x}}dx$

58) Integrate the following with respect to x.

$\frac{cos2x+2sin^2x}{cos^2x}$

59) Evaluate $\int x^3 e^x dx$

60) Evaluate $\int x^3 \log x \, dx$

61) Evaluate $\int e^x \left(x^2+2x\right)dx$

62) Evaluate $\int e^{2x}\left[\frac{2x-1}{4x^2}\right]dx$

63) Integrate the following with respect to x.

$e^x\left[\frac{1}{x^2}-\frac{2}{x^3}\right]$

64) Evaluate $\int \frac{dx}{x^2-3x+2}$

65) Evaluate $\int \frac{dx}{\sqrt{x^2-3x+2}}$

66) Evaluate $\int \sqrt{x^2-4x+3}\ dx$

67) Evaluate $\int_0^1 (x^3+7x^2-5x)\ dx$

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

69) Using second fundamental theorem, evaluate the following:

$\int_1^e \frac{dx}{x(1+logx)^3}$

70) Evaluate the following using properties of definite integrals:

$\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin^2\theta d\theta$

71) Evaluate the following using properties of definite integrals:

$\int_{-1}^{1} log\left(\frac{2-x}{2+x}\right)dx$

72) Evaluate $\int_2^3 \frac{x^4+1}{x^2}dx$

73) Find the area bounded by the line y = x, the x-axis and the ordinates x = 1, x = 2

74) Find the area of the region lying in the first quadrant bounded by the region $y = 4x^2$, x = 0, y = 0 and y = 4

75) The marginal cost function of manufacturing x shoes is $6 + 10x - 6x^2$. The cost producing a pair of shoes is Rs. 12. Find the total and average cost function.

76) A company has determined that the marginal cost function for a product of a particular commodity is given by MC = $125 + 10x - \frac{x^2}{9}$ where C rupees is the cost of producing x units of the commodity. If the fixed cost is Rs.250 what is the cost of producing 15 units.

77) The marginal cost function of a product is given by $\frac{dC}{dx} = 100 - 10x + 0.1x^2$ where x is the output. Obtain the total and the average cost function of the firm under the assumption, that its fixed cost is Rs. 500.

78) Given the marginal revenue function $\frac{4}{(2x+3)^2} - 1$, show that the average revenue function is P = $\frac{4}{6x+9} - 1$

79) If MR = $14 - 6x + 9x^2$, find the demand function.

80) Calculate consumer's surplus if the demand function p = $122 - 5x - 2x^2$ and x = 6

81) The demand function p = $85 - 5x$ and supply function p = $3x - 35$. Calculate the equilibrium price and quantity demanded. Also calculate consumer's surplus.

82) The demand and supply functions under perfect competition are $p_d = 1600 - x^2$ and $p_s = 2x^2 + 400$ respectively. Find the producer's surplus.

83) For the marginal revenue function MR = $6 - 3x^2 - x^3$, Find the revenue function and demand function.

84) Find the differential equation of the family of curves $y = e^x (a\cos x + b\sin x)$ where a and b are arbitrary constants.

85) Find the differential equation corresponding to $y = ae^{4x} + be^{-x}$ where a, b are arbitrary constants.

86) Solve $\frac{dy}{dx} = e^{x-y} + x^2e^{-y}$

87) The marginal cost function of manufacturing x gloves is $6 + 10x - 6x^2$. The total cost of producing a pair of gloves is Rs. 100. Find the total and average cost function.

88) Solve: $\frac{dy}{dx} = y \sin 2x$

89) Find the curve whose gradient at any point P(x, y) on it is $\frac{x-a}{y-b}$ and which passes through the origin.

90) Solve $\frac{dy}{dx} + \frac{y}{x} = x^3$

91) Solve the following differential equations: $(4D^2+4D-3)y = e^{2x}$

92) Solve : $(D^2-4D-1)y = e^{-3x}$

93) Solve: $\log\left(\frac{dy}{dx}\right) = ax + by$

94) Using graphic method, find the value of y when x = 38 from the following data:

x	10	20	30	40	50	60
y	63	55	44	34	29	22

95) Construct a forward difference table for $y = f(x) = x^3+2x+1$ for $x = 1,2,3,4,5$

96) By constructing a difference table and using the second order differences as constant, find the sixth term of the series 8,12,19,29,42...

97) Prove that $f(4) = f(3) + \Delta f(2) + \Delta^2 f(1) + \Delta^3 f(1)$ taking '1' as the interval of differencing.

98) Evaluate $\Delta(\log ax)$.

99) If h = 1 then prove that $(E^{-1}\Delta)x^3 = 3x^2 - 3x + 1$.

100) If $f(x) = x^2 + 3x$ then show that $\Delta f(x) = 2x + 4$

101) Find the missing entry in the following table

x	0	1	2	3	4
y_x	1	3	9	-	81

102) If $p(x) = \begin{cases} \frac{x}{20}, & x = 0,1,2,3,4,5 \\ 0, & \text{otherwise} \end{cases}$

Find

(i) P(X< 3) and

(ii) $P(2 \leq 4)$

103) A continuous random variable X has the following p.d.f

f(x) = ax, $0 \leq x \leq 1$

Determine the constant a and also find $P\left[X \leq \frac{1}{2}\right]$

104) A fair die is thrown. Find out the expected value of its outcomes

105) Suppose the probability mass function of the discrete random variable is

X=x	0	1	2	3
p(x)	0.2	0.1	0.4	0.3

What is the value of $E(3X + 2X^2)$?

106) The time to failure in thousands of hours of an important piece of electronic equipment used in a manufactured DVD player has the density function.

$f(x) = \{3e^{-3x}, \quad x > 0$

$0, otherwise$

Find the expected life of the piece of equipment.

107) In a business venture a man can make a profit of Rs. 2,000 with a probability of 0.4 or have a loss of Rs. 1,000 with a probability of 0.6. What is his expected, variance and standard deviation of profit?

108) A person tosses a coin and is to receive Rs. 4 for a head and is to pay Rs. 2 for a tail. Find the expectation and variance of his gains.

109) The probability distribution function of a discrete random variable X is

$f(x) = \{2k, x = 1$

$3k, x = 3$

$4k, x = 5$

$0, otherwise$

where k is some constant. Find (a) k and (b) P(X > 2).

110) Consider a random variable X with p.d.f

$$f(x) = \begin{cases} 3x^2, & \text{if } 0 < x < 1 \\ 0, & \text{otherwise} \end{cases}$$

Find E(X) and V(3X-2).

65 x 5 = 325

111) Show that the equations 2x + y + z = 5, x + y + z = 4, x − y + 2z = 1 are consistent and hence solve them.

112) Show that the equations are inconsistent x − 4y + 7z = 14, 3x + 8y − 2z = 13, 7x − 8y + 26z = 5

113) Find k, if the equations x + 2y − 3z = −2, 3x − y − 2z = 1, 2x + 3y − 5z = k are consistent.

114) Find k, if the equations x + y + z = 7, x + 2y + 3z = 18, y + kz = 6 are inconsistent

115) Investigate for what values of 'a' and 'b' the following system of equations x + y + z = 6,x + 2y + 3z = 10, x + 2y + az = b have

(i) no solution

(ii) a unique solution

(iii) an infinite number of solutions.

116) The total number of units produced (P) is a linear function of amount of over times in labour (in hours) (l), amount of additional machine time (m) and fixed finishing time (a)

i.e, P = a + bl + cm

From the data given below, find the values of constants a, b and c

Day	Production (in Units P)	Labour (in Hrs l)	Additional Machine Time (in Hrs m)
Monday	6,950	40	10
Tuesday	6,725	35	9
Wednesday	7,100	40	12

Estimate the production when overtime in labour is 50 hrs and additional machine time is 15 hrs.

117) The price of three commodities X, Y and Z are x, y and z respectively Mr. Anand purchases 6 units of Z and sells 2 units of X and 3 units of Y. Mr. Amar purchases a unit of Y and sells 3 units of X and 2units of Z. Mr. Amit purchases a unit of X and sells 3 units of Y and a unit of Z. In the process they earn Rs. 5,000/-, Rs. 2,000/- and Rs. 5,500/- respectively. Find the prices per unit of three commodities by rank method.

118) An amount of Rs. 5,000/- is to be deposited in three different bonds bearing 6%, 7% and 8% per year respectively. Total annual income is Rs. 358/-. If the income from first two investments is Rs. 70/- more than the income from the third, then find the amount of investment in each bond by rank method.

119) 80% of students who do maths work during one study period, will do the maths work at the next study period. 30% of students who do english work during one study period, will do the english work at the next study period. Initially there were 60 students do maths work and 40 students do english work.
Calculate,
(i) The transition probability matrix
(ii) The number of students who do maths work, english work for the next subsequent 2 study periods.

120) A new transit system has just gone into operation in Chennai. Of those who use the transit system this year, 30% will switch over to using metro train next year and 70% will continue to use the transit system. Of those who use metro train this year, 70% will continue to use metro train next year and 30% will switch over to the transit system. Suppose the population of Chennai city remains constant and that 60% of the commuters use the transit system and 40% of the commuters use metro train this year.
(i) What percent of commuters will be using the transit system after one year?
(ii) What percent of commuters will be using the transit system in the long run?

121) Solve the following equation by using Cramer's rule
x + 4y + 3z = 2, 2x−6y + 6z = −3, 5x− 2y + 3z = −5

122) Evaluate $\int \frac{3x+2}{(x-2)^2(x-3)}dx$

123) Evaluate $\int \frac{3x^2+6x+1}{(x+3)(x^2+1)}dx$

124) Integrate the following with respect to x.
$\frac{4x^2+2x+6}{(x+1)^2(x-3)}$

125) Integrate the following with respect to x.
$\frac{3x^2-2x+5}{(x-1)(x^2+5)}$

126) Evaluate $\int (logx)^2 dx$

127) Evaluate $\int \left[\frac{1}{\log x} - \frac{1}{(\log x)^2}\right] dx$

128) Evaluate $\int_0^{\frac{\pi}{2}} \frac{sinx}{sinx+cosx}$ dx

129) Evaluate $\int_2^5 \frac{\sqrt{x}}{\sqrt{x}+\sqrt{7-x}}$ dx

130) Evaluate the following using properties of definite integrals:
$\int_0^{\frac{\pi}{2}} \frac{sin^7 x}{sin^7 x+cos^7 x}dx$

131) Evaluate the following using properties of definite integrals:
$\int_0^1 log\left(\frac{1}{x}-1\right)dx$

132) Evaluate the following using properties of definite integrals:
$\int_0^1 \frac{x}{(1-x)^{\frac{3}{4}}}dx$

133) Evaluate the integral as the limit of a sum: $\int_1^2 (2x+1)dx$

134) Evaluate the integral as the limit of a sum: $\int_1^2 x^2$ dx

135) Evaluate the following integrals as the limit of the sum:
$\int_0^1 (x+4)$ dx

136) Evaluate the following integrals as the limit of the sum:
$\int_1^3 xdx$

137) Evaluate the following integrals as the limit of the sum:
$\int_1^3 (2x+3)dx$

138) Evaluate the following integrals as the limit of the sum:
$\int_0^1 x^2 dx$

139) Find the area of the parabola $y^2 = 8x$ bounded by its latus rectum.

140) Sketch the graph $y = |x+3|$ and evaluate $\int_{-6}^0 |x+3|$ dx.

141) Using integration find the area of the circle whose center is at the origin and the radius is a units.

142) Find the area bounded by the curve y = x^2 and the line y = 4

143) A firm has the marginal revenue function given by MR = $\frac{a}{(x+b)^2}$ - c where x is the output and a, b, c are constants. Show that the demand function is given by $x = \frac{a}{b(p+c)} - b$.

144) The marginal cost C'(x) and marginal revenue R'(x) are given by C'(x) = 50 + $\frac{x}{50}$ and R'(x) = 60. The fixed cost is Rs. 200. Determine the maximum profit

145) The marginal cost and marginal revenue with respect to commodity of a firm are given by C'(x) = 8 + 6x and R'(x)= 24. Find the total Profit given that the total cost at zero output is zero.

146) Elasticity of a function $\frac{Ey}{Ex}$ is given by $\frac{Ey}{Ex}$ = $\frac{-7x}{(1-2x)(2+3x)}$. Find the function when x = 2, y = $\frac{3}{8}$

147) The elasticity of demand with respect to price p for a commodity is $\eta_d = \frac{p+2p^2}{100-p-p^2}$.. Find demand function where price is Rs. 5 and the demand is 70.

148) The marginal cost of production of a firm is given by C'(x) = 5 + 0.13x, the marginal revenue is given by R'(x) = 18 and the fixed cost is Rs. 120. Find the profit function.

149) The demand and supply function of a commodity are p_d = 18− 2x − x^2 and p_s = 2x − 3 . Find the consumer's surplus and producer's surplus at equilibrium price.

150) Under perfect competition for a commodity the demand and supply laws are P_d = $\frac{8}{x+1} - 2$ and P_s = $\frac{x-3}{2}$ respectively. Find the consumer's and producer's surplus.

151) The demand equation for a products is x = $\sqrt{100-p}$ and the supply equation is x = $\frac{p}{2}$ -10. Determine the consumer's surplus and producer's surplus, under

market equilibrium.

152) Find the consumer's surplus and producer's surplus for the demand function p_d = 25 − 3x and supply function p_s = 5 + 2x.

153) The marginal cost of production of a firm is given by C'(x) = 20 + $\frac{x}{20}$ the marginal revenue is given by R'(x) = 30 and the fixed cost is Rs. 100. Find the profit function

154) The demand equation for a product is p_d = 20 − 5x and the supply equation is p_s = 4x + 8. Determine the consumer's surplus and producer's surplus under market equilibrium.

155) Solve $3e^x \tan y dx + (1 + e^x)\sec^2 y dy = 0$ given $y(0) = \frac{\pi}{4}$

156) Solve the differential equation $y^2dx + (xy + x^2)dy = 0$

157) If the marginal cost of producing x shoes is given by $(3xy + y^2)dx + (x^2 + xy)dy = 0$ and the total cost of producing a pair of shoes is given by Rs. 12. Then find the total cost function.

158) Solve the following:
$\frac{dy}{dx}$ + ytan x = $\cos^3 x$

159) Solve the following differential equations $(D^2+D-6)y=e^{3x} + e^{-3x}$

160) Solve the following differential equations $(D^2-10D+25)y = 4e^{5x} + 5$

161) Solve the following differential equations $(4D^2 + 16D + 15)y = 4e^{-\frac{3}{2}x}$

162) Suppose that the quantity demanded Q_4 = 13 - 6P + $2\frac{dp}{dt} + \frac{d^2p}{dt^2}$ and quantity supplied Q_s = − 3 + 2p, where p is the price. Find the equilibrium price for market clearance.

163) Suppose that the quantity demanded $Q_d = 29 - 2p - 5\frac{dp}{dt} + \frac{d^2p}{dt^2}$ and quantity supplied Q_s = 5 + 4p where p is the price. Find the equilibrium price for market clearance.

164) Suppose that $Q_d = 30 - 5P + 2\frac{dp}{dt} + \frac{d^2P}{dt^2}$ and Q_s = 6 + 3P. Find the equilibrium price for market clearance.

165) From the following table find the number of students who obtained marks less than 45.

Marks	30-40	40-50	50-60	60-70	70-80
No. of Students	31	42	51	35	31

166) Using appropriate interpolation formula find the number of students whose weight is between 60 and 70 from the data given below

Weight in lbs	0-40	40-60	60-80	80-100	100-120
No.of.students	250	120	100	70	50

167) Evaluate $\Delta\left[\frac{5x+12}{x^2+5x+6}\right]$ by taking '1' as the interval of differencing.

168) The following data are taken from the steam table

Temperature C^0	140	150	160	170	180
Pressure kg f / cm^2	3.685	4.854	6.302	8.076	10.225

Find the pressure at temperature t = 175^0

169) Evaluate $\Delta\left[\frac{1}{(x+1)(x+2)}\right]$ by taking '1' as the interval of differencing

170) Find the missing entries from the following

x	0	1	2	3	4	5
y = f(x)	0	-	8	15	-	35

171) Use Lagrange's formula and estimate from the following data the number of workers getting income not exceeding Rs. 26 per month

Income not exceeding (Rs)	15	25	30	35
No. of workers	36	40	45	48

172) Using Lagrange's interpolation formula find a polynomial which passes through the points (0, –12), (1, 0), (3, 6) and (4,12).

173) If $u_0 = 560$, $u_1 = 556$, $u_2 = 520$, $u_4 = 385$, show that $u_3 = 465$

174) A random variable X has the following probability function

Values of X	0	1	2	3	4	5	6	7
p(x)	0	a	2a	2a	3a	a^2	$2a^2$	$7a^2+a$

(i) Find a, Evaluate

(ii) P(X < 3),

(iii) P(X > 2) and

(iv) P(2 < X $\leq$ 5).

175) A continuous random variable X has the following probability function

Value of X = x	0	1	2	3	4	5	6	7
P(x)	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2+k$

(i) Find k

(ii) Ealuate p(x< 6), p(x$\geq$6) and p(0)

(iii) If P(X$\leq$x).$\frac{1}{2}$, then find the minimum value of x.

****