RAVI MATHS TUITION CENTER PH - 8056206308

1st MID - TERM MODEL PAPER 1

Date : 16-Jul-19

12th Standard 2019 EM

Business Maths

Reg.No. : | | | | | | |

Time : 01:15:00 Hrs

Total Marks : 50

15 x 1 = 15

1) The rank of m×n matrix whose elements are unity is

(a) 0 (b) 1 (c) m (d) n

2) If $A = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$ then the rank of AA^T is

(a) 0 (b) 1 (c) 2 (d) 3

3) If $\rho(A) = \rho(A, B)$ = the number of unknowns, then the system is

(a) Consistent and has infinitely many solutions (b) Consistent and has a unique solution (c) inconsistent (d) consistent

4) If A, B are two n x n non-singular matrices, then

(a) AB is non-singular (b) AB is singular (c) $(AB)^{-1} = A^{-1} B^{-1}$ (d) $(AB)^{-1}$ does not exit

5) $\int \frac{e^x}{\sqrt{1+e^x}}$ dx is

(a) $\frac{e^x}{\sqrt{1+e^x}} + c$ (b) $2\sqrt{1+e^x} + c$ (c) $\sqrt{1+e^x} + c$ (d) $e^x\sqrt{1+e^x} + c$

6) $\int \left[\frac{9}{x-3} - \frac{1}{x+1}\right]$ dx is

(a) $log|x-3| - log|x+1| + c$ (b) $log|x-3| + log|x+1| + c$ (c) $9log|x-3| - log|x+1| + c$

(d) $9log|x-3| + log|x+1| + c$

7) $\Gamma(1)$ is

(a) 0 (b) 1 (c) n (d) n!

8) $\int \frac{2}{(e^x+e^{-x})^2}$ dx = _____ +c

(a) $\frac{-e^{-x}}{e^x+e^{-x}}$ (b) $-\frac{-e^{-x}}{e^x+e^{-x}}$ (c) $\frac{1}{(e^x+1)^2}$ (d) $\frac{1}{e^x-e^{-x}}$

9) $\int_1^4 f(x)dx$, where f(x) = $\begin{cases} 7x+3 & if \quad 1 \le x \le 3 \\ 8x & if \quad 3 \le x \le 4 \end{cases}$ is _____.

(a) 58 (b) 60 (c) 62 (d) 52

10) Area bounded by the curve y = $\frac{1}{x}$ between the limits 1 and 2 is

(a) log2 sq.units (b) log5 sq.units (c) log3 sq.units (d) log 4 sq.units

11) If MR and MC denotes the marginal revenue and marginal cost functions, then the profit functions is

(a) P = ∫(MR − MC) dx + k (b) P = ∫(MR + MC) dx + k (c) P = ∫(MR)(MC)dx + k (d) P = ∫(R −C)dx + k

12) The marginal revenue and marginal cost functions of a company are MR = 30 − 6x and MC = −24 + 3x where x is the product, then the profit function is

(a) $9x^2 + 54x$ (b) $9x^2 - 54x$ (c) $54x - \frac{9x^2}{2}$ (d) $54x - \frac{9x^2}{2} + k$

13) Area bounded by y = x between the lines y = 1, y = 2 with y = axis is

(a) $\frac{1}{2}$ sq.units (b) $\frac{5}{2}$ sq.units (c) $\frac{3}{2}$ sq.units (d) 1 sq.unit

14) The area enclosed by the curve $y = \cos^2 x$ in $[0, \pi]$ the lines $x=0$, $x=\pi$ and the X-axis is _____sq.units.

(a) 2π (b) 2π (c) $\frac{2}{\pi}$ (d) $\frac{\pi}{2}$

15) The area of the region bounded by the line y = 3x + 2, the X-axis and the ordinates x = - 1 and x = 1is_____ sq. units.

(a) $\frac{13}{3}$ (b) 13 (c) $\frac{26}{3}$ (d) $\frac{3}{13}$

4 x 2 = 8

16) 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.

17) A total of Rs 8,600 was invested in two accounts. One account earned $4\frac{3}{4}$ % annual interest and the other earned $6\frac{1}{2}$ % annual interest. If the total interest for one year was Rs 431.25, how much was invested in each account? (Use determinant method).

18) Integrate the following with respect to x. $\left(9x^2 - \frac{4}{x^2}\right)^2$

19) Calculate the area bounded by the parabola $y^2 = 4ax$ and its latusrectum.

4 x 3 = 12

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

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

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

23) The marginal revenue function is given by $R'(x) = \frac{3}{x^2} - \frac{2}{x}$. Find the revenue function and demand function if R(1)=6

3 x 5 = 15

24) Solve by Cramer's rule x+y+z=4,2x−y+3z=1,3x+2y−z = 1

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

26) The demand and supply curves are given by $P_d = \frac{16}{x+4}$ and $P_s = \frac{x}{2}$. Find the Consumer's surplus and producer's surplus at the market equilibrium price.

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1st MID - TERM MODEL PAPER 2

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10 x 1 = 10

1) The system of equations 4x+6y=5, 6x+9y=7 has

(a) a unique solution (b) no solution (c) infinitely many solutions (d) none of these

2) The value of $\begin{vmatrix} 5^2 & 5^3 & 5^4 \\ 5^3 & 5^4 & 5^5 \\ 5^4 & 5^5 & 5^6 \end{vmatrix}$

(a) 5^2 (b) 0 (c) 5^{13} (d) 5^9

3) $\int_0^1 (2x+1)dx$ is

(a) 1 (b) 2 (c) 3 (d) 4

4) If n > 0, then Γ (n) is

(a) $\int_0^1 e^{-x}x^{n-1}$ dx (b) $\int_0^1 e^{-x}x^n dx$ (c) $\int_0^\infty e^x x^{-n}$ (d) $\int_0^\infty e^{-x}x^{n-1}$

5) $\int |x|^3$ dx = _____ +c

(a) $\frac{-x^4}{4}$ (b) $\frac{|x|^4}{4}$ (c) $\frac{x^4}{4}$ (d) none of these

6) If ° x sin x dx = - x cos x + α then α = _____ +c

(a) sin x (b) cos x (c) C (d) none of these

7) If the marginal revenue MR = 35 + 7x − 3x², then the average revenue AR is

(a) $35x + \frac{7x^2}{2} - x^3$ (b) $35x - \frac{7x^2}{2} - x^2$ (c) $35 + \frac{7x^2}{2} + x^2$ (d) 35 + 7x + x²

8) Area bounded by y = eˣ between the limits 0 to 1 is

(a) (e −1) sq.units (b) (e +1) sq.units (c) $\left(1 - \frac{1}{e}\right)$ sq.units (d) $\left(1 + \frac{1}{e}\right)$ sq.units

9) The area unded by the curves y = 2ˣ, x = 0 anx=2 is_____sq.units.

(a) $\log_e 2$ (b) $3\log_e 2$ (c) $\frac{3}{\log_e 2}$ (d) $2\log_e 3$

10) The area enclosed by the curve y = cos²x in [0,π] the lines x=0, x=π and the X-axis is _____sq.units.

(a) 2π (b) 2π (c) $\frac{2}{\pi}$ (d) $\frac{\pi}{2}$

4 x 2 = 8

11) Find the rank of the matrix A = $\begin{pmatrix} 4 & 5 & 2 & 2 \\ 3 & 2 & 1 & 6 \\ 4 & 4 & 8 & 0 \end{pmatrix}$

12) Integrate the following with respect to x.

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

13) Evaluate $\int x\sqrt{x+2}dx$

14) The elasticity of demand with respect to price for a commodity is given by $\frac{(4-x)}{x}$, where p is the price when demand is x. Find the demand function when price is 4 and the demand is 2. Also find the revenue function.

4 x 3 = 12

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

16)

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

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

Determine the market share of each brand in equilibrium position.

17) Evaluate $\int e^x \left(\frac{1+sinxcosx}{cos^2x}\right) dx$

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

4 x 5 = 20

19) Using determinants, find the quadratic defined by fix) = $ax^2 + bx + c$ if f(1) = 0,f(2) = - 2 and f(3) = -6.

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

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

22) 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 $x = \frac{a}{b(p+c)} - b$.

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10 x 1 = 10

1) Cramer's rule is applicable only to get an unique solution when

(a) $\triangle_z \neq 0$ (b) $\triangle_x \neq 0$ (c) $\triangle_{\neq} 0$ (d) $\triangle_y \neq 0$

2) For what value of k, the matrix $A = \begin{pmatrix} 2 & k \\ 3 & 5 \end{pmatrix}$ has no inverse?

(a) $\frac{3}{10}$ (b) $\frac{10}{3}$ (c) 3 (d) 10

3) If A is a singular matrix, then Adj A is.

(a) non-singular (b) singular (c) symmetric (d) not defined

4) $\int 3^{x+2}$ dx = _____ +c

(a) $\frac{3^x}{log3}$ (b) $\frac{9\left(3^x\right)}{log3}$ (c) $\frac{3.3^x}{log3}$ (d) $\frac{3^x}{9log3}$

5) The value of $\int_0^{\frac{\pi}{2}} cosxe^{sinx}dx =$

(a) 1 (b) e-1 (c) 0 (d) -1

6) ° (1-x) $\sqrt{x}$ dx = _____+c

(a) $\frac{2}{3}x^{\frac{3}{2}} - \frac{5}{2}$ (b) $x^{\frac{3}{2}} - \frac{2}{5}x^{\frac{5}{2}}$ (c) $\frac{3}{2}x^{\frac{2}{3}} - \frac{5}{2}x^{\frac{2}{5}}$ (d) $\frac{2}{3}x^{\frac{3}{2}} - \frac{2}{5}x^{\frac{5}{2}}$

7) The area of the region bounded by the line 2y = -x + 8, X - axis and the lines x = 2 and x = 4 is _____ sq.units.

(a) $\frac{1}{5}$ (b) $\frac{2}{5}$ (c) 5 (d) $\frac{5}{2}$

8) The area lying above the X-axis and under the parabola $y = 4x - x^2$ is _____ sq. units

(a) $\frac{16}{3}$ (b) $\frac{8}{3}$ (c) $\frac{32}{3}$ (d) $\frac{64}{3}$

9) If MR = 15 - 8x, then the revenue function is

(a) $15x-4x^2+k$ (b) $\frac{15}{x} - 8$ (c) -8 (d) 15x-8

10) Profit function is maximum when $\frac{dp}{dx}$ =0 and $\frac{d^2p}{dx^2}$ is _____.

(a) positive (b) negative (c) 0 (d) maximum

4 x 2 = 8

11) 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?

12) Integrate the following with respect to x.

$\frac{e^{3x}+e^{5x}}{e^{x}+e^{-x}}$

13) Integrate the following with respect to x.

$e^x (1+ x) \log(xe^x)$

14) If the marginal cost function of x units of output is $\frac{a}{\sqrt{ax+b}}$ and if the cost of output is zero. Find the total cost as a function of x.

4 x 3 = 12

15) 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.

16) 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?

17) Evaluate $\int \frac{1}{x-\sqrt{x^2-1}}$ dx

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

4 x 5 = 20

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

20) Evaluate $\int \frac{xe^x}{(1+x)^2}dx$

21) 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

22) 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.

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