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SB-1368

First Year B. B. A. (Sem. - II) Examination

March / April - 2011

Quantitative Methods - I

(Old Course)

Time : Hours] [Total Marks : **70**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ F. Y. B. B. A. (SEM. - 2)

Name of the Subject :

☛ QUANTITATIVE METHODS - 1 (OLD)

☛ Subject Code No. : 1 3 6 8 ☛ Section No. (1, 2,.....) : NIL

Seat No. :

Student's Signature

(2) All questions are compulsory.
(3) Indicate your options clearly.
(4) Figures to the right indicate full marks.
(5) Use of one simple calculator is allowed.

1 Answer the following questions : **10**

(1) Define powerset with illustration.

(2) If $f(x)=3x^2+ax+5$ and $f(2)=27$ then find a.

(3) If $f(x)=xe^x$ then find $f'(x)$.

(4) Evaluate $\lim_{x\to 0}(1-3x)^{1/x}$

(5) Evaluate $\int_0^1 (x^2+2x-1)\,dx$

(6) Define marginal revenue.

(7) If $A=\begin{bmatrix}1 & 1\\ 2 & 7\end{bmatrix}$ and $B=\begin{bmatrix}-2 & -3\\ 1 & -1\end{bmatrix}$ then find $4A-3B$.

(8) Evaluate $\begin{vmatrix} 1 & 2 & 1 \\ 2 & 4 & 2 \\ 1 & 6 & 9 \end{vmatrix}$

(9) If $f(x) = 2x^2 - x + 3$ then find $f''(1)$.

(10) If the demand function is $x = \frac{50 - 2p}{3}$ then find revenue function.

2 (a) For two real numbers a and b prove that $|a+b| \leq |a| + |b|$ **4**

(b) The survey of housing society of 350 residents on Bombay provides the following information : **4**

(1) Every residents can speak Gujarati or Hindi

(2) 140 residents can speak Gujarati

(3) 170 residents can speak Hindi.

Find out how many residents of this society can speak both the languages and how many speak only Hindi ?

(c) If $A = \{a | a \leq 3, a \in N\}$, $B = \{b \mid |b \leq 1|, b \in Z\}$, $C = \{C | C^3 = 27, C \in N\}$ then verify that, **4**

$A - (B \cap C) = (A - B) \cup (A - C)$

OR

2 (a) In usual notation P.T. $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$. **4**

(b) The cost function is $C(x) = 5x + 9$ and selling price is Rs. 16. Find profit function. **4**

(c) If $A = \{2, 3, 4\}$, $B = \{1, 3, 4\}$, $P = \{1, 2, 3\}$, $Q = \{1, 3, 5\}$ then verify that, $(A \times B) \cap (P \times Q) = (A \cap P) \times (B \cap Q)$ **4**

3 (a) Evaluate : **4**

(1) $\lim_{x \to 0} 2 + \frac{5}{3 + \frac{2}{x}}$ (2) $\lim_{x \to \infty} \sqrt{x}\left(\sqrt{x+2} - \sqrt{x}\right)$

(b) Find $\frac{dy}{dx}$ if $y = \frac{1+x}{1+x^2}$ **4**

(c) The demand and supply function of commodity are as follows : **4**

$D : (x+10)(p+20) = 300$

$S : x = 2p - 8$

Find equilibrium price and equilibrium quantity.

OR

3 (a) Evaluate $\lim_{x \to 1/5} \frac{125x^3 - 1}{625x^4 - 1}$ 4

(b) Find dy/dx if (i) $y = x^2 e^x$ (ii) $y = \frac{\log x}{x}$ 4

(c) The cost function for an output x is, $C = x^3 - 12x^2 + 48x - 11$ and revenue function is $R = 83x - 4x^2 - 21$. Find output for which profit is maximum and maximum profit. 4

4 (a) Evaluate $\int \frac{10x^4 - 16x^3 + 3}{\sqrt{2x^5 - 4x^4 + 3x + 2}} dx$ 4

(b) Evaluate $\int_{-1}^{1} (x^2 + 2x - 1) dx$ 4

(c) If the marginal revenue of a firm is $MR = 9 - 3x^2$. Find 4
(i) Total Revenue R
(ii) Average Revenue
(iii) Demand function.

OR

4 (a) Evaluate $\int xe^x \cdot dx$ 4

(b) Evaluate $\int_{3}^{"} \sqrt{2x+3}\, dx$ 4

(c) The marginal cost function for the product is $1 + 2x + 6x^2$ where x is the output. Find the total cost function if fixed cost is Rs. 100. 4

5 (a) Solve the following equations using inverse matrix method : 4

$x + 2y + 3z = 6, \quad 2x + 4y + z = 7, \quad 3x + 2y + 9z = 14$

(b) Find inverse of the following matrix : 4

$$\begin{bmatrix} 10 & 15 & 20 \\ 20 & 15 & 5 \\ 5 & 10 & 20 \end{bmatrix}$$

(c) Evaluate : 4

(i) $\begin{vmatrix} 1 & 2 & 1 \\ 3 & 1 & 5 \\ 2 & 4 & 2 \end{vmatrix}$ (ii) $\begin{vmatrix} 201 & 210 & 220 \\ 151 & 155 & 140 \\ 50 & 55 & 80 \end{vmatrix}$

OR

5 (a) If $A=\begin{bmatrix} 0 & 4 & 3 \\ 1 & -3 & -3 \\ -1 & 4 & 4 \end{bmatrix}$ then show that $A^2 = I$. **4**

(b) Solve the following equations using inverse matrix method : **4**

$4x - y - z = 32, \quad 3x + y + 2z = 39, \quad 3x - y + z = 24$

(c) If $A=\begin{bmatrix} 1 & -1 \\ -2 & 3 \end{bmatrix}$ and $B=\begin{bmatrix} 0 & 1 \\ -1 & 2 \end{bmatrix}$ then verify that, **4**

$(A+B)^2 = A^2 + B^2$

6 Attempt any two : **12**

(a) Solve the following LPP using graphical method.

Minimum $Z = 2x_1 + 3x_2$

Subject to the constraints,

$x_1 + 4x_2 \geq 12$

$x_1 + x_2 \geq 6$

$5x_1 + x_2 \geq 10$

$x_1, x_2 \geq 0$

(b) Obtain an optimal solution of the following transportation problem :

	D_1	D_2	D_3	D_4	a_i
O_1	5	3	6	2	19
O_2	4	7	9	1	37
O_3	3	4	7	5	24
b_j	16	18	31	25	

(c) Solve the following cost minimising assignment problem :

	P	Q	R	S
A	12	15	18	8
B	13	10	9	14
C	10	12	15	13
D	7	8	9	14