END TERM EXAMINATION

SECOND SEMESTER [B.COM] MAY-JUNE 2016

Paper Code: BCOM-106 ***Subject: Business Mathematics***

Time: 3 Hours ***Maximum Marks: 75***

Note: Attempt any five questions.

Q1 (a) How many numbers less than 10,000 and divisible by 5 can be formed with the 10 digits 1, 2, 3, 4, 5, 6, 7, 8, 9, 0 each digit not occurring more than once in each number. **(7.5)**

(b) Using, Principle of Mathematical Induction, prove that $n^3+(n+1)^3+(n+2)^3$ is divisible by 9 for every natural number n. **(7.5)**

Q2 (a) If a^2, b^2, c^2 are in A.P, then prove that $\frac{1}{b+c}, \frac{1}{c+a}, \frac{1}{a+b}$ are in A.P. **(7.5)**

(b) Find the sum of n terms of the series $.7+.77+.777+.....$ **(7.5)**

Q3 (a) Show that $A=\begin{pmatrix}3 & -2 & 3\\ 2 & 1 & -1\\ 4 & -3 & 2\end{pmatrix}$ and $B=\frac{1}{17}\begin{pmatrix}1 & 5 & 1\\ 8 & 6 & -9\\ 10 & -1 & -7\end{pmatrix}$ are inverse of each other. **(7.5)**

(b) Show that the equations $2x-y+z=7$, $3x+y-5z=13$ $x+y+z=5$ are consistent and have unique solution. **(7.5)**

Q4 (a) A firm invested different amounts at 8%, 8.75% and 9%, all at simple interest. Altogether the firm invested Rs. 40,000 and earns Rs. 3,455 per year. How much does the firm have invested at each rate if the firm has Rs. 4,000 more invested at 9% than at 8%? Solve by using matrices. **(7.5)**

(b) A salesman has the following record of sales during three months for three items A, B and C which have different rates of commission. **(7.5)**

Months	**Sale Units**			**Total commission drawn (in Rs.)**
	A	**B**	**C**	
January	90	100	20	800
February	130	50	40	900
March	60	100	30	850

Find out the rates of commission on the items A, B and C. Solve by Cramer's rule.

Q5 (a) A firm produces x tones of output at a total cost **(1.5x5=7.5)**

$$C(x)=\frac{1}{10}x^3-4x^2+20x+5$$

Find (i) Average cost (ii) Average Variable Cost (iii) Average Fixed Cost (iv) Marginal Cost and (v) Marginal Average Cost

(b) Verify Euler's theorem for the function if $u=\sin^{-1}\left(\frac{x^{1/3}+y^{1/3}}{x^{1/2}+y^{1/2}}\right)^{1/2}$ **(7.5)**

Q6 (a) The total cost and total revenue of a firm are given by $C(x) = x^3 - 12x^2 + 48x + 11$ and $R(x) - -4x^2 + 83x - 21$. Find the output (i) when the revenue is maximum (ii) when profit is maximum. **(7.5)**

(b) Find the elasticity of supply for the supply function

$$x = 2p^2 + 8p + 10$$

(7.5)

Q7 (a) The marginal cost function of manufacturing x units of a commodity is $6+10x-6x^2$. Find the total cost and average cost, given that the total cost of producing 1 unit is 15. **7.5)**

(b) Find the consumers' surplus for the demand function $p=25-x-x^2$ where $p_0=19$. **(7.5)**

Q8 (a) Integrate $\int_0^{\pi/2} \frac{\sqrt{\sin^3 x}dx}{\sqrt{\sin^3 x} + \sqrt{\cos^3 x}}$ **(7.5)**

(b) Evaluate $\int \frac{(x+1)dx}{(2x^2+x+3)}$ **(7.5)**