END TERM EXAMINATION

FIRST SEMESTER [BBA] DEC.2014 – JAN.2015

Paper Code: BBA-105   **Subject: Business Mathematics**
         BBA(TTM)-105

Time: 3 Hours   *Maximum Marks: 75*

Note: Attempt any six questions.

Q1   (a) Prove by induction, the following.   **(6)**
        $10^n + 3.4^{n+2} + 5$ is divisible by 9.
     (b) Find the value of r if $^{20}C_r = ^{20}C_{r+2}$ **(6.5)**

Q2   (a) A committee consists of 10 members, 6 belonging to party A and 4 to party
        B. In how many ways can a committee of 5 to be selected so that the
        members of the party A are in majority.   **(6)**
     (b) Find the sum to n terms of the series 8+88+888+.... n terms.   **(6.5)**

Q3   (a) Given below the National Income Model:-   **(6)**
        $C = a + bY \quad (a > 0, 0 < b < 1)$
        $I = d + eY \quad (d > 0, 0 < e < 1)$
        $Y = I + C$
        Solve for the endogenous variables C, I and Y using cramers rule.
     (b) Find the inverse of the matrix $\begin{bmatrix} 1 & -1 & 0 \\ 0 & 1 & -1 \\ 1 & 0 & 1 \end{bmatrix}$ and hence solve the system of

     equations: $x - y = a, y - z = b, x + z = c$.   **(6.5)**

Q4   Given below is the transaction matrix for two industries I_1 and I_2. Find the gross
     output of each industry if the final demand is 80 and 40 units respectively.

| Industry | Input to | | Domestic | Total |
	I_1	I_2	demand	output
I_1	30	40	50	120
I_2	20	10	30	60

     Also test the Hawkins Simon Conditions.   **(12.5)**

Q5   (a) A monopolist has the following demand function $p = 2\left(100 - \dfrac{x}{4}\right)$ and the cost

     function is given by $c(x) = 120x + \dfrac{x^2}{2}$ where p is the price per unit and x is

     the output. Find the most profitable output and the maximum profit.   **(6)**
     (b) If x, y and z are respectively the sum of p, q and r terms of an A.P. Show

     that $\dfrac{x}{p}(q-r) + \dfrac{y}{q}(r-p) + \dfrac{z}{r}(p-q) = 0$.   **(6.5)**

Q6   (a) Optimise the Utility function $U = 4xy - y2$ subjected to the constraint
        $2x + y = 6$.   **(6)**
     (b) Find the maximum and minimum values of the function,
        $f(x) = x^5 - 5x^4 + 5x^3 - 1$. Discuss its nature at x = 0.   **(6.5)**

P.T.O.

Q7 (a) A firm manufactures 5000 Air conditioners per day. It is observed the rate of change of production w.r.t additional number of workers employed (i.e.x) is given by $100 - 6x^{1/2}$. If the firm employs 16 workers more, estimate the new level of production. **(6)**

(b) Find the PS if the supply curve is $P = \sqrt{9 + x}$ and quantity sold is 7 units.**(6.5)**

Q8 (a) Solve: **(2x3=6)**

(i) $\dfrac{dy}{dx} = 1 + x + y + xy$,

(ii) $e^x \sqrt{1 - y^2} \, dx + \dfrac{y}{x} \, dx = 0$,

(iii) $\dfrac{dy}{dx} = \dfrac{x^2 - 2y^2 + xy}{x^2}$.

(b) Demand and supply functions for tea are given by

$$x_d = \left\{ 120 - 2p + 5\frac{dp}{dt} \right\} \text{ kg per week}$$

$$x_s = \left\{ 3p - 30 + 50\frac{dp}{dt} \right\} \text{ kg per week.}$$

Where p is the price at time t. If the initial price is 36 per kg, find the condition for dynamic equilibrium. **(6.5)**

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