# END TERM EXAMINATION

### FIRST SEMESTER [BBA] NOVEMBER - DECEMBER 2017

| | |
|---|---|
| Paper Code: BBA-103 | Subject: *Business Mathematics* |
| | *(Batch 2017 Onwards)* |
| Time: 3 Hours | Maximum Marks: 75 |

### Note: Attempt any five questions.

Q1 (a) Prove by the method of induction (5)

$$P(n) = 2 + 7 + 12 + ... + (5n - 3) = \frac{1}{2}n(5n - 1)$$

(b) Find the sum to n terms of the series: (5)

$$\left(1 - \frac{1}{n}\right) + \left(1 - \frac{2}{n}\right) + \left(1 - \frac{3}{n}\right) + ...$$

(c) If a, b, c are in AP., then prove that $a^3 + 4b^3 + c^3 = 3b(a^2 + c^2)$ (5)

Q2 (a) A man is employed to count Rs. 10,710. He counts at the rate of Rs. 180 per minute for half an hour. After this he counts at the rate of Rs.3 less every minute than the preceding minute. Find the time taken by him to count the entire amount. (5)

(b) Find three numbers in G.P. such that their sum is 21, and the sum of their squares is 189. (5)

(c) If a, b, c, d are in G.P., prove that a+b, b+c, c+d are also in G.P. (5)

Q3 (a) A finance company has offices located in every division, every district and every taluka in a certain state in India. Assume that there are 5 divisions, 30 districts and 200 talukas in the state. Each office has 1 head clerk, 1 cashier, 1 clerk and 1 peon. A divisional office has in addition, an office superintendent, 2 clerks, 1 typist and 1 peon. A district office has in addition 1 clerk and 1 peon. The basic monthly salaries are as follows: (12)
Office Superintendent: Rs. 5,000, Head clerk: Rs. 2,000, Cashier: Rs. 1750, Clerks and Typists: Rs. 1500 and Peon: Rs.. 1000. Using matrix notation find:
(i) The total number of Posts of each kind in all the offices taken together.
(ii) The total basic monthly salary bill of each kind of office
(iii) The total basic monthly salary bill of all the officer taken together
(b) Explain the following:-` (3)
(i) Diagonal Matrix (ii) Triangular Matrices (iii) Scalar Matrix

Q4 (a) In how many different ways can 8 examination papers be arranged in a line so that best and worst are never together? (5)
(b) A party of 3 ladies and 4 gentlemen is to be formed from 8 ladies and 7 gentlemen. In how many different ways can the party be formed if Mrs. X and Mr. Y refuse to join the same party? (5)

(c) If $A = \begin{bmatrix} 1 & 2 & 1 \\ 0 & 2 & -1 \\ 1 & 1 & 1 \end{bmatrix}$ show that $A^3 - 3A^2 - A + 9I = 0$. (5)

Q5  (a) Differentiate $\log\left[e^{3x}\left(\frac{(5x-3)}{(4x+2)}\right)^{1/3}\right]$ w.r.t.x. **(7)**

(b) Find the maximum and minimum values of the function $\frac{2}{3}x^3 + \frac{1}{2}x^2 - 6x + 8$ **(8)**

Q6  (a) The demand function for a particular commodity is: $y = 15e^{-x/3}$ for $0 \le x \le 8$, where y is the price per unit and x is the number of units demanded. Determine the price and the quantity for which the revenue is maximum. **(7)**

(b) A monopolist's total cost is $Tc = ax^2 + bx + c$ and the demand function is $p = \beta - \alpha x$ where x and p denote the units of output and price respectively and a, b, c $\alpha$ and $\beta$ are the constants. If the government imposes tax @ t per unit of output show that the total cost is maximum when $t = (\beta - b)/2$. **(8)**

Q7  Let p be the price of rice, q the quantity of rice and s the amount of fertiliser used in rice production. Using data of a report, we find for the per capital demand function for rice: (p= 0.964-6.773q) and for supply function **(15)**

q = 0.063+0.036s

(a) Find the equilibrium in the rice market if s = 0.5

(b) Find the consumer's surplus.

Q8  (a) Evaluate $\int \frac{x^3}{(x-a)(x-b)(x-c)} dx$ **(8)**

(b) Price Elasticity of a demand curve $x = f(p)$ is of the form $(a - bp)$ where 'a' and 'b' are given constants. Find the demand curve. **(7)**

***********