Section B

11. Determine the range of the following functions for the given domain :

(a) $y = x + 2$ $\quad D = \{x \in R \mid x = 2\}$

(b) $y = x^2 + 3x + 5$ $\quad D = \{x \in R \mid 5 \leq x \leq 10\}$

(c) $y = x^2 + 5$ $\quad D = \{x \in R \mid -4 \leq x \leq 10\}$

(d) $w = \sqrt{x^2 + 25}$ $\quad D = \{x \in R \mid -4 \leq x \leq 4\}$

(e) $f(z) = \sqrt{z + 5}$ $\quad D = \{z \in R \mid z > -3\}$

Or

Find the equilibrium price and quantity for the following market model :

(a) $Q_d = 200 - 40P$

$Q_s = -40 + 80P$

(b) $Q_d = 1400 - 60P$

$Q_s = -400 + 30P.$

Subject Code—0755

B. B. A. (First Year) EXAMINATION

(Batch 2009 to 2017 Re-appear)

BUSINESS MATHEMATICS

BBA-105

Time : 3 *Hours* *Maximum Marks :* 70

Note : Attempt any *seven* questions from Section A carrying 5 marks each. Attempt *three* questions from Section B where first two questions carry 12 marks each, and third question carries 11 marks.

Section A

1. Assume A is the set of names of 100 faculty members at a small college and B is the set of academic ranks a faculty member could have :
B = {Professor, Associative Professor, Assistant Professor, Lecturer}
Is a mapping from A to B a function ?

2. An item of equipment is bought for Rs. 1,000 and is to be depreciated at a fixed rate of 40% per annum. What will be its value at the end of four years ?

3. How much should be invested now (to the nearest Rs.) to receive Rs. 20,000 per annum in perpetuity if the annual rate of interest is 20% ?

4. Trevor's Trousers sells a pair of trousers for Rs. 80 at a 15% mark-up. Calculate the profit made by Trevor's Trousers.

5. Solve the quadratic equation $2x^2 - 11x + 12 = 0$ using both for factorization and formula.

6. Differentiate each of the following functions :

(i) $f(x) = 9x - 6$.

(ii) $f(x) = x^8 + 8x^6 + 11$.

7. Consider the following market demand and supply function for a commodity :

$$Q_d = 20000 - 400P$$

$$Q_s = -4000 + 800P$$

Determine the equilibrium price and quantity.

8. The following times taken to produce a batch of 100 units of Product X have been noted.

21 mins, 17 mins, 24 mins, 11 mins, 37 mins, 27 mins,

20 mins, 15 mins, 17 mins, 23 mins, 29 mins, 30 mins,

24 mins, 18 mins, 17 mins, 21 mins, 24 mins, 20 mins,

What is the Median Time ?

9. Sketch the graph of the cubic function $f(x) = 6 + 12x + 3x^2 - 2x^3$ for $-2 \leq x \leq 3$.

10. Define limits and continuity for a function.

20	30	11
30	40	15
40	50	12
50	60	7
60	70	6

Calculate the variance and standard deviation of the frequency distribution shown above.

Or

(a) Estimated reserves of an oil field are 84 million barrels. What annual growth in the rate of extraction will exhaust the oil in 12 years given that this year's production is 6 million barrels ?

(b) In a water authority's are the current river flows allow a maximum extraction rate of 100 million gallons per day and current usage is 25 million gallons per day. When will a crisis point be reached if consumption grows by 4% per annum ? What rate of growth would allowed current supply sources to be sufficient for the next 100 years ?

12. An economy is forecast to grow continuously at an annual rate of 3% so that the gross national product (GNP), measured in billions of rupees, after t years is given by GNP = $60e^{0.03t}$.

(a) Calculate the current value of GNP and its future value in four years' time.

(b) After how many years is GNP forecast to be 90 billion rupees ?

Or

Use matrix algebra to solve for x_1, x_2 and x_3 given that :

$$3x_1 + 4x_2 + 3x_3 = 60$$
$$4x_1 + 10x_2 + 2x_3 = 104$$
$$4x_1 + 2x_2 + 4x_3 = 60$$

13. The hours of overtime worked in a particular quarter by the 60 employees of ABC Co. are as follows :

Hours		**Frequency**
More than	**Not more than**	
0	10	3
10	20	6