

UNIVERSITY OF KERALA
Model Question Paper
First Degree Programme
Semester V Open Course
MM 1551. 2 Business Mathematics

Time: 3 hours

Maximum Marks: 80

Section-I

All the first 10 questions are compulsory. They carry 1 mark each.

1. What is discounting?
2. Define force of discount.
3. What is scrap value?
4. What is equation of value?
5. Define critical points of a function.
6. What is elasticity of demand?
7. Define consumers' surplus.
8. Define producers' surplus.
9. What is meant by base shifting?
10. What do you mean by value index number?

Section-II

Answer any 8 questions from among the questions 11 to 22.
These questions carry 2 marks each.

11. Discuss, briefly, term life insurance policy.
12. Explain the role of calculus in calculating amount and present values of annuities.
13. How do you calculate the compound interest if the rate of interest is varying?
14. Ram deposited a sum of Rs.10,000 in a bank. After 2 years, he withdrew Rs.4,000 and at the end of 5 years he received an amount of Rs.7,520. Find the rate of simple interest.
15. Calculate the nominal rate of interest convertible half-yearly when the effective rate is 8% per annum.
16. A firm has revenue function $R = 8D$ given by where R and D is the quantity sold and the production cost function is given by $C = 1,50,000 + 60 \left(\frac{D}{900}\right)^2$. Find the total profit function and the number of units to be sold to get the maximum profit.
17. Write a note on price elasticity of demand.
18. Find the total revenue between 0 to 20 units of output from the marginal revenue given by
$$MR = \frac{3x^2}{200} - 10x + 100$$
19. The supply function of a product is $y = 3x^2 + 6$. Find the producers' surplus when 10 units are supplied.
20. What are the different types of index numbers?
21. What are the characteristics of index numbers?
22. What are the disadvantages of moving average method?

Section-III

Answer any 6 questions from among the questions 23 to 31.

These questions carry 4 marks each.

23. Calculate the present value of an annuity of Rs.30,000 per annum, assumed to be payable continuously for 12 years, at the rate of interest of 8% per annum compounded continuously:
24. Suppose that the interest rate r is such that the present value of receiving Rs. V_2 in t_2 years from now is the same as receiving Rs. V_1 in t_1 in years from now with $t_2 > t_1$. Assuming the interest is compounded annually show that $V_2 > V_1$ and the present value of receiving Rs. V_2 , $(t_2 + k)$ years from now is equal to the present value of receiving Rs. V_1 , $(t_2 + k)$ years from now for any value of k .
25. In lieu of a single payment of Rs.4,000 at the present moment, a person agrees to receive three equal payments at the end of 3 years, 7 years and 10 years respectively. Assuming a rate of interest of 7% per annum, what should be the value of each of the three payments?
26. A company has a demand curve given by the function $2Q + 3P = 160$. The average cost curve of the firm is given by the relation $AC = 3Q^2 - 18Q + 63 + \frac{5}{Q}$. Find the level of output which (i) maximises the total revenue and (ii) minimises the marginal cost.
27. The cost of producing x units of TV sets by a monopolist is given by $TC = \frac{x^2}{25} + 3x + 100$ and the demand function is given by $x = 75 - 3p$ (where p is the price). If a tax of k per set is imposed by the government, determine the monopolist's output and price under the new situation. Find the value k of that maximizes the tax revenue to the government.
28. A company suffers a loss of Rs. 1,000 if its product does not sell at all. Marginal revenue and marginal cost functions for the product are given by $MR = 50 - 4x$, $MC = -10 + x$. Determine the total profit function, break-even points and the profit maximising level of output.
29. The marginal cost function when output is x units is given by $MC = x^2 - 2x + 5$. Find the total cost function C and the average cost function AC if the fixed cost is Rs.30. Also show that the slope of the average cost curve is $\frac{MC-AC}{x}$.
30. Compare and contrast Laspeyre's and Paasche's index numbers.
31. Write the merits and demerits of index numbers?

Section-IV

Answer any 2 questions from among the questions 32 to 35.

These questions carry 15 marks each.

32. a) A moneylender charges 'interest' at the rate of 10 paise per rupee per month, payable in advance. What effective rate of interest does he charge per annum?
b) Discuss the different components of time series.
33. a) A machine, costing Rs. 20,000, is sold for Rs. 5,000 down and the balance payable in semi annual instalments in the next five years. What is the instalment if interest if (i) 4% compounded semi annually? (ii) 4% compounded annually?
b) Calculate index number of prices for 1995 on the basis of 1990 from the data given below:

Commodity	Weight	Price per unit 1990 (Rs.)	Price per unit 1995 (Rs.)
A	40	16	20
B	25	40	50
C	20	12	15
D	15	2	3

If the weights of commodities A, B, C, D are increased in the ratio 1:2:3:4 what will be the increase in the index number?

34. A company has a sales of Rs. 1,000 per month and the profit to the company averages 10% of sales. The company's past experience with a certain advertising strategy is that sales increases by 2% per month continuously over the length of the advertising campaign (12 months). If the advertisement costs Rs. 130 in a year, determine if the company should embark on a similar campaign when the market rate of interest is 12% per annum.
35. The figures of sales (in thousand quintals) of a firm operating in a sugar industry is given below:

Year	Sales
1997	70
1999	90
2001	100
2003	130
2005	170

- i. Fit a straight line trend to these figures using least squares method
- ii. Estimate the sales of the firm for the year 2008.
