

Presidency University, Bengaluru  
School of Law

II Semester 2015-2016 Test 2

Course: **BBL A 106 Business Mathematics and  
Statistics**

( Closed Book)

Max Marks: 50

Max Time: 50 Min

Weightage: 25 %

2 May 2016

**Set A**

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Part A

(10 X 2 = 20 Marks)

1. Give the formula for calculating nth term of an arithmetic series?
2. Write down the values of a and d -  $90+87+84+\dots = 420$ ?
3. Give the formula for calculating the present value for a simple interest?
4. Give the total value formula if continuous compounding is used?
5. What are the two methods of depreciation?
6. What is an annuity?
7. Find the sum of first 7 terms of the series  $-2, 1, 1/2$ ?
8. A savings account of Rs. 25,000 earns simple interest at 5 % per annum calculate the value of account after 6 years?
9. Calculate the APR for a 3% per annum nominal rate of interest compounded continuously?
10. Give the formula for calculating IRR?

Part B

(4 X 5 = 20 Marks)

11. A TV Manufacturer plans to increase his output by 5% each month . If he is now producing 300 TVs per month , Calculate, using series,
  - a) His monthly output in 15 months from now .
  - b) His total output in 15 months , starting with the present month
  - c) The month in which his output reaches 500
12. Calculate the annual rate of interest required for an investment of Rs.50,000 to double in value in (a) 12 years, (b) 8 Years and (c) 5Years . Assume annual compounding ?
13. Suppose Rs,2500 is invested at a nominal rate of 5 % per annum . Calculate the amount accumulated at the end of 10 years if the interest is calculated (a) Annually (B) 4 Times annually and (c) continuously
14. To provide for future education costs , A family considers various methods of saving. Assume savings continuous for 10 years at an interest rate of 7.5 % per annum
  - a) Calculate the value of fund at the end if 10 years when a deposit of Rs. 2000 is made Annually
  - b) How much should be deposited each month if the final value of the fund is Rs. 60,000

Part C

(1 X 10 = 10 Marks)

15. The net cash flow for two projects , A (Fat food) and B ( amusement ), is as follows

Year	0	1	2	3	4	5
Project A	-420000	-5000	122000	130000	148000	150000
Project B	-95000	-10000	-120000	200000	110000	-50000

- a) Use the net present value criterion to decide which project is the most profitable if a discount rate of i) 6% and ii) 8% are used.
- b) Estimate the IRR for each project. Which project would now be considered more profitable?

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Test 1

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4 Apr 2016

Set A

Part – A

(5 X 1 = 5 Marks)

Answer all the questions

1. A straight line has a slope of 2 and intersects the y-axis at  $y = -2$ . Deduce the equation of the line.
2. Give the formulae to calculate arc elasticity of demand between price and quantity?
3. The demand and supply functions for a good are given as  
Demand Function :  $P_d = 100 - 0.5 Q_d$   
Supply Function :  $P_s = 10 + 0.5 Q_s$   
Calculate the equilibrium price and quantity.
4. The total revenue and total cost functions are given as follows:  
 $TR = 3 Q$   
 $TC = 10 + 2 Q$   
Calculate the equilibrium quantity, total cost and total revenue at break-even point.
5. Solve  $2^x 2^{x+1} = 7$

Part – B

(3 X 5 = 15 Marks)

Answer all the questions

6. Sales for a new magazine are expected to grow according to the equation  $S = 200000(1 - e^{-0.05 t})$ , where  $t$  is given in weeks.
  - a) Calculate the number of magazines sold after one week.
  - b) Calculate the number of magazines sold after 5, 20, 35, 45, 50 and 52 weeks.
  - c) Plot the sales over the first 52 weeks.  
Comment on the general trend in sales.
7. The demand and supply functions for a goods are given by the equations:  
 $P_d = 80 - 0.4 Q_d$  and  $P_s = 20 + 0.4 Q_s$ 
  - a) Calculate the equilibrium price and quantity.
  - b) If government provides a subsidy of Rs. 4 per good: deduce the equation of supply function to include the subsidy and calculate the new equilibrium price and quantity.



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8. Given the demand function,  $P = 60 - 0.2Q$ , Calculate the arc price elasticity of demand when
- Price decreases from Rs. 50 to Rs. 40
  - Price decreases from Rs. 20 to Rs. 10

Part – C

(1 X 10 = 10 Marks)

Answer all the questions

9. The demand and supply functions for two complementary products X and Y respectively are given as:

$$Q_{dX} = 190 - 2 P_X - 2 P_Y$$

$$Q_{dY} = 240 - 2 P_X - 4 P_Y$$

$$Q_{sX} = -10 + 2 P_X$$

$$Q_{sY} = -40 + P_Y$$

Find the equilibrium price and quantity for each good.

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**Set B**

Part – A

(5 X 1 = 5 Marks)

Answer all the questions

1. A supply function is given by the equation  $20P = 80 + 5Q$ . Deduce the equation of the supply function if a tax of Rs. 1.50 is imposed on the price of each unit produced.
2. When the price of a good is Rs. 20/-, the price elasticity of demand is - 0.7. Calculate the percentage change in demand  $Q$  when the price increases by 5%.
3. Define Consumer surplus?
4. The demand and supply functions for a safari holiday package are given as:

$$\text{Demand Function : } Q = 81 - 0.05P$$

$$\text{Supply Function : } P = -24 + 0.025Q$$

The government imposes a tax of Rs. 120. Calculate the equilibrium price and quantity when the tax is imposed.

5. Graph the function  $10(1 - e^{-0.2t})$ , use intervals of 0.5 for  $0 < t < 5$ .

Part – B

(3 X 5 = 15 Marks)

Answer all the questions

6. A firm charges a fixed price of Rs. 81 for each shirt sold. The firm has a total cost function:  $TC = Q^3$ 
  - a. Write down the equation of the total revenue function.
  - b. Graph the TR and TC function on the same graph for  $0 \leq Q \leq 12$ , showing the breakeven point.
  - c. From the graph estimate the values of  $Q$  within which firm makes a profit and loss.
7. The demand and supply functions for a good (jeans) are given by:  
 $P_d = 50 - 3Q_d$  and  $P_s = 14 + 1.5Q_s$ 
  - a) Calculate the equilibrium price and quantity.
  - b) Calculate the level of excess supply ( $Q_s - Q_d$ ) when  $P = 38$ .
  - c) Calculate the profit made on the black market if a maximum price of Rs. 20 per pair is imposed.
8. The swimming club provides swimming lessons to boost the club funds. The club has fixed costs of Rs. 250 daily when offering these lessons. The variable cost is Rs. 25 for each lesson given:
  - a. Write down the equation for total cost and plot its graph.



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**Set B**

- b. Calculate the cost of providing 28 lessons.
- c. Calculate the number of lessons provided when total costs are Rs. 1400.

Part – C

(1 X 10 = 10 Marks)

Answer all the questions

9. The demand and supply function for a product are given by:

$$\text{Demand Function: } Q = 50 - 0.1 P$$

$$\text{Supply Function: } Q = -10 + 0.1 P$$

- a. Calculate the equilibrium price and quantity. Plot the demand and supply functions in the form of  $P = g(Q)$ . Illustrate graphically the consumer and producer surplus at equilibrium.
- b. Calculate the consumer surplus, producer surplus and total surplus at equilibrium.

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