

# College of Applied Business (CAB)

Sent-up Examination, February 2015

## BBA / First Semester / MTH 201: Business Mathematics

Candidates are required to give their answers in their own words as far as practicable.

### Section "A"

Time: 20 minutes

Brief answer questions. (Attempt ALL questions.)

[6×1=6]

1. Given the equation  $3x - 4y = 24$ , write the equation in the form of  $y = f(x)$  and find the intercept and slope.
2. Write the condition that the following systems of linear equation have unique solution, infinite solution and no solution.  $a_1x + b_2y = c_1$ ,  $a_2x + b_2y = c_2$ .
3. A taxi charges Rs.20 at a time of starting and Rs.5 for each additional kilometer. If  $y$  is the total taxi charges for  $x$  kilometers. Determine the relationship  $y = f(x)$ .
4. Find the value of  $k$  so the roots of the equation  $4x^2 - 2kx + 9 = 0$  are equal.
5. Find  $\frac{dy}{dx}$  if  $y = e^{(x^2-2x)^3}$
6. Given a basic Keynesian macroeconomic model  $Y = C + I$ ,  $C = 20 + 0.6y$ ,  $I = 60$ . Find the equilibrium national income  $y$ .

### Section "B"

Time: 30 minutes

Comprehensive answer questions. (Attempt ALL questions.)

[1×10=10]

7. The fixed cost for a good of a firm is Rs.120 and the variable cost per unit is Rs.6 and while the price-demand equation is

$$P = 48 - 3q,$$

where  $P$  is the unit price in Rs. and  $q$  is the quantity demanded in units.

- a. Write down the total cost function, and revenue function in term of  $q$ .
- b. Find the domain of the function defined by the price-demand equation.
- c. For What value of  $q$  dose the revenue maximum and maximum value of the revenue applying properties of the revenue function?
- d. Draw graph of the revenue function and the cost function on the same coordinate system over the permissible values of  $q$ .
- e. Estimate the level of outputs at which break even points occurs from the graph. Also, confirm these results algebraically.
- f. Using application of derivatives, Determine the value of  $q$  at which profit maximum and find the value of the maximum profit.
- g. Locate break even points, and shade the regions of losses and gain on the graph over the permissible values of  $q$ .

### Section "C"

Time: 80 minutes

Short answer questions.

[6×4=24]

8. Find the root of the equation  $x^3 - x - 4 = 0$  lying between 1 and 2 with accuracy  $10^{-3}$  by using bisection method.

9. The demand and supply function of a good are given as  
 Demand function:  $P = 60 - 0.6Q$   
 Supply function:  $P = 20 + 0.2Q$
- Calculate the equilibrium price and quantity for goods algebraically and graphically.
  - Calculate the values of consumer surplus and producer surplus at market equilibrium.
  - What is the value of total surplus?
10. Given the supply function,  $P = 25 + 0.5Q$
- Calculate the arc elasticity of supply when price increases from Rs. 50 to Rs.80.
  - Calculate the percentage change in quantity supplied in response to a price increase of 10% when  $P = 60$ .
11. Suppose that the demand function for a product is  $q = 1500 - 50p$ , Where  $q$  equals the quantity demanded in thousands of units and  $P$  equals, the price in Rupees and  $R$  equals the revenue solve graphically, what value of  $p$  maximizes  $R$  ? How many units would be demanded at this price? What is the maximum value of  $R$ ?
12. A firm fixed the manufacturing cost of an item consists of Rs. 10,000 as overheads, materials cost Rs. 20 per item and labour cost Rs.  $\frac{x^2}{900}$  for  $x$  items produced. Find how many items be produced to have to average cost minimum.
13. The demand and supply functions for a good are given as Demand function:  $p_d = 450 - 2Q_d$ , Supply function:  $p_s = 100 + 5Q_s$  Calculate the
- Calculate the equilibrium price and quantity.
  - The government provides a subsidy of \$70 per unit sold:
    - Write down the equation of the supply function, adjusted for subsidy.
    - Find the new equilibrium price and quantity algebraically.
    - Outline the distribution of the subsidy, that is calculated how much of the subsidy is received by the consumer and the supplier.