Max Marks: 25

Duration: 1hr 30 min

Instructions:
1) Start each question on fresh page.
2) Figures to the right indicate maximum marks.

## Q1. Answer the following:

1. Find the inverse of the function $f(x) = \frac{x-2}{3}$      [1 Mark]

2. Find the derivative of      [2 Marks]

    a. $f(x) = \frac{2x}{1+x^2}$

    b. $f(x) = xe^x$

3. Find the range of the function $f(x) = \frac{1}{7-x}$      [1 Mark]

4. Find $\int (3x^2 - e^x + \sin x)\, dx$      [1 Mark]

## Q2. Attempt the following

[5 x4= 20 Marks]

a. Find fog(x), gof(x), fof(x) and gog(x) of the following functions

    $f(x)=x^2+2$ and $g(x)=\frac{1}{1-x}$

b. Evaluate the following limits

   i.    $\lim\limits_{x \to 2} \frac{x^2-3x+2}{x^2-2x}$

   ii.    $\lim\limits_{x \to \infty} \frac{5x^4+3x^2+2x^3-1}{x^4+5x-2}$

   iii.    $\lim\limits_{x \to 0} \cos 3x + \frac{\sin 5x}{3x}$

c. The total cost function for the production of x units of an item is $C = 10 - 4x^3 + 3x^4$. Find

   : i) Average cost function

       ii) Marginal Cost function

       iii) Marginal Average Cost function at x=10 units

d. Find the maximum and minimum value of $f(x)= x^3 - 3x + 3$

e. The demand and supply law for the commodity are respectively $p=5 - \frac{3}{2}D$ and $p=3+\frac{D^2}{2}$. Find consumer's surplus under pure competition.