Question Bank Module 5

Type 1 Constrained & Unconstrained Problems

① Find min value of $f(x) = 2x^3 - 18x^2 + 30x + 36$ (5 marks)

② $f(x,y) = x^2 + y^2$ subject to $x + y = 12$ (5 marks)

③ Let $Z = f(x,y)$ is the given function (5 marks)

(i) if $r < 0$ and $rt - s^2 > 0$ the $f(x,y)$ has a maximum point at (a,b) and the corresponding maximum values is ~~at~~ $f(a,b)$

(ii) if $r > 0$ and $rt - s^2 > 0$ the $f(x,y)$ has a minimum point at (a,b) and the corresponding ~~maximu~~ minimum value is $f(a,b)$

(iii) $rt - s^2 < 0$ the $f(x,y)$ has neither a maximum nor a minimum point at (a,b) and the point is called a saddle point

(iv) If $rt - s^2 = 0$ the further investigation is needed for classification

④ Find extreme values of (10 Marks)

$$f(x,y) = x^3 + y^3 - 63(x+y) + 12xy$$

⑤ Examine the function for convexity and concativity & Determine the extreme values of. (10 marks)

① $f(x_1, x_2) = -x_1^2 - x_2^2 - 4x_1 - 8.$

② $f(x_1, x_2) = x_1^3 + x_2^3 - 3x_1 - 12x_2 + 20.$

⑥ Optimize $Z = 2x_1^2 + x_2^2 + 3x_3^2 + 16x_1 + 8x_2 - 6x_3 + 100$ (10 marks)

subject to $x_1 + x_2 + x_3 = 20$

$x_1, x_2, x_3 \geq 0.$

Type 2 :- Exhaustive search method (10 Marks)

(10M) ① Minimize $f(x) = x^2 + \frac{54}{x}$ in the interval (0,5) considering only 10 intermediate points

Type 3 Bisection method

(10M) ① Minimize $f(x) = x^2 + \frac{54}{x}$ in (2,5) $\epsilon = 10^{-3}$

Type 3 :- Steepest Descent method

(10Marks) Q. Minimize $f(x_1, x_2) = x_1 - x_2 + 2x_1^2 + 2x_1x_2 + x_2^2$ Starting from point $x_1 = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$ using steepest descent method.