Q 31173 Solution set I

Solution set Semester II

(2 ½ Hours) [Total Marks: 75]

Q. 1	Attempt All (Each of 5Marks)	(15M)
(a)	**Select correct answer from the following:** 1. **b) Euler's Method** 2. **d) (1/15) $\tan^{-1}(3x/5) + c$** 3. **a) Bijective function** 4. c) zero 5. d) None	
(b)	**Fill in the blanks:** 1. $-\infty$ 2. e^x 3. $(4i+5j)/41$ 4. **$x - 3\log\|x+3\| + c$** 5. derivative	
(c)	**Define the following.** 1. The tangent plane is the locus of all tangent lines. 2. The value of a variable when first order derivative of function is zero. 3. Definite integral: integral with limits 4. **- 1/2** 5. Linearization of a function f(x,y) is the first degree in x and y	
Q. 2	**Attempt the following (Any THREE)**	**(15M)**
(a)	Show that $\lim_{x\to 1} 2x^2 + 3x - 4 = 1$	
(b)	Discuss the continuity of the function $f(x)=\sqrt{4-x^2}$ If c is any point the interval (-2, 2), f (c) exist Left hand limit = Right hand limit=0	
(c)	For increasing function $f'(x)>0$ $(x+3)^2+1>0$ Addition of two positive numbers	
(d)	Critical points (0, 0), (1,1), (-1,-1) Saddle point at (0, 0) Maxima at (1, 1) and (-1,-1)	
(e)	Using Newton's method find the approximate root for the equation f(x)=x- cosx x1=1 x2=0.75	

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	x3=0.73 x4=0.73	
(f)	Divide 100 into two parts such that sum of their square is minimum. $x^2+(100-x)^2$ Ans : 50	
Q. 3	**Attempt the following (Any THREE)**	**(15M)**
(a)	$2[\sin^{-1}\sqrt{x}\ (x/2) + \sqrt{x}/4\ (\sqrt{1-x}) + (1/2)\sin^{-1}\sqrt{x} - (1/2)\sin^{-1}\sqrt{x}] + c$	
(b)	Using property of definite integration $I = \Pi/12$	
(c)	64/3 or 21.333	
(d)	Using variable separable method solution is $\tan x \tan y = 1$	
(e)	Using the formula $x_n = x_0 + nh$, $y_n = y_{n-1} + h\ f(x_{n-1}, y_{n-1})$ by taking h = 0.1 and performing 3 iterations we get y(0.1) = 0.1 and y(0.3) = 0.271	
(f)	Using formula of linear differential equation dy/dx + Py = Q Integrating factor = 1/(x + 1) Solution is: $y/(x+1) = e^x + c$	
Q. 4	**Attempt the following (Any THREE)**	**(15)**
(a)	$f(2,3) = \lim_{(x,y)\to(2,3)}[f(x,y)]$	
(b)	Find the second order derivatives of $f(x,y)=x^2y^3+x^4y$ $\frac{df}{dx} = 2x\ \ y^3 + 4x3y$, $\frac{df}{dy} = 3y^3x^2 + x^4$ $\frac{d^2f}{dx^2} = 2y^3$ $\frac{d^2f}{dy^2} = 6y^2x^2$ $\frac{d^2f}{dx\ dy} = 6xy^3+4x^3$ $\frac{d^2f}{dydx} = 6xy^2+4x^3$	
(c)	$\frac{dz}{dt} = 7t^2$	
(d)	$27\sqrt{2}$	
(e)	$(3x^{1/4})/(2)^{1/4}$	
(f)	Tangent : -4x-4y+z=-8 Normal: x=2-4t, y=1-4t, z=4+t	

Q. 5	Attempt the following (Any THREE)	(15)
(a)	D=8>0 Relative minimum at (2, 6)	
(b)	By substituting 4x + y + 1 = v we get the solution $(1/2)\tan^{-1}[(4x + y + 1)/2] = x + c$	
(c)	Sketch the graph of the equation $y= x^3+3x+2$ and identify the intervals of increasing and decreasing function(draw the graph on the answer sheet itself).	
(d)	Vertical: x=-1 and x=-2 Horizontal: y=0	
(e)	By substituting 4x + y + 1 = v we get the solution $(1/2)\tan^{-1}[(4x + y + 1)/2] = x + c$	