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Set II

Q.P. Code 31174

Semester II

Q. 1	Attempt All (Each of 5Marks)	(15M)
(a)	**Select correct answer from the following:** 1. *b* 2. a 3. a 4. c 5. a	
(b)	**Fill in the blanks:** 1. $\lim_{n\to\infty}(-2x) =$ ____________. 2. The absolute value of continuous function is ________________. 3. Modelling 4. ¼ 5. 5x+5y-8	
(c)	**Define the following.** 1. $\in - \partial$ definition of limit: f(x) is said to be continuous at x=a if $\forall \in > 0, \exists\, \partial > 0$ such that $\|x-a\| < \partial \Rightarrow \|f(x) - l\| < \in$ 2. Concavity: It is the direction of bending to the curve. If the curve lies above the tangent at a point then the curve is called concave upward and if a lie below then the curve is called concave downward. 3. **I = $(x^3/3) + (a^x/\log a) + c$** 4. **Definite integral: Integral with limits** 5. Absolute Maximum if f(c)$\geq f(x)$ Absolute Minimum if f(c)$\leq f(x)$	
Q. 2	Attempt the following (Any THREE)	(15M)
(a)	Factorization of numerator (x-3)(x^2-x+10)/(x-3) $\lim_{x\to\infty} x^2$-x+10 =16	3 1 1
(b)	Use definition of$\|x\|$ to prove contiuity Left hand limit=Right hand limit	3 2
(c)	F′(x)=2x-4 F′(x)<0 ,F is decreasing on (-∞, 2) F′(x)>0, F is increasing on (2, ∞).	1 2 2
(d)	f′(x)=1+8x-3x^2 when f′(x)=0, x= 4/3 f′′(x)=-6 Local maxima at =4/3	1 2 1 1
(e)	f(x)=$x^3 - x - 1$	1

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	$x_{n+1}=x_n-\frac{f(xn)}{f'(xn)}$ interval (1, 2)	2
	x1=1.5 x2= 1.34 x3=1.32 x4=1.32 Ans:1.32	2
(f)	A=xy A=x(72-x) $\frac{dA}{dx}$ =72 -2x Maximum value x=36	1 2 1 1
Q. 3	**Attempt the following (Any THREE)**	**(15M)**
(a)	Divide Numaretor and Denominator by $\cos^2 x$ and evaluate, we get $I = (1/6)\tan^{-1}(2\tan x / 3) + c$	
(b)	Using Property of definite integration $I = \Pi/4$	
(c)	Using variable separable method solution is $e^{2y}/2 = (e^{3x}/3) + (x^3/3) + c$	
(d)	Using the formula $x_n = x_0 + nh$, $y_n = y_{n-1} + h\, f(x_{n-1}, y_{n-1})$ by taking h = 0.2 and performing 5 iterations we get y(1) = 2.97314	
(e)	Using formula of linear differential equation dy/dx + Py = Q Integrating factor = sec x Solution is: y sec x = sin x + c	
(f)	12.871	
Q. 4	**Attempt the following (Any THREE)**	**(15)**
(a)	Ans: 0	
(b)	Find the second order derivatives of f(x,y)=$y^2e^x + y$ $\frac{df}{dx} = e^x y^2, \frac{df}{dy} = 2e^x y \quad +1$ $\frac{d^2f}{dx^2} = e^x y^2$ $\frac{d^2f}{dy^2} = 2e^x$	1 1 1

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	$\frac{d^2f}{dx\ dy} = 2e^x y$ $\frac{d^2f}{dydx}$ =2ye^x	1 1
(c)	dz/dt=0	5
(d)	f_x(x, y, z)= 2xy, f_y(x, y, z)=x^2-z^3 f_z(x, y, z)=-3yz^2+1 at(1,-2,0) f_x(x, y, z)=-4 at(1,-2,0) f_y(x, y, z)=1 at(1,-2,0) f_z(x, y, z)=1 u(unit vector)=(2i+j-2k)/$\sqrt{9}$ D(1,-2,0)=(-4)(2/3)+(1/3)-(2/3)=-3	1 2 1 1
(e)	Find the gradient vector of f(x, y) if f(x, y)=$x^3 + 2xy^2$. Evaluate it at (-3, -4) f_x=3x^2+2y^2 f_y=4xy gradf(-3, -4)=(59,48)	1 4
(f)	Tangent:-4x-4y+z=-8 Normal: x=2-4t, y=1-4t, z=4+t	2 3
Q. 5	**Attempt the following (Any THREE)**	**(15)**
(a)	Critical points are(0,2) ,(0,-2),(2,2)and (2,-2) r=f_{xx}=6x-6, s=f_{xy}=0 and t=f_{yy}=12y rt-s^2=-144 (0,2) is saddle point (0,-2) localmaximum value 48 (2,2) local minimum value=-20 F has no extreme value at(2, -2)	5
(b)	By substituting y = vx we get the solution log (y/x) + (y/x) = - log x + c	5
(c)	Sketch the graph of the equation y= x^3+3x+2 and identify the locations of intercepts.(draw the graph on the answer sheet itself).	5
(d)	Using trigonometric formula of SinA CosB = (1/2)[sin(A +B) + sin (A – B)],evaluate we get I = 1 /2	5
(e)	Vertical asymptotes x=-1 and x=-2 Horizontal asymptote y=0	5