Seat No.: \_\_\_\_\_

Enrolment No.

## **GUJARAT TECHNOLOGICAL UNIVERSITY**

BE SEMESTER 1st / 2nd (NEW) EXAMINATION WINTER 2016

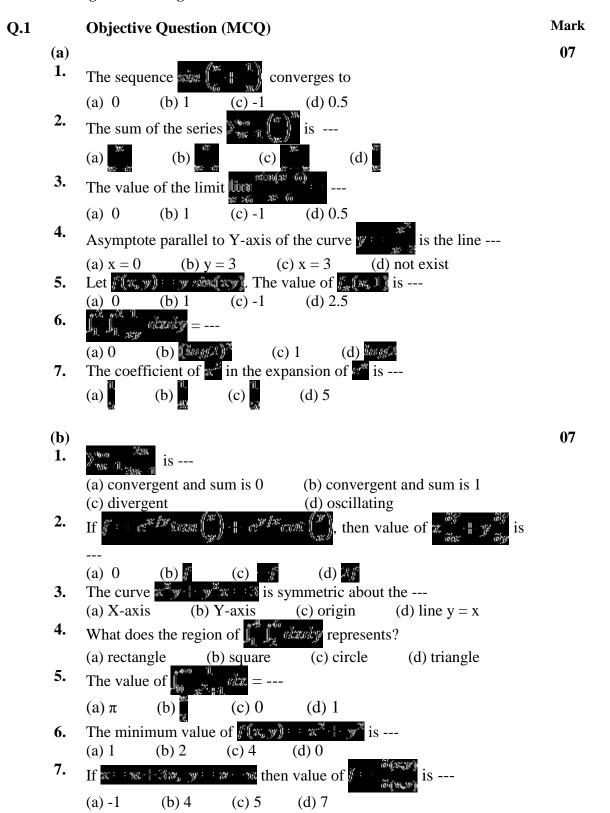
Subject Code: 2110014 Date: 24/01/2017

**Subject Name: Calculus** 

Time:10:30 AM TO 1:30 PM Total Marks: 70

Instructions

- 1. Question No. 1 is compulsory. Attempt any four out of remaining Six questions.
- 2. Make suitable assumptions wherever necessary.
- 3. Figures to the right indicate full marks.



Q.2	(a)	You drop a ball from $a$ meters above a flat surface. Each time the ball hits the surface after falling a distance $h$ , it rebounds a distance $rh$ , where $0 < r < 1$ . Find the total distance ball travels up and down when $a = 6$ m and $r = 2/3$ m.	03
	(b)	Evaluate  (1) limit (2) limit (3 ii) limit (3 iii) limit (4 iii) limit (4 iii) limit (5 iii) limit (	04
	(c)	series of long (1.1 and then obtain approximate value of	07
Q.3	(a)	Show that $f(x,y) := \begin{cases} x^{2}y & (x,y) \neq 0 \\ 0 & (x,y) = 0 \end{cases}$ is not continuous at the origin.	03
	(b)	If $0 = \sqrt{3}$ , then find the value of $m$ for which	.04
	(c)	State Euler's theorem on homogenous function of two variables. If	07
Q.4	(a)	Find the Jacobian of the transformation	03
	<b>(b)</b>	Find the tangent plane and normal line of the surface	04
	(c)	A rectangular box open at the top is to have a volume of 32 cubic units. Find the dimensions of the box requiring least material for its construction.	07
Q.5	(a)	Evaluate $\int_{-1}^{1} \int_{0}^{2} (1 - (\alpha x^{2}y) dx dy)$ .	03
	<b>(b)</b>	Evaluate $\int_{0}^{3} \int_{0}^{2} \int_{0}^{2} (r^{2}ccos^{2}\theta + x^{2})rd\theta drdx$ .	04
	(c)	Change the order of integration and evaluate	07
Q.6	(a)	Let $3:1000000000000000000000000000000000000$	03
	<b>(b)</b>	Check for convergence/divergence	04
		$(1) \sum_{m=1}^{\infty} \frac{m^{2} \cos n}{m^{2} \left(m + 2\right) \left(m^{2} + 2\right)} $ $(2) \sum_{m=1}^{\infty} \frac{m^{2} \sin n}{m^{2} + 3}$	
	(c)	(1) Check for absolute/conditional convergence of	03 04
		(2) For the series (2) For the series (3) find the radius and interval of convergence.	

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