Enrolment No.	
---------------	--

GUJARAT TECHNOLOGICAL UNIVERSITY BE SEMESTER- 1st / 2nd (SPFU) EXAMINATION – WINTER 2016

Su Su	bject	t Code: MTH002 Date:17/0)1/2017	
Su Tiı Ins	me:1 tructio 1. 2. 3.	30 AM TO 1:00 PM Total Marks: 7 30 AM TO 1:00 PM Total Marks: 7 31 Attempt any five questions. Attempt any five questions. Attempt assumptions wherever necessary. Total Marks. Sigures to the right indicate full marks. Total Marks.		
Q.1	(a)	Solve the following differential equations	07	
	(b)	1. $\cos^2 x \frac{dy}{dx} + y = \tan x$ Solve the following differential equations 1. $y'' - 5y = 0$ 2. $\frac{dy}{dx} = xe^{-y}$ 2. $\frac{dy}{dx} = xe^{-y}$ 2. $\frac{dy}{dx} = xe^{-y}$	07	
Q.2	(a)	Solve $(xy^3 + y)dx + 2(x^2y^2 + x + y^4)dy = 0, y(0) = 1.$	07	
	(b)	The tank contains 1000 gal of water in which initially 100 lb of salt is disso Brine runs in ac a rate of 10 gal/min. and each gallon contains 5 lb of disso salt. The mixture in the tank is kept uniform by stirring. Brine runs out gal/min. Find the amount of salt in the tank at any time t.	lved. olved at 10 07	
Q.3	(a)	If $y_1 = 1$ is a solution of the following differential equation. Use reduction order formula to find a second solution	of	
		y'' + 3y' = 0	07	
	(b)	Solve the differential equation $y'' - 2y' + y = e^x \log x$ by method of variati parameters.	on of 07	
Q.4	(a)	Solve $x^2 y'' - 4xy' + 6y = 0$ given that $y(1) = 1, y'(1) = 0$.	07	
	(b)	Using method of undetermined coefficients, solve the differential equation $y'' + y = xe^{x}$	ation 07	
Q.5	(a)	Prove that $[x^{n}J_{n}(x)]' = x^{n}J_{n-1}(x).$	07	
	(b)	Find the general solution of the following system	07	
		$y_1 = y_1 - y_2, y_2 = y_1 + y_2$	07	
Q.6	(a)	Solve the differential equation $y'' - y = 0$ by means of a power series above	it the	
	(b)	point $x = 0$. Find series solution of $2x^2y'' + 3xy' - y = 0$ near at regular singular	07	
	~)	x = 0.	07	
Q.7	(a)	Find power series solution of $x(x-1)y'' + (3x-1)y' + y = 0$ near $x = 0$.	07	
	(b)	Find the current $I(t)$ in an RLC-circuit with $R = 11 \Omega$ (of $L = 0.1 H$ (henry), $C = 10^{-2} F$ (farad), which is connected to a source voltage $E(t) = 100 \sin 400 t$.	1ms), e of 07	
