

**Vivekananda College of Engineering & Technology, Puttur**  
 [A Unit of Vivekananda Vidyavardhaka Sangha Puttur ®]  
 Affiliated to VTU, Belagavi & Approved by AICTE New Delhi

CRM08

Rev 1.11

BS

07/02/22

**CONTINUOUS INTERNAL EVALUATION - 2**

Dept:BS	Sem / Div:I/A,B,C,D,E &F	Sub:Calculus and Differential Equations	S Code:21MAT11
Date:16-02-22	Time: 9:30-11:00	Max Marks: 40	Elective:N

Note: Answer any 2 full questions, choosing one full question from each part.

QN	Questions	Marks	RBT	CO's
<b>PART A</b>				
1 a	Expand $y = \log(\sec x)$ up to the term containing $x^6$ Using Maclaurin's series	6	L2	CO2
b	If $u = f(2x-3y, 3y-4z, 4z-2x)$ then show that $6u_x + 4u_y + 3u_z = 0$	7	L2	CO2
c	Find the extreme values of the function $f(x, y) = x^3 + y^3 - 3x - 12y + 20$	7	L2	CO2
<b>OR</b>				
2 a	Evaluate (i) $\lim_{x \rightarrow 0} \left[ \frac{\tan x}{x} \right]^{\frac{1}{x^2}}$ ii) $\lim_{x \rightarrow 0} \left[ \frac{a^x + b^x + c^x}{3} \right]^{\frac{1}{x}}$	6	L2	CO2
b	If $u = \tan^{-1} \left[ \frac{y}{x} \right]$ where $x = e^t - e^{-t}$ , $y = e^t + e^{-t}$ Find the total derivative $\frac{du}{dt}$ using partial differentiation	7	L2	CO2
c	If $u = \frac{yz}{x}$ , $v = \frac{zx}{y}$ , $w = \frac{xy}{z}$ then find $\frac{\partial(u, v, w)}{\partial(x, y, z)}$	7	L2	CO2

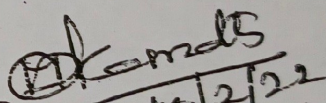
**PART B**

3	a	Solve $[2xy + y - \tan y]dx + [x^2 - x \tan^2 y + \sec^2 y]dy = 0$	6	L2	CO3
	b	Prove that the system of parabolas $y^2 = 4a(x+a)$ is self orthogonal	7	L3	CO3
	c	Solve $\frac{dy}{dx} + y \tan x = y^2 \sec x$	7	L2	CO3

**OR**

4	a	Solve $(x^2 + y^3 + 6x)dx + y^2 x dy = 0$	6	L2	CO3
	b	A copper ball originally at $80^\circ C$ cools down to $60^\circ C$ in 20 minutes, if the temperature of the air being $40^\circ C$ , what will be the temperature of the ball after 40 minutes from the original?	7	L3	CO3
	c	Find the orthogonal trajectories of $r^n \cos n\theta = a^n$	7	L3	CO3

Prepared by: Ravishankar N K

  
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