SREE VIDYANIKETHAN ENGINEERING COLLEGE

(An Autonomous Institution, Affiliated to JNTUA, Ananthapuramu)

I B.Tech I Semester (SVEC-19) Regular Examinations December - 2019

DIFFERENTIAL EQUATIONS AND MULTIVARAIBLE CALCULUS

[Civil Engineering, Electrical and Electronics Engineering, Mechanical Engineering, Electronics and Communication Engineering, Computer Science and Engineering, Electronics and Instrumentation Engineering, Information Technology, Computer Science and Systems Engineering]

Time: 3 hours **Max. Marks: 60**

Answer One Question from each Unit
All questions carry equal marks

UNIT-I

1.	a)	Solve the differential equation $(D^3 - 6D^2 + 11D - 6)y = e^{-2x} + e^{-3x}$.	6 Marks	L3	CO1	PO1 PO2
	b)	Solve the differential equation $y''' + 2y'' - y' - 2y = 1 - 4x^3$.	6 Marks	L3	CO1	PO1 PO2
		(OR)				
2.	a)	Using the method of variation of parameters solve $(D^2 + 1)y = x\cos x$.	6 Marks	L3	CO1	PO1 PO2
	b)	Change the differential equation $x^3\frac{d^3y}{dx^3} + 2x^2\frac{d^2y}{dx^2} + 2y = 10\left(x + \frac{1}{x}\right)$ into linear equation with constant coefficients and find the general solution.	6 Marks	L2	CO1	PO1 PO2

UNIT-II

3.	a)	Construct the partial differential equation by eliminating the arbitrary function from the relation $Z = f(x + at) + g(x - at)$.	6 Marks	L3	CO1	PO1
	b)	Find the complete solution of the partial differential equation $p + q = \sin x + \sin y$.	6 Marks	L1	CO1	PO1 PO2
		(OR)				
4.	a)	Solve the partial differential equation $4\frac{\partial^2 z}{\partial x^2} - 4\frac{\partial^2 z}{\partial x \partial y} + \frac{\partial^2 z}{\partial y^2} = 16\log(x + 2y)$.	6 Marks	L3	CO1	PO1 PO2
	b)	Applying the method of separation of variables, solve $3\frac{\partial u}{\partial x} + 2\frac{\partial u}{\partial y} = 0,\ u(x,0) = 4e^{-x}$.	6 Marks	L3	CO1	PO1 PO2

UNIT-III

5.	a)	Find $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z}$; *if* $u = f(y - z, z - x, x - y)$.	6 Marks	L1	CO2	PO1
	b)	Evaluate $\frac{\partial(x,y,z)}{\partial(u,v,w)}$; *if* $x + y + z = u,\ y + z = uv,\ z = uvw$.	6 Marks	L5	CO2	PO1 PO2
		(OR)				
6.	a)	Investigate the maxima and minima, if any, of the function $f(x,y) = x^3y^2(1 - x - y)$.	6 Marks	L5	CO2	PO1 PO2
	b)	Calculate the maximum value of $x^m y^n z^p$, given $x + y + z = a$ using Lagrange's method of undetermined multipliers.	6 Marks	L3	CO2	PO1 PO2

UNIT-IV

7.	a)	Evaluate $\iint_R y\,dx\,dy$ where R is the region bounded by the parabolas $y^2 = 4x$ *and* $x^2 = 4y$.	6 Marks	L5	CO2	PO1 PO2
	b)	Using change the order of integration, evaluate $\int_0^{4a} \int_{\frac{x^2}{4a}}^{2\sqrt{ax}} dydx$.	6 Marks	L3	CO2	PO1 PO2
		(OR)				
8.	a)	Evaluate $\int_{-1}^{1} \int_{0}^{z} \int_{x-z}^{x+z} (x + y + z)\, dxdydz$.	6 Marks	L5	CO2	PO1
	b)	By changing into polar coordinates, evaluate $\int_{y=0}^{1} \int_{x=y}^{a} \frac{x}{x^2 + y^2} dxdy$.	6 Marks	L3	CO2	PO1 PO2

UNIT-V

9.	a)	Find div $\vec{F}$ and curl $\vec{F}$ at the point (1,2,3) given $\vec{F}$ = grad $\left(x^3y + y^3z + z^3x - x^2y^2z^2\right)$.	6 Marks	L1	CO3	PO1 PO2
	b)	Evaluate $\int_S \vec{F}\, ds$, *where* $\vec{F} = 4x\bar{i} - 2y^2\bar{j} + z^2\bar{k}$ and S is the surface bounding the region $x^2 + y^2 = 4, z = 0$ and $z = 3$.	6 Marks	L5	CO3	PO1 PO2
		(OR)				
10.		Verify Green's theorem for $\int_C \left[\left(xy + y^2\right)dx + x^2dy\right]$, where C is the bounded by $y = x$ *and* $y = x^2$.	12 Marks	L5	CO3	PO1 PO2