Code No: R161102 **R16** SET - 1

I B. Tech I Semester Supplementary Examinations, May - 2018
MATHEMATICS-I

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1. a) Solve the DE $y(xy + e^x)dx - e^x dy = 0$. (2M)

b) Solve the DE $y^{11} - 2y^1 + 10y = 0$, given y (0) = 4, y^1 (0) = 1. (2M)

c) If $u = \frac{x^2 y^2}{x+y}$ then find $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$ (2M)

d) If $f(x, y, z) = e^{xyz}$ then find $\frac{\partial^3 f}{\partial x \partial y \partial z}$ (2M)

e) Find $L\{\delta(t-3)\}$ (2M)

f) Solve z=p(x+1)+q(y+2). (2M)

g) Classify the nature of the PDE $\frac{\partial^2 u}{\partial x^2} + 2\frac{\partial^2 u}{\partial x \partial y} + 4\frac{\partial^2 u}{\partial y^2} = 0$ (2M)

PART –B

2. a) A body kept in air with temperature 25^0C cools from 140^0C to 80^0C in 20 minutes. Find when the body cools down to 35^0C. (7M)

b) An R – L circuit has an Emf given (in volts) by 10 sin t, a resistance of 90 ohms, an inductance of 4 henries. Find the current at any time t by assuming zero initial current. (7M)

3. a) Solve the DE $(D^2 + 1)y$ = cotx by the method of variation of parameters (7M)

b) Determine the charge on the capacitor at any time t > 0 in circuit in series having an emf E(t) = 100 sin 60 t, a resistor of 2 ohms, an inductor of 0.1 henries and capacitor of $\frac{1}{260}$ farads, if the initial current and charge on the capacitor are both zero. (7M)

4. a) Evaluate $\int_0^\infty \frac{e^{-t} - e^{-2t}}{t} dt$ (7M)

b) Using Laplace transform solve $y(t) = sint + \int_0^t u\, y(t-u)\, du$ (7M)

5. a) Find the minimum value of $x^2 + y^2 + z^2$ subject to ax + by + cz = p. (7M)

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b) Check whether the following are functionally dependent or not, then find the relation between $u=\dfrac{x-y}{x+y}, v=\dfrac{xy}{(x+y)^2}$ (7M)

6. a) Find partial differential equation by eliminating arbitrary function $f(x^2+y^2, z-xy)=0$ (7M)

b) Solve the PDE $\dfrac{p^2}{z^2}=1-pq$. (7M)

7. a) Solve the PDE $\left(D^2-3D-D^{1^2}+3D^1\right)z=e^{x-2y}$ (7M)

b) Solve the PDE $\left(D-D^1-1\right)\left(D-D^1-2\right)z=x+e^{3x-y}$ (7M)

Code No: R13102 **R13** SET - 1

I B. Tech I Semester Supplementary Examinations, May - 2018
MATHEMATICS-I
(Com. to All branches)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Find the integrating factor for the non exact differential equation. $x^2ydx-(x^3+y^3)dy=0$. (4M)

b) Find the solution of y^{11}+y=cos 2x. (4M)

c) If $L(\cos 2t)=\frac{s}{s^2+4}$ then find $L\left(\int_0^t \cos 2t dt\right)$. (4M)

d) Find the inverse Laplace transform of $\left(\frac{1}{s(s+a)}\right)$. (4M)

e) Formulate the partial differential equation from z=(x+a)(y+b) by eliminating ‘a’ and ‘b’. (3M)

f) Find the solution of the partial differential equation p+q = pq. (3M)

PART -B

2. a) Solve $(xe^{xy}+2y)\frac{dy}{dx}+ye^{xy}=0$. (8M)

b) A metal ball is heated to a temperature of 100^0C and at time t = 0 it is placed in water which is maintained at 40^0C. If the temperature of the ball reduces to 60^0C in 4 minutes, find the time at which the temperature of the ball is 50^0 C. (8M)

3. a) Solve $(D^3-3D^2+4)y=e^{2x}+6+80Cos2x$. (8M)

b) Solve $(D^2-3D+2)y=2x^2e^x$. (8M)

4. a) Find $L\left[\int_0^t \frac{1-e^{-u}}{u}du\right]$. (8M)

b) Solve $y'''-3y''+3y'-y=t^2e^t$ given that $y=1, y'=0, y''=-2$ at t = 0. (8M)

5. a) Determine whether the functions U $=\frac{x}{y-z}$, V $=\frac{y}{z-x}$, W$=\frac{z}{x-y}$ are dependent. If dependent find the relationship between them. (8M)

b) Investigate the maxima and minima, if any, of the function f(x) = $x^3y^2(1-x-y)$. (8M)

6. a) Form the p.d.e by eliminating the arbitrary function *f* from $xyz=f(x^2+y^2+z^2)$. (8M)

b) Solve $(x^2-yz)p+(y^2-zx)q=z^2-xy$. (8M)

7. a) Solve PDE $\frac{\partial u}{\partial x}-2\frac{\partial u}{\partial y}=u$ and u(*x*,0)=$3.e^{-5x}+2.e^{-3x}$. (8M)

b) A tightly stretched string with fixed end points x = 0 and x = L is initially in a position given by $y=y_0\sin^3\left(\frac{\pi x}{L}\right)$. If it is released from rest from this position; find the displacement y(x, t). (8M)

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Code No: R10102 **R10** SET - 1

I B. Tech I Semester Supplementary Examinations, May - 2018
MATHEMATICS-I
(Com. to All branches)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1\. a) Solve $(y\cos x+\sin y+y)dx+(\sin x+x\cos y+x)dy=0.$ (8M)

b) Find the orthogonal trajectories of the family of curves: $r^n = a^n \sin n\theta$. (7M)

2\. a) Solve $(D^3-3D^2+4)y=e^{2x}+6+80cos2x.$ (8M)

b) Solve $(D^2+3D+2)y=xe^x Sinx.$ (7M)

3\. a) Prove that u $=\dfrac{x^2-y^2}{x^2+y^2}$, v $=\dfrac{2xy}{x^2+y^2}$ are functionally dependent and find the relation between them. (8M)

b) Expand $\tan^{-1}x$ in powers of (x – 1) up to the term containing fourth degree. (7M)

4\. Trace the curve x = a (θ + sinθ), y = a (1 + cosθ). (15M)

5\. a) Find the perimeter of the curve $r=a\cos\theta$. (8M)

b) Find the volume of the solid generated by the revolution of the cardioid r = a (1+cosθ) about the initial line $\theta=0$. (7M)

6\. a) Evaluate $\iint (x+y)dxdy$, over the region in the positive quadrant bounded by the ellipse $\dfrac{x^2}{a^2}+\dfrac{y^2}{b^2}=1$ (8M)

b) By changing the order of integration, evaluate $\int_0^1\int_1^{2-x} xydxdy.$ (7M)

7\. a) Find the directional derivative of $\phi=x^2yz+4xz^2$ at (1, -2, -1) in the direction of $2\bar{i}-\bar{j}-2\bar{k}$. (8M)

b) Find the constants a, b, c so that the vector $\bar{f}=(x+2y+az)\bar{i}+(bx-3y-z)\bar{j}+(4x+cy+2z)\bar{k}$ is irrotational. Also find the scalar potential ϕ. (7M)

8\. Verify Stoke's theorem for $\bar{F}$ = $(x^2 - y^2)\,\bar{i}$ + 2xy $\bar{j}$ over the box bounded by the planes x = 0, x = a, y = 0, y = b, z = c. (15M)
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