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 $(D^2+3D+2)y = xe^xSinx.$ (7M)

3. a) Prove that u $=\frac{x^2-y^2}{x^2+y^2}$, v $=\frac{2xy}{x^2+y^2}$ 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 ($\theta$ + sin $\theta$), y = a (1 + cos $\theta$). (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+cos $\theta$) 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 $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ (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 $\phi$. (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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