R09

Code No: 51002

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD
B.Tech I Year Examinations, December-2014/January-2015
MATHEMATICS-I
(Common to all Branches)

Time: 3 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks

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1.a) Show that a series of positive terms, if convergent is absolutely convergent.

b) Test for convergence of the series $\frac{1}{6}-\frac{2}{11}+\frac{3}{16}-\frac{4}{21}+\frac{5}{26}-.....$

2.a) State Lagrange's mean value theorem and verify it for $f(x)=x-x^3$ in (-2, 1).

b) Examine for minimum and maximum values of $\sin x+\sin y+\sin(x+y)$.

3. Trace the curve $r(1+\cos\theta)=2a$. Find its length as cut off by the latus rectum.

4.a) Show that the curve $x=a(\theta-\sin\theta), y=a(1-\cos\theta)$ is divided in the ratio 1: 3 at $\theta=2\pi/3$.

b) Evaluate $\iint r\sin\theta\, dr\, d\theta$ over the cardioids $r=a(1-\cos\theta)$ above the initial line.

5.a) Solve $x\frac{dy}{dx}+y=x^3y^6$.

b) Obtain the orthogonal trajectories of the semi-cubical parabolas $ay^2=x^3$.

6.a) Using the method of variation of parameters solve $\frac{d^2y}{dx^2}+4y=\tan 2x$.

b) Solve $(D^2-4D+4)y=x^2\sin x+e^{2x}+3$.

7.a) Find the Laplace transform of the function $f(t)=\begin{cases} t & 0<t<a \\ -t+2a & a<t<2a \end{cases}$

b) Using Laplace transform, solve $y''-2y'-8y=0;\ y(0)=3,\ y'(0)=6$.

8. Verify divergence theorem for $2x^2yi-y^2j+4xz^2k$ taken over the region of first octant of the cylinder $y^2+z^2=9$ and $x=2$.

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