R09

Code No: 51002

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech I Year Examinations, December - 2017
MATHEMATICS-I
(Common to CE, EEE, ME, ECE, CSE, CHEM, EIE, BME, IT, ETM, MMT, AE, BT, AME, MIE, PTM, MSNT, AGE)

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

Answer any five questions
All questions carry equal marks

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1.a) Test the convergence of the series $\frac{x}{1.2}+\frac{x^2}{2.3}+\frac{x^3}{3.4}+\frac{x^4}{4.5}+...$

b) Find the interval of convergence of the series $\sum_{n=1}^{\infty}(-1)^n n(x+1)^n \frac{1}{2^n}$ [8+7]

2.a) Expand $\ln(1+x)$ in powers of x.

b) Find the shortest distance from origin to the surface $xyz^2=2$. [7+8]

3.a) Show that the radius of curvature of the curve $xy^2=a^3-x^3$ is $\frac{3a}{2}$.

b) Trace the curve $r^2=a^2\cos 2\theta$. [7+8]

4.a) Find the surface area of the solid formed by revolving the cardioid $r=a(1+\cos\theta)$ about the initial line.

b) Evaluate by changing order of integration $\int_0^1\int_{x^2}^{2-x} xydydx$. [8+7]

5.a) Solve the differential equation $(1+y^2)+(x-e^{\tan^{-1}y})\frac{dy}{dx}=0$

b) A copper ball is heated to a temperature of 80^0C. Then at time t=0 it is placed in water which is maintained at 30^0C. If at t=3 minutes, the temperature of the ball is reduced to 50^0C then find the time at which the temperature of the ball is 40^0C. [7+8]

6. Solve $(D^2-4D+4)y=8x^2e^{2x}\sin 2x$ [15]

7.a) Find L{3sin3tcos2t}.

b) Solve the following differential equation using Laplace transforms $\frac{d^2y}{dt^2}+2\frac{dy}{dt}+2y=5\sin t$ with $y(0)=0$ and $y'(0)=0$. [7+8]

8.a) Find a unit normal vector to the surface $x^3+y^3+z^3=3$ at the point $(1,-2,1)$.

b) Applying Green's theorem, evaluate $\int_c (y-\sin x)dx+\cos xdy$, where C is the plane triangle enclosed by the lines $y=0, x=\frac{\pi}{2}$ and $y=\frac{2x}{\pi}$. [7+8]

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