POKHARA UNIVERSITY

Level: Bachelor Semester:Fall Year : 2020
Programme:BE Full Marks: 100
Course:Engineering Mathematics II Pass Marks: 45
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) Find the image of the point (1, 2, 3) in the plane 2x-y+z+3=0. 8

OR

Define shortest distance between two skew lines in space. Find the length and equation of shortest distance between the lines $\frac{x}{2}=\frac{y}{-3}=\frac{z}{1}$ and $\frac{x-2}{3}=\frac{y-1}{-5}=\frac{z+3}{2}$

b) Find the equation of the sphere through the circle $x^2+y^2+z^2=1$, $2x+4y+5z=6$ and touching the plane $z=0$. 7

2. a) State and prove Euler's theorem for homogeneous function of two variable. If $u=\tan^{-1}\left(\frac{x^3+y^3}{x+y}\right), x \neq y$, Show that $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}=\sin 2u$ 8

b) What are the criteria of a function of two independent variables to have extreme values? Find the extreme value of $f=xyz$ subject to $x+y+z=24$. 7

3. a) Evaluate $\int_0^2\int_x^2 y^2 \sin xy \, dy\, dx$ by reversing the order of integrations. 8

b) Find the volume in the first octant bounded by coordinate planes, the cylinder $x^2+y^2=4$ and the plane $z+y=3$. 7

4. a) Solve: $\frac{dy}{dx}+\frac{1}{x}\sin 2y = x^3.\cos^2 y$ 7

b) Solve $\frac{d^2x}{dy^2}-2\frac{dy}{dx}+y=12\frac{e^x}{x^3}$ 8

5. a) Find the solution of the differential equation: $y''+4y=0$, by using power series method. 7

b) Solve $y''+2y+y=e^{-x}$ $y(0)=-1$, $y'(0)=1$ 8

6. a) Find Laplace transform of (i) $\frac{\cosh t}{t}$ (ii) $(t-1)u(t-1)$ 8

b) Solve the initial value problem: $y''-2y'+y=e^t, y(0)=2, y'(0)=-1$, by using Laplace transform. 7

7. Write short notes on: 10

a) Find the equation of the line passing through the (1, 5, 3) and perpendicular to the plane 2x + 3y + 7z = 0

b) Find the partial derivatives of $f(x,y)=x\cos\left(\frac{x}{y}\right)$.

c) Evaluate $\int_0^1\int_0^2 xy\,dy\,dx$.

d) Find laplace transform of t^n.