a) Solve by power series method $y' = 2xy$. 8

b) Use method of variation of parameter to solve 7

$y'' + 2y' + y = e^{-x}\cos x$

a) i Find Laplace transform of $f(t) = e^{-3t}\sin 2t$. 7

ii Find $f(t) if\ F(s) = log\frac{s(s+1)}{s^2+4}$.

b) Solve the following initial value problem by using Laplace transform 8

$$y'' + 2y' + 17y = 0, y(0) = 0, y'(0) = 12$$

OR

State and prove the convolution theorem for Laplace transform. Use it to find f(t) where $F(s) = \frac{1}{(s^2+1)^2}$.

Attempt all 4×2.5

a) Find the equations of the plane which passes through (-1, 3, 2) and is normal to the planes x+2y+2z=5 and 3x+3y+2z=8.

b) Express the equation of cone having three mutually perpendicular generators if a+b+c = 0

c) Prove that $l^2 + m^2 + n^2 = 1$

d) Find Laplace transform of Sin (wt + θ)

POKHARA UNIVERSITY

Level: Bachelor Semester: Fall Year : 2017

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) Reduce the equation of a line x+y+z+1=0, 4x+y-2z+2=0 in symmetrical form. 7

OR

Find the equation of the line through the point (1,6,3) perpendicular to the line $\frac{x}{1} = \frac{y-1}{2} = \frac{z-2}{3}$.

b) Find the equation of the sphere which passes through the circle $x^2 + y^2 + z^2 = 5$, x+2y+3z = 3 and touch the plane 4x+3y = 15. 8

2. a) State and prove Euler's theorem for a homogeneous function of two variable of degree n and hence if $v = \log\frac{x^2+y^2}{x+y}$, show that 8

$$x\frac{\partial v}{\partial x} + y\frac{\partial v}{\partial y} = 1.$$

b) Write down the necessary condition that f(x, y, z) to have maximum or minimum value. Show that the function $u = y^2 + x^2y + x^4$ has a minimum value at (0, 0). 7

3. a) Sketch the region of integration of $\int_0^\infty \int_x^\infty \frac{e^{-y}}{y} dy\, dx$, and evaluate by interchanging the order of integration. 8

b) Find the volume of the solid whose base is the region in xy-plane that is bounded by the parabola $y = 3 - x^2$, y = 2x while the top is bounded by the plane z = x +1. 7

4. a) Solve $\frac{dy}{dx} - \frac{tany}{1-x} = (1+x)e^x secy$. 7

b) Solve y''+ 9y = 6cos3x, y(0) = 1, y'(0) = 0. 8