POKHARA UNIVERSITY

Level: Bachelor	Semester – Spring	Year: 2020
Program: BE		Full Marks: 70
Course: Engineering Mathematics-II		Pass Marks: 31.5
		Time: **2** hrs.

Candidates are required to answer in their own words as far as practicable.
The figures in the margin indicate full marks.
Attempt all the questions.

Group - A: (5×10=50)		
Q. N. 1	a) What is an exact ODE? Is f(x)dx+g(y)dy = 0 always exact? Under what conditions for the constant a, b, k, l is (ax+by)dx+(kx+ly)dy = 0 exact? b) Does the initial value problem $(x-2)\,y'=y$, $y(2)=1$ have a solution? What happens if you replace y(2) = 1 with y(2) = k? c) Verify and explain why $y=e^{-2x}$ is a solution of $y''-y'-6y=0$ but xe^{-2x} is not. **OR**	1+3+2+4
	a) Differentiate between homogeneous linear equation and non-homogeneous linear equation with examples. b) What does an initial value problem of a second-order ODE look like? Why must you have a general solution to solve it? c) Solve $y''+16y=17e^{x}$, $y(0)=6, y'(0)=-2$.	3+3+4
Q. N. 2	a) Which order of differentiation will calculate f_{xy} faster; x first , or y first? Discuss with function $f(x,y)=x^2+5xy+\sin x+7e^{x}$. b) Suppose that the partial derivatives of a function f(x,y,z) at point on the helix x=cost, y=sint, z=t are $f_x=\cos t,\ f_y=\sin t,\ f_z=t^2+t-2$, At what points on the curve ,if any can f take on extreme values? c) Find the maximum value of w = xyz on the line of intersection of the two planes x+y+z=40 and x+y-z=0.	2+4+4
Q. N. 3	**a)** Define the double integral of a function of two variables over a bounded region in the coordinate plane. Does the order of integration matter? How are the limits of integration determined? Give examples. **b)** Why we change Cartesian integral changes to polar integral? How would you evaluate the double integral of a continuous function f(x,y) over the region R in the xy-plane enclosed by the triangle with vertices (0,1), (2,0) and (1,2) ? Give reasons for your answer. c) Find the volume of solid in the first octant bounded by the co-ordinate planes, the planes x=3, and the parabolic cylinder $z=4-y^2$	3+3+4
Q. N. 4	a) What are the process of solving the differential equation by power series method?	2+8

	b) Find solution of following equation by using power series method : (1+x) $y' = y$	
Q. N. 5	a) How can you find angle between line and plane? b) Find the equation to the plane through the line $\frac{x-\alpha}{l} = \frac{y-\beta}{m} = \frac{z-\gamma}{n}$ parallel to the line $\frac{x}{l'} = \frac{y}{m'} = \frac{z}{n'}$.	2+8
Group - B: (1×20=20)		
Q. N. 6	a) Define Laplace transform. Give simple example of functions that have no Laplace transform. b) When and how do you use the unit step function? Explain the use of the two shifting theorems from memory. c) Solve the initial value problem using $y''+3y'+2y = 2u(t-2), y(0) = 0, y'(0) = 0$ d) $L^{-1}\left\{log\left(\frac{s(s+1)}{s^2+4}\right)\right\}$ e) Estimate how much wood it takes to make a hollow rectangular box who's inside measurements are 5ft long by 3ft wide by 2ft deep if the box is made of lumber ½ - inch thick and the box has no top.	2+3+5+4+6