

The Open University of Sri Lanka  
B.Sc. Degree Programme - Level 05  
No Book Test-2015/2016  
APU3240/APE5240 — Numerical Methods



DURATION: ONE AND HALF (1 ½) HOURS

Date: 07. 05. 2016

Time: 10.30 a.m. –12.00noon

ANSWER ALL QUESTIONS.

1. (a) Applying Trapezoidal rule for five sub intervals, evaluate the integral  $\int_0^1 x^3 dx$ .

(b) Applying Simpson's three eight's rule for following data,

$\sin(\pi/12)$	$\sin(\pi/6)$	$\sin(\pi/4)$	$\sin(\pi/3)$	$\sin(5\pi/12)$	$\sin(\pi/2)$
0.2588	0.5000	0.7071	0.8660	0.9659	1.0

evaluate the integral  $\int_0^{\pi/2} \sin x dx$ .

2. (a) Applying Taylor series method of fourth order for the differential equation

$$\frac{dy}{dx} = xy^2 + 1 \text{ subject to the initial condition } y(0) = 1, \text{ evaluate } y(0.2).$$

(b) Applying Picard's method for the differential equation  $\frac{dy}{dx} = 2x - y^2$  subject to the initial condition  $y(0) = 0$ , find the first three successive approximations.

3. (a) Applying Taylor series method of third order for the simultaneous differential equations  $\frac{dy}{dx} = x + z$  and  $\frac{dz}{dx} = x - y^2$  subject to the initial conditions  $y(0) = 2$  and  $z(0) = 1$ , evaluate  $y(0.1)$  and  $z(0.1)$ .

(b) Solving the differential equation  $\frac{dy}{dx} = 3x^2 + 1$  subject to the initial condition  $y(1) = 2$  by Euler method, evaluate  $y(2)$  in four steps.