THE OPEN UNIVERSITY OF SRI LANKA

B.Sc/B.Ed Degree Programme

Applied Mathematics – Level 05

ADU5302/ADE5302 – Mathematical Methods

OPEN BOOK TEST (OBT) – 2017/2018

DURATION: ONE (01)–HOUR

Date: 17.06.2018. **Time: 14.30p.m.-15.30 p.m.**

ANSWER **ALL** QUESTIONS.

01. (a) Obtain the Laplace transform of each of the functions $f(t)$:

(i) $f(t) = (e^{-2t} - 1)^2$

(ii) $f(t) = te^{-2t}\cos(3t)$

(b) Find the inverse Laplace transform of each of the following :

(i) $\dfrac{s-2}{6s^2+20}$

(ii) $\dfrac{s+4}{s(s-1)(s^2+4)}$

(c) Use the convolution theorem to find $L^{-1}\dfrac{1}{s(s^2+a^2)}$

02. (a) Using Laplace Transform solve the following boundary value problem :

$$\frac{d^2y}{dt^2} + y = \sin 3t;\ y(0) = y'(0) = 0$$

(b) Given that $f(x) = x + x^2$ for $-\pi < x < \pi$, find the Fourier expansion of $f(x)$.