Total No. of Questions :8] *[Total No. of Printed Pages :3*

Roll No.....

MNT-101

M.E./M.Tech. I Semester

Examination, June 2017

Mathematical Methods & Programming

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt any five questions.
ii) All questions carry equal marks.

1. a) Find the Fourier sine and cosine transform of

$$f(x)=\begin{cases} x, & 0<x<1 \\ 2-x, & 1<x<2 \\ 0, & x>2 \end{cases}$$

b) Find the complex Fourier transform of $f(x)=e^{-|x|}$

2. a) Find the inverse Laplace transform of

$$F(s)=\frac{s^2-1}{(s-2)^2(s^2+s-6)}$$

b) Find $L\{e^{-3t}(t\sin 2t)\}$

45
1157

3. a) Solve the initial value problem by Laplace method

$$\frac{d^2y}{dt^2}-2\frac{dy}{dt}-8y=0,\ y(0)=3,\ y'(0)=6$$

b) Solve the partial differential equation:

$$\frac{\partial u}{\partial t}+x\frac{\partial u}{\partial x}=x,\ x>0,\ t>0$$

4. a) Prove that

$$\int_{-\infty}^{\infty} e^{-x^2}H_n(x)H_m(x)dx=\begin{cases} 0, & \text{if } m\neq n \\ \sqrt{\pi}\ 2^n\lfloor n, & \text{if } m=n \end{cases}$$

b) Find the solution Bessels differential equation.

5. a) If A and B are two events, where $P(A)=\frac{1}{2}$ $P(B)=\frac{1}{3}$, and $P(A\cap B)=\frac{1}{4}$ then evaluate the following

i) $P(A/B)$

ii) $P(B/A)$

iii) $P(A\cup B)$

b) A bag contains 3 white and 2 black balls, an another bag contains 5 white and 3 black balls. If a bag is selected at random and a ball is drawn from it, find the probability that it is white.

6. a) Find r_{xy} for the following data:

x:	1	2	3	4	5
y:	5	4	3	2	6

b) Prove that the coefficient of correlation is the geometric mean of the coefficient of regression.

7. a) Write a code for finding the sum of first hundred positive integers through c++ programming language.

b) Write a note on followings:

i) For loops

ii) While loops

iii) Do loops for C++ language

8. a) Plot the function $y = -x^2$ for $x \in [-2, 2]$.

b) Write MATLAB command, which shows use of hold, legend and axis, with the help of a program code.

******