MEIC/MEPE/MEHP/MEPS/MTPS/ MEDC/MEMT/MEVD-101

M.E./M.Tech., I Semester

Examination, December 2017

Advanced Mathematics

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt any five questions.

ii) All questions carry equal marks.

1. Solve the partial differential equation

$\nabla^2 u = -10(x^2 + y^2 + 10)$ over the square with sides $x = 0$. $y = 0$, $x = 3$, $y = 3$ with $u = 0$ on the boundary and mesh length = 1.

2. Using the method of separation of variable to solve the equation $\frac{\partial u}{\partial x} + u = \frac{\partial u}{\partial t}$ if $u = 4e^{-3x}$ when $t = 0$.

3. Fit a binomial distribution to the following frequency distribution.

x :	0	1	2	3	4	5	6
$f(x)$:	13	25	52	58	32	16	4

4. The Nine item of a sample have the following values: 45, 47, 50, 52, 48, 47, 49, 53, 51. Does the mean of their differ significantly from the assumed mean 47.5 ?

5. What do you understand by Markov chains. Explain how it can be used for predicting soles-force needs.

6. Write an essay on various characteristics of a queueing system.

7. The failure rate of a certain component is $h(t) = \lambda_0 t$ where $\lambda_0 > 0$ is a given constant. Determine the reliability. R(t) of the component. Repeat for $h(t) = \lambda_0 t^{1/2}$.

8. Find the Fourier transform of $f(x) = \begin{cases} 1 & |x| < a \\ 0 & |x| > a \end{cases}$. Hence, find the value of $\int_0^\infty \frac{\sin x}{x} dx$.

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