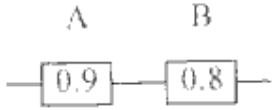

ii) A product has an MTBF of 1500 hours. What is the reliability for a 500 hours mission?

b) A firm produces two products x and y. The unit profit from product x is Rs. 100 and that of product y is Rs. 50. The goal of the firm is to earn a total profit of exactly Rs. 700 in the next week. Find.

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Roll No.

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

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

Examination, June 2014

Advanced Mathematics

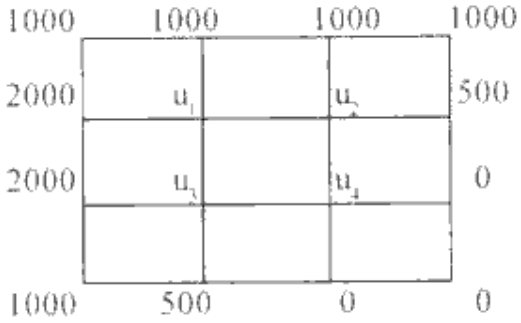
Time : Three Hours

Maximum Marks : 70

Note : Attempt any five questions. All questions carry equal marks.

1. a) Given the values of u(x, y) on the boundary of the square in the fig. evaluate the function u(x, y) satisfying the Laplace's equation $\nabla^2 u = 0$ at the pivotal points of this figure by:

Jacobis method.



b) Find the values of u (x, t) satisfying the parabolic equation $\frac{\partial u}{\partial t} = 4\frac{\partial^2 u}{\partial x^2}$ and the boundary conditions u(0, t) = 0 = u (8, t) and $u(x, 0) = 4x - \frac{1}{2}x^2$ at the points $x = i$; i = 0, 1, 2, ...7 and $t = \frac{1}{8}j$: j = 0, 1, 2, ...5.

2. a) Find the Fourier transform of $F(x)=\begin{cases}1-x^2, & x\le 1\\ 0, & |x|>1\end{cases}$

Hence evaluate $\int_0^{\infty} \frac{x\cos x-\sin x}{x^3}\cos\frac{x}{2}\,dx$.

b) Solve the heat equation $\frac{\partial u}{\partial t}=\frac{\partial^2 u}{\partial x^2}$ subject to the conditions $u(t)=u(1,t)=0$ and $u(x,0)=2x$ for $0\le x\le \frac{1}{2}$, $=2(1-x)$ for $\frac{1}{2}\le x\le 1$. Take $h=\frac{1}{4}$ and k according to Brandt-Schmidt equation.

3. a) Find mean and variance of a Binomial distribution.

b) A set of 8 coins (biased) was tossed 256 times and the frequencies of heads obtained are given by the following table.

x:	0	1	2	3	4	5	6	7	8
f:	2	6	24	63	64	50	36	10	1

Fit a binomial distribution to this data.

4. a) Explain the following with examples.

i) Hypothesis

ii) Testing of Hypothesis

iii) Theory of estimation

iv) Diserete Random Variable

b) A poisson distribution has a double mode at $x=4$ and $x=5$. Find the probability that x will have either of these values $P(x=4)=P(x=5)$.

5. a) Define : (i) Stochastic process (ii) Markov process (iii) Transition probability (iv) Transition diagram.

b) Suppose these are two market products of brands A and B respectively. Let each of these two brands have exactly 50% of the total market in same period and let market be of a fixed size. The transition matrix is given below.

$$\text{From}\begin{matrix}\\ A\\ B\end{matrix}\begin{matrix}\text{To}\\ \begin{pmatrix}0.9 & 0.1\\ 0.5 & 0.5\end{pmatrix}\end{matrix}\quad\begin{matrix}\\ A\\ B\end{matrix}$$

If the initial market share break down is 50% for each brand, then determine there market shares in the steady state.

6. a) Describe completely the points in the Queuing system.

b) Find out the probability distribution function of arrival that is of inter arrival times.

7. a) Define : Properties of Fuzzy sets, Fuzzy relations composition of Fuzzy relations.

b) Apply the Fuzzy modes ponens rule to deduce rotation is quite slow given

i) If the speed is high then the rotation is slow.

ii) The speed is very high.

8. a) i) Calculate the reliability of the following series system, where each component has the identical reliability.