

**Unit - V**

- a) What is FEM? Write some application of FEM.
- b) Find the extremal of  $I = \int_{x_0}^{x_1} (16y^2 - y^{1/2} + x^2) dx$

OR

1. a) Find the curve on which the functional  $\int_0^1 [(y')^2 + 2xy] dx$  with  $y(0) = 0$  and  $y(1) = 1$  can be extremised?
- b) Write short note on
- Ritz method
  - Galerkin's method

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Roll No .....

**MMTP/MMCM/MMIE/MMMD/MMPD-101****M.E./M.Tech., I Semester**

Examination, July 2015

**Advanced Mathematics****Time : Three Hours****Maximum Marks : 70**

**Note :** Attempt one question from each unit. All questions carry equal marks.

**Unit - I**

- Show that the mapping  $T: V_2(R) \rightarrow V_3(R)$  defined by  $T(a, b) = (a + b, a - b, b)$  is a linear transformation from  $V_2(R)$  into  $V_3(R)$ ?
  - Show that the vectors  $(1, 0, 0)$   $(1, 1, 0)$   $(1, 1, 1)$  form a basis for  $R^3$ ?

OR

- Prove that four vectors  $\alpha_1 = (1, 2, 3)$ ,  $\alpha_2 = (1, 0, 0)$ ,  $\alpha_3 = (0, 1, 0)$ ,  $\alpha_4 = (0, 0, 1)$  in  $V_3(R)$  form a linearly dependent set.
  - What are Hermite polynomials explain briefly?

**Unit - II**

- Use the method of separation of variables to solve the equations:

$$\frac{\partial^2 u}{\partial x^2} = \frac{\partial u}{\partial y} + \partial u$$

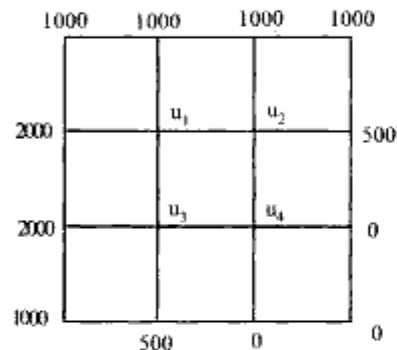
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b) Write short note on

- i) FT                      ii) DFT  
OR

a) Given the values of  $u(x, y)$  on the boundary of the square in the following figure:

Evaluate the function  $u(x, y)$  satisfying the Laplace equation  $\nabla^2 u = 0$  at the pivotal points of this figure by:



b) Explain the wavelet transform, explain briefly?

### Unit - III

a) A can hit a target 4 times in 5 shots B can hit three times in 4 shots and C can hit twice in 3 shots. They fire a volley what is the probability that two shots at least hit?

b) Write short note on

- i) Hypothesis  
ii) Recurred relation

OR

a) The probability that a valve manufactured by a company will be defective is  $1/10$ . If 12 such valves are manufactured find the probability with the help of binomial distribution

- i) Exactly two will be defective  
ii) At least two will be defective

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b) Write short note on

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- i) Poisson distribution  
ii) Normal distribution

### Unit - IV

7. a) Find the probability for queuing model

(M/M/1 :  $\infty/\infty$  / FCFS)

b) A self service store employs one cashier at its counter. Nine customers arrive on an average every 5 minutes while the cashier can serve 10 customers in 5 minutes. Assuming Poisson distribution for arrival rate and exponential distribution for service rate find:

- i) Average number of customers in the system.  
ii) Average number of customer in queue  
(average queue length)

OR

8. a) Write short note on

- i) Maslov process  
ii) Transient and steady state for queuing system

b) A person repairing radio's find that the time spent on the radio sets has been exponential distributed with mean 20 minutes. If the radios are repaired in the order in which they come in and their arrival is approximately poisson with an average rate of 15 for 8 hour day. What is the repairman's expected idle time each day.