

Roll No

MCIT-101

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

Examination, June 2013

Mathematical Foundation of Information Technology

Time : Three Hours

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Maximum Marks : 70

Note: Attempt one question from each unit.

Unit - I

1. a) Write short note on Entropy information measures and characteristics on information measure?
b) Write short notes on:
 - i) Uncertainty
 - ii) Channel coding

OR

2. a) Explain Shannon's concept of Information?
b) Write short note on channel mutual information capacity?

Unit - II

3. a) What is parity check codes and take an example of parity check polynomial?
b) Write short note on:
 - i) Hamming and Lee metrics
 - ii) Types of codes

OR

4. a) Write short note on: **rgpvonline.com**
- Channel coding
 - Description of linear block codes by matrices.
- b) Explain error correcting and detecting code?

Unit - III

5. a) Define fuzzy set and membership functions with example?
- b) Let $X = \{(x_1, x_2, x_3, x_4)\}$ and two fuzzy sets A and B are
- $$A = \{(x_1, .2), (x_2, .5), (x_3, .7), (x_4, 1)\}$$
- $$B = \{(x_1, .6), (x_2, 1), (x_3, .4), (x_4, .3)\}$$
- Find $A \cup B$ and $A \cap B$?

OR

6. a) Verify De Morgan's law $(A \cup B)' = A' \cap B'$ for the fuzzy set given by

$$X = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$$

$$A = \left\{ \frac{0}{1}, \frac{.1}{2}, \frac{.3}{2}, \frac{.5}{4}, \frac{1}{5}, \frac{.2}{6}, \frac{.4}{7}, \frac{.6}{8}, \frac{.8}{9}, \frac{0}{10} \right\}$$

$$B = \left\{ \frac{0}{1}, \frac{0}{2}, \frac{.2}{3}, \frac{.4}{4}, \frac{.6}{5}, \frac{.8}{6}, \frac{1}{7}, \frac{0}{8}, \frac{0}{9}, \frac{0}{10} \right\}$$

- b) Explain Fuzzy reasoning and extension principle?

Unit - IV

7. a) Solve the equation $y'' = x + y$ with the boundary conditions $y(0) = y(1) = 0$.

- b) Find the Fourier transform of $e^{-x^2/2}$? **rgpvonline.com**

OR

8. a) Write short notes on:
- Discrete Fourier transform
 - Wavelet transform.
- b) Find the Fourier transform of :

$$f(x) = x, \quad 0 < x < a$$

$$= 0 \quad \text{otherwise.}$$

Unit - V

9. a) State and prove Bay's theorem?
- b) 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.
- Exactly two will be defective
 - At least two will be defective.

OR

10. a) Write short note on probability distribution?
- b) An article manufactured by a company consists of two parts A and B. In the process of manufacture of Part A, 9 out of 100 are likely to be defective, similarly 5 out of 100 are likely to be defective in the manufacture of part B. Calculate the probability that the assembled part will not be defective?

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