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मध - 037

Digital Communication (1030)

P. Pages : 2

Time : Three Hours

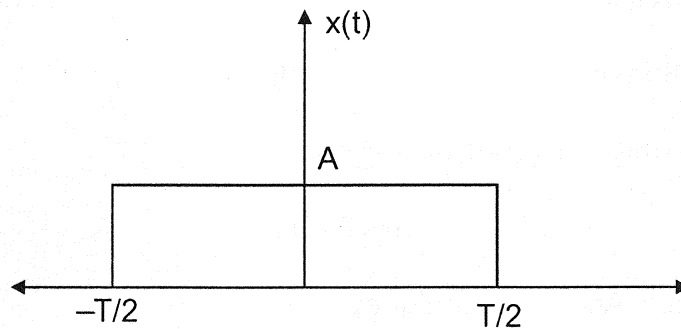
Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answersheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Solve **any two** subquestions from each unit.
5. Draw neat diagram wherever necessary.
6. Assume suitable data if necessary.
7. Figure to the right indicates full marks.

UNIT - I

1. a) State the Rayleigh's Energy Theorem & Parseval's power theorem. Explain multiplication in time domain property of Fourier Transform. 10
b) What is natural sampling ? Derive the spectrum of naturally sampled signal. 10
c) Obtain the Fourier transform of rectangular pulse of duration T sec. & amplitude 'A' as shown. Draw the amplitude & phase spectrum. 10



UNIT - II

2. a) Two weak students in programming, write a program. Their chance of writing a program correctly are $\frac{1}{8}$ & $\frac{1}{12}$. Now if the probability of making a common error is $\frac{1}{10001}$ & they get the same answer, then find the probability that their program is correct. 10

- b) The probability density function (PDF) of a continuous random variable is of the form.

$$f_x(x) = \frac{1}{2} e^{-|x|} \text{ for } -\infty < x < \infty.$$

Determine the mean of the random variable.

10

- c) Explain the following processes :

10

- i) Ensemble Averages
- ii) Ergodic Process.
- iii) Gaussian Process.

UNIT - III

3. a) In a binary PCM system, the output signal to quantizing noise ratio is to be held to a minimum value of 40dB. Determine the number of required levels, & find the corresponding output signal to quantizing noise ratio.

10

- b) List various encoding methods (Digital Formats) used in digital signal transmission with appropriate wave patterns. (any five patterns)

10

- c) Draw & explain early & late synchronization.

10

UNIT - IV

4. a) Explain QPSK transmitter & receiver block schematic with neat waveforms.

10

- b) Derive equation of error probability of BFSK.

10

- c) Explain Transmitter & receiver of QAM.

10

UNIT - V

5. a) Explain Multiple Access Techniques.

10

- b) Explain Direct sequence spread spectrum modulation technique.

10

- c) Explain frequency hopping techniques.

10
