



- Q. 4 a)** Define Laplace Transform of: (07)
- i)  $x(t) = e^{-at} u(t)$                       ii)  $x(t) = e^{-at} u(-t)$
- b)** State and explain Time scaling and Time shifting property at Fourier Transform. (06)

**SECTION - II**

- Q. 5 a)** State and explain sampling theorem. (05)
- b)** Define PDF and explain its properties. (05)
- c)** Explain Gaussian probability model. (04)
- Q. 6 a)** An analog signal is expressed by the equation (07)
- $$x(t) = 3 \cos 50\pi t + 10 \sin 300\pi t - \cos 100\pi t.$$
- Calculate the Nyquist rate for this signal.
- b)** With neat waveforms explain the effect of undersampling. (06)
- Q. 7 a)** The probability density function (PDF) of a random variable  $x$  is given as: (07)
- $$f_x(x) = k(1 - x^2) \quad 0 \leq x \leq 1$$
- $$= 0 \quad \text{elsewhere}$$
- Obtain PDF.
- b)** Two dice are thrown simultaneously. Find the probability of getting a number 5 and 7. (06)
- Q. 8 a)** The random variable  $x$  have uniform distribution as: (07)
- $$f_x(x) = \frac{1}{2\pi} \quad 0 \leq x \leq 2\pi$$
- $$= 0 \quad \text{otherwise}$$
- Calculate mean and variance.
- b)** Briefly explain the following: (06)
- i) Binomial distribution
- ii) Poisons distribution

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