



M 22535

Reg. No. : .....

Name : .....

**V Semester B.Tech. (Including Part Time) Degree  
(Regular/Supplementary/Improvement) Examination, November 2012  
(2007 Admn. Onwards)**

**PT2K6/2K6CE/ME/EE/EC/CS/IT/AEI 501 : ENGINEERING MATHEMATICS – IV**

Time: 3 Hours

Max. Marks : 100

**PART – A**

**All questions carry 5 marks each :**

- I. a) A die is tossed thrice. A success is getting 1 or 6 on a toss. Find the mean and the variance of number of success.
- b) Find the mean and variance of uniform distribution.
- c) Define :
  - i) Null hypothesis
  - ii) Alternator-hypothesis
  - iii) Critical region.
- d) A coin was tossed 400 times and returned heels to 216 times. Test the hypothesis that the coin is unbiased.
- e) Show that  $\int J_3(x)dx = -J_2(x) - \frac{2}{x} J_2(x)$ .
- f) Show that  $P_n(1) = 1$ .
- g) Find the Fourier transform of  $f(t) = \begin{cases} 1, & 0 \leq t \leq 1 \\ 0, & \text{otherwise} \end{cases}$ .
- h) Define :
  - i) Definite
  - ii) Semi definite and
  - iii) Indefinite quadrature forms.

**(8×5=40)**

**PART – B**

- II. ai) In playing with an apparent of equal ability which is more probable ?
  - i) Winning 3 games out of 4, or 5 out of 8
  - ii) Winning atleast 3 games out of 4 or way atleast 5 games out of 8.

**8**

**P.T.O.**



- aii) An expert short hits a target 95% of the time. What is the probability that he will miss the target for the first time on 15<sup>th</sup> shot. 7

OR

- b) In a normal distribution 7% of the items are below 35 and 89% of the items are below 63. What are the mean and standard deviation of the distribution ? 15

- III. a) The following are measurements of the heat producing capacity of specimens of coal from two mines. 15

**Mine 1 :** 8260 8130 8350 8070 8340

**Mine 2 :** 7950 7890 7900 8140 7920 7840

Use 0.01 level of significance to test whether the difference between the means of two samples is significant.

OR

- b) A set of 5 coins is tossed 320 times and the result is as follows :

**No. of Heads :** 0      1      2      3      4      5

**Frequency :**    6      27    72    112   71    32

Test the hypothesis that all the coins are unbiased at 5% level of significance. 15

- IV. a) State and prove orthogonality of Bessel functions. 15

OR

- b) i) Prove  $J_{5/2}(x) = \sqrt{\frac{2}{\pi x}} \left( \frac{3-x^2}{x^2} \sin x - \frac{3}{x} \cos x \right)$ . 7

- ii) Prove  $J_4(x) = \left( \frac{48}{x^3} - \frac{8}{x} \right) J_1(x) + \left( 1 - \frac{24}{x^2} \right) J_0(x)$ . 8

- V. a) Deduce  $8x^2 + 7y^2 + 3z^2 - 12xy + 4xz - 8yz$  into canonical form by orthogonal transformation. 15

OR

- b) Find the Fourier transform of  $f(t) = \begin{cases} 1-t^2, & |t| < 1 \\ 0, & |t| > 1 \end{cases}$

and hence evaluate  $\int_0^{\infty} \left( \frac{x \cos x - \sin x}{x^3} \right)^2 dx$ . 15

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