S5 EC

Nov 2015

K15F 0144

Reg. No. : ....

Name : ....

V Semester B.Tech. Degree (Reg./Sup./Imp. – Including Part Time) Examination, November 2015
(2007 Admn. Onwards)
PT2K6/2K6 CE/ME/EE/EC/CS/IT/AEI 501 : ENGINEERING MATHEMATICS – IV

Time : 3 Hours | Max. Marks : 100

***Instruction** : Answer **all** questions.*

1. a) A continuous random variable X that can assume any value between $x = 2$ and $x = 5$ has a density function given by $f(x) = K(1 + x)$ find $P(X < 4)$.

   b) If the probability that a Burgler will be caught in any given job is 0.20. Find the probability that he will be caught for the first time on his 4^{th} job.

   c) A random sample of size 10 is taken from a normal population having the variance $\sigma^2 = 42.5$. Find approximately the probability of getting a sample standard deviation between 3.14 and 8.94.

   d) If the s.d. is 10 find the sample size of the maximum error in the estimate of the population mean is not to exceed 3 with probability 0.99.

   e) Show that $J_{5/2}(x) = \sqrt{\frac{2}{\pi x}}\left(\frac{3-x^2}{x^2}\sin x - \frac{3}{x}\cos x\right)$.

   f) Express $x^3 - 5x^2 + x + 2$ in terms of legendre polynomials.

   g) Define definite, semi definite and indefinite forms of quadrature form.

   h) Find Fourier transfer of $u(t)e^{-at}$, $a > 0$. **(8×5=40)**

2. a) Solve Dessel's equation of order "n". 15

   OR

   b) Derive the generating function for Pn(X). 15

P.T.O.

3. a) Fit a Poisson distribution for the following distribution and also test the goodness of fit. **15**

x	:	0	1	2	3	4	5
f	:	142	156	69	27	5	1

OR

b) Test the normality of the following distribution using χ^2-test of goodness of fit. **15**

x	:	125	135	145	155	165	175	185	195	205
f	:	1	1	14	22	25	19	13	3	2

4. a) Derive Rodrigue's formula. **15**

OR

b) Show that :

i) $4\, J_n''(x) = J_{n-2}(x) - 2\, J_n(x) + J_{n+2}(x)$

ii) $\int x J_0^2(x)\, dx = \frac{1}{2} x^2 \left[J_0^2(x) + J_1^2(x) \right] + C$

where C is a constant. **15**

5. a) Find the canonical form and nature of $x^2 - 2y^2 + z^2 + 4xy - 8xz - 4yz$. **15**

OR

b) i) Find the Fourier cosine transfer of $f(x) = \dfrac{1}{1+x^2}$. **8**

ii) Find the Fourier transfer of $f(x) = \begin{cases} 1, & |x| < 1 \\ 0, & |x| \geq 1 \end{cases}$ hence evaluate $\int_0^\infty \frac{\sin x}{x} dx$. **7**
