C 40931 (Pages : 2) Name.....

Reg. No.....

FOURTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION APRIL 2013

EN 09 401 B—ENGINEERING MATHEMATICS IV

(2009 Admissions—Regular/Supplementary/Improvement)

[Common for IC, EC, EE, AI, BM, SC and IT]

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

1. If X follows the uniform distribution in $(-K, K)$ find K such that $P(X > 1) = \frac{1}{3}$.
2. Find the Z-transform of n^2.
3. Show $P_n(1) = 1$.
4. Solve $\sqrt{p} + \sqrt{q} = 1$.
5. Solve $(pq - p - q)(z - px - 9y) = pq$.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

1. The probability that a bomb dropped from a plane will strike the target is 0.2. If 6 bombs are dropped find the probability that (a) exactly two will strike the target. (b) at least two will strike the target. (c) atmost two will strike the target.
2. The probability of hitting an aircraft is 0.001 for each shot. How many shots should be fired so that the probability of hitting with two or more shots is above 0.95 ?
3. Solve $u_{k+1} + u_k = 1$ if $u_0 = 0$ using Z-transforms.
4. Prove that $\frac{d}{dx}\left(x^{-n} J_n(x)\right) = -x^{-n} J_{n+1}(x)$.

Turn over

5. Solve $z^2\left(p^2+q^2+1\right)=a^2$.

6. Solve $\left(x^2-y^2-z^2\right)p+2xyq=2xz$.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*

1. At an examination 10% of the students got less than 30 marks and 97% got less than 62 marks. Assuming normal distribution, find μ and σ. Find the percentage of students who got marks between 40 and 70.

Or

2. Define the following distributions : (a) Geometric distribution. (b) Hyper geometric distribution. (c) Gamma distribution and (d) Uniform distribution.

3. Find the inverse z-transform of $\frac{z^2+3}{(z-1)\left(z^2+1\right)}$ by Residue method.

Or

4. Find the inverse z-transform of $\frac{10z}{z^2-3z+2}$ by long division method.

5. Prove that $\left(1-2xz+z^2\right)^{-1/2}=\sum_{n=0}^{\infty}P_n(x)z^n$.

Or

6. Prove that $J_{-n}(x)=(-1)^n J_n(x)$.

7. Derive the one dimensional heat equation.

Or

8. Obtain the D'Alembert's solution of the one dimensional wave equation.

(4 × 10 = 40 marks)