Code No.: 3305

FACULTY OF ENGINEERING

B.E. II/IV Year (IT) II Semester (Main) Examination, May/June, 2011

PROBABILITY & RANDOM PROCESS

Time : 3 *Hours*] [*Max. Marks* : 75

Answer **all** *questions from Part A.*

Answer any **five** *questions from Part B.*

Part A – (Marks : 25)

1. If A and B are independent events prove that P ($A^c \cap B$) is also independent.L 3
2. A number is choosen at random from 200 numbers. Find the probability it is devisible by 4 or 6. 3
3. Define characteristice function and explain briefly. 3
4. State and prove addition Theorem for random vairieties. 3
5. Derive the characterstic function for 2
   $f(x) = k \left\{ \begin{matrix} a < x < b \\ a < b \end{matrix} \right\}$
6. Define probability function. 2
7. State Ergodicity and Stationarity. 3
8. State the Bivaiate Gaussion process. 2
9. Define White Noise. 2
10. State the properties of Co–variance function. 2

Part B – (Marks : 50)

11. (a) State and prove Baye's Theorem. 4

    (b) Player A speaks fruit 4 out of 7 times. A card is drawn from a pack of 52 cards, he reports that there is a club. Find if it was a club. 6

12. Given the r.v.x with density function f (x) = 2x 0<x<1 find the p.d.f. of $Y = 8x^3$ 4

    (b) Find mean and variance of the r.v. for p.d.f.

    $f(x) = \Phi\, e^{-\Phi x}\ \Phi > 0 : x \geq 0.$

13. (a) Find the density function f (x) corresponding to the characteristic function defined as : 5

    $\Phi(t) = 1 - 1t1 \qquad 1t1 \leq 1$

    $\qquad 0 \qquad\qquad 1t1 > 1$

    (b) State the properties of power spectral density function. 5

14. If $x(t) = 5\cos(10t + \Phi)$ and $Y(t) = 20\sin(10t + \Phi)$ where Φ is a r.v. Uniformly distributed in $(0, 2\pi)$, prove that the processes x (t) and y (t) are jointly wide-stationary process. 10

15. (a) State the properties of cross correlation function. 4

(b) Find the power spectral density of a WSS process with auto correlation function $R(T) = e^{-\alpha\tau^2}$ 6

16. The joint probability function is given by

x/y	1	2	3	4	5	6
0	0	0	1/32	2/32	2/32	3/32
1	1/16	1/16	1/8	1/8	1/8	1/8
2	1/32	1/32	1/64	1/64	0	2/64

find (i) $p(x \leq 1)$ (ii) $p(x \leq 1), y \leq 3$. (iii) $p(x \leq 1 / y \leq 3$

(iv) $p(x+y \leq 4)$, (v) $p(y \leq 3 / x \leq 1)$

17. X (t) is the input voltage to a circuit and y (t) is the output voltage. If x(t) is a stationary random process with $M_x = 0$; $R_{xx}(\tau) = e^{-2|T|}$ and Transfer function $H(w) = \frac{1}{w+2i}$ find $R_{yy}(\tau)$. 10