

18/6/2011

TE EXTC VT (old)  
Probability & Random  
Processes

PE-Exam-May-11-137

Con. 3080-11.

(OLD COURSE)

(3 Hours)

RK-2430

[Total Marks : 100

- N.B. :** (1) Question No. 1 is compulsory.  
 (2) Solve any four questions out of remaining six questions.  
 (3) Figures in brackets on the right side indicate full marks.

1. A) State the three axioms of probability. (06)  
 B) If A and B are two independent events then prove that (03)  
 $P(A \cap \bar{B}) = P(A)P(\bar{B})$ .  
 C) State and explain Bayes Theorem. (05)  
 D) Suppose five cards to be drawn at random from a standard deck of cards. If all the drawn cards are red, what is the probability that all of them are hearts? (06)
2. A) Define discrete and continuous random variables by giving examples. Discuss the properties of distribution function. (08)  
 B) A random variable has the following exponential probability density function:  $f(x) = Ke^{-x}$ . Determine the value of K and the corresponding distribution function. (12)
3. The joint probability density function of two random variables is given by  $f_{x,y}(x,y) = 15e^{-3x-3y}; x \geq 0, y \geq 0$  (20)  
 i) Find the probability that  $x < 2$  and  $y > 0.2$ .  
 ii) Find the marginal densities of x and y.  
 iii) Are x and y independent?  
 iv) Find  $E(x/y)$  and  $E(y/x)$ .
4. A) Define information content and entropy. (04)  
 B) Write short notes on the following special distributions. (09)  
 i) Binomial distribution ii) uniform distribution  
 iii) Gaussian distribution.  
 C) Discuss the properties of cross correlation function. (07)
5. A) Suppose X and Y are two random variables. Define covariance and correlation of X and Y. When do we say that X and Y are (i) Orthogonal, (ii) Independent, and (iii) Uncorrelated? Are uncorrelated variables independent? (10)  
 B) What is a Random Process? State four classes of random processes giving one example each. (10)
6. A) Explain power spectral density function. State its important properties and prove any one of the property. (10)  
 B) Prove that if input to LTI system is w.s.s. then the output is also w.s.s. (10)
7. A) Write short notes on maximum likelihood parameter estimation and mean square error estimation. (10)  
 B) A stationary process is given by  $X(t) = 10 \cos [100t + \theta]$  where  $\theta$  is a random variable with uniform probability distribution in the interval  $[-\pi, \pi]$ . Show that it is a wide sense stationary process. (10)

Con. 3797-11.

T. E (Electrical, ETAX, INSTRUMENTA  
EXTC, ) VI (OLD)Industrial Economics & Management  
RK-2319

(OLD COURSE)

(3 Hours)

[Total Marks : 100]

- N.B. : (1) Question No. 1 is **compulsory**.  
(2) Solve any **four** out of remaining **six** questions.

- |    |                         |   |    |
|----|-------------------------|---|----|
| 1. | (a)                     | Explain law of demand. What are the assumptions and exceptions to the law of demand ?                           | 5  |
|    | (b)                     | What are the sources of public revenue ?  | 5  |
|    | (c)                     | What is devaluation ?   | 5  |
|    | (d)                     | What do you understand by flat organisation ?   | 5  |
| 2. | (a)                     | Explain Maslow's theory of motivation.  | 10 |
|    | (b)                     | Differentiate between centralisation and decentralisation.  | 10 |
| 3. | (a)                     | Explain the features of New Economic Policy.  | 10 |
|    | (b)                     | What are the functions of a commercial bank ?   | 10 |
| 4. | (a)                     | What is a communication process ? What are the barriers to effective communication ?                            | 10 |
|    | (b)                     | Explain decision making process.  | 10 |
| 5. | (a)                     | What is black money ? What are the consequences of black money ? How can black money removed from our country ? | 10 |
|    | (b)                     | What are the causes of under development ?  | 10 |
| 6. | (a)                     | Explain CPM and PERT  | 10 |
|    | (b)                     | What is marketing research ?  | 10 |
| 7. | Write short notes on :- |   |    |
|    | (a)                     | Break-even analysis   | 5  |
|    | (b)                     | Delegation of Authority   | 5  |
|    | (c)                     | Inflation   | 5  |
|    | (d)                     | Balance of payment.   | 5  |

Con. 3494-11.

(OLD COURSE)

RK-2427

(3 Hours)

[ Total Marks : 100

**N.B.** (1) Question No. 1 is compulsory.(2) Solve any **four** questions from remaining question nos. 2 to 7.(3) Draw **suitable** diagrams wherever **necessary**.

1. (a) Discuss the factors which determine the number of scanning lines in a TV system. 5  
(b) Discuss the relative merits of magnetic deflection over electrostatic deflection. 5  
(c) Explain, how compatibility between colour and monochrome TV system is achieved. 5  
(d) Describe the new TV standard adopted for HDTV service. 5
2. (a) What do you understand by Kell factor ? How has its value been estimated ? Explain how does it affect resolution. 10  
(b) Draw and explain functional blocks of a monochrome TV camera. 10
3. (a) Draw block diagram of an NTSC colour TV transmitter and describe each block. 10  
(b) Explain the working of precision-in-line picture tube. Discuss its merits over delta gun picture tube. 10
4. (a) Explain block diagram of a digital TV receiver. 7  
(b) What do you understand by I and Q signals ? Indicate their weighting factors and Bandwidth. 7  
(c) Explain the working of Plumbicon camera tube. 6
5. (a) Explain the Basic elements of a Facsimile system. 7  
(b) Discuss automatic correction of colour errors in PAL receivers. 7  
(c) What do you understand by persistence of vision and flicker ? How flicker is removed in TV ? 6
6. (a) Discuss the steps for trouble shooting in a TV receiver. 10  
(b) Discuss and explain AFC in TV system. 10
7. Write short notes on :—
  - (a) Deguassing 7
  - (b) Interleaving colour signals 7
  - (c) Merits of digital TV receiver. 6

Con. 3959-11.

(OLD COURSE)

RK-2433

(3 Hours)

[ Total Marks : 100

- N. B. :** (1) Question No. 1 is **compulsory**.  
(2) Attempt any **four** questions from Qestion Nos. 2 to Q. No. 7.  
(3) Support your answers with **neat** sketches wherever **necessary**.  
(4) Assume **suitable** data, if **required**.  
(5) **All** questions carries **equal** marks.

1. Answer the following :— 20
- (a) What are data aquisition systems ?
  - (b) Write about "Neural Network", basic concepts.
  - (c) State and explain the working of LVDT.
  - (d) Explain 'Successive Approximation' type ADC.
2. (a) Explain, any two configuration of a multichannel data aquisition system with 20  
example.  
(b) Explain the construction, working and application of strain guage.
3. (a) What is Ladder Diagram ? Draw a Ladder diagram for a simple application and 20  
explain its working.  
(b) What is fuzzy control ? Describe the elements of fuzzy logic. State the advantages  
of fuzzy controller.
4. (a) Explain working of a PID controller. State its field of application. 20  
(b) Describe different types of capacitive transducers.
5. (a) What is PLC ? Draw its block diagram and explain in details, the different modules. 20  
(b) Derive, 'guage factor', expression. How strain guage is used for measurement  
of Pressure ?
6. (a) Describe in details 'computer based data aquisition systems'. 20  
(b) Describe supervisory control in detail.
7. Write short notes on (any two) :— 20
- (a) Data Logger
  - (b) ISA Logic Symbols
  - (c) Tunning of PID Controller
  - (d) Classification of Transducers.
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31/5/2011

T.E. EXTC VI (Old)  
Antenna & Wave Propagation

Con. 3371-11.

(OLD COURSE)

RK-2424

(3 Hours)

[Total Marks : 100

- N.B. : (1) Question No. 1 is compulsory.  
(2) Answer any four from remaining six questions.  
(3) Assumption made should be clearly stated.  
(4) Figures to the right indicates marks.

1. Answer any four — 20
- (a) Explain the term 'effective area', 'effective height', 'power gain' & 'radiation resistance' as applied to antenna.
  - (b) Calculate the gain of an antenna with circular aperture of diameter 3m at a frequency of 5GHz.
  - (c) Define 'skip distance'. Determine critical frequency for reflection at vertical incidence, if the maximum value of electron density is  $1.86 \times 10^6$  percc.
  - (d) What are the advantages, disadvantages and application of microstrip antenna ?
  - (e) Explain the term near field and far field related to antenna.
2. (a) Compare endfire and broad side array in detail. 10  
(b) Explain the formation of inversion layer in the phenomenon of duct propagation . 10  
What is the frequency range for duct propagation ?
3. (a) What is 'Yagi Uda' antenna ? Explain the term driven element, reflector and director in detail. 10  
(b) What is small loop antenna ? Compare for fields of small loop and short 10  
dipole. Draw field pattern of small loop antenna.
4. (a) Explain the structure of microstrip antenna. Discuss its feed mechanisms 10  
and applications.  
(b) Explain helical antenna. List its advantages and disadvantages. Mention 10  
its applications.
5. (a) Explain principle of pattern multiplication with suitable example. 10  
(b) Explain in detail the working of folded dipole and its advantages. 10
6. (a) Derive Friis transmission formula. A radio link has a 15w transmitter connected 10  
to an antenna of  $0.1\text{m}^2$  effective aperture at 5GHz. The receiving antenna  
has an effective aperture of  $0.5\text{m}^2$  and is located at 15km line of sight distance  
of the transmitting antenna. Assuming lossless matched antennas, find the  
power delivered to the receiver.  
(b) Explain log periodic antenna in detail. 10
7. Write short notes on :— 20
- (a) Retarded vector potential
  - (b) Ground interference effect
  - (c) Parabolic reflector antenna
  - (d) Ionospheric propagation.
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**N.B.:** (1) Question NO.1 is compulsory.

(2) Answer any four out of remaining six questions.

(3) Assume suitable data, wherever required with justification.

1. A Chemical process is required to be controlled using a microcontroller based 20 system with following requirements :-

The chemical process is to be carried out four steps one after another in a sequence.

(a) It involves mixing of liquid raw material by means of stirrer (driven by a Stepper motor) for 15 seconds. .

(b) It involves heating of the above material at the temperature of 50°C for 90 seconds.

(c) It involves heating of the above material at temperature of 30°C for 30 seconds.

(d) It involves cooling of above material to a room temperature for 90 seconds.

For heating, a heater with feedback system with a temperature sensor, A/D convertor, relay to switch ON/OFF the heater to maintain a temperature.

Draw and explain a complete schematic diagram using 8051/8751.

Write a program for above control system.

2. (a) Draw and explain the Serial communication of 8051. 10

(b) Draw and explain the interfacing circuit to interface a matrix keyboard and a seven segment display. 10

3. (a) Explain the following instructions of 8051 :- 10

(i) MOVX A, @ DPTR

(ii) MOVC A, @ DPTR

(iii) SWAP

(iv) CJNE @ Rp, #n, radd

(v) DJNZ Rn, radd

(b) Write a program to generate square wave of 1 KHz using 8051 Timer. Assume 10 system frequency of 6 MHz.

4. (a) Draw and explain the Analog to digital and PWM section of 80196. 10

(b) Explain how to interface an external ROM and an external RAM with 80196. 10

5. (a) What are Semaphores? Discuss the problems that may arise while using them. 10

(b) Explain the various types of embedded system architectures and compare them. 10

6. (a) Explain the following data transfer instructions of 80196. 10

(b) Draw and explain the port structure of all the ports of 8051. 10

7. Write notes on any four of the following :- 20

(a) Timer and counters in 8051

(b) Important features of RTOS

(c) Context switching

(d) Pre-emptive and Non-Pre-emptive multitasking

(e) Power down and idle mode of 80196