T.E. (EXTC)
V C.B.G.S.
AC
29105/15

QP Code : 3385

(3 Hours) **[Total Marks : 80**

N. B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **three** questions out of remaining **five** questions.
(3) Assume suitable data if necessary.

1. Answer the following **(any four)** :– **20**
   (a) Classify and explain the various types of noises affecting communicaiton.
   (b) Differentiate between narrowband and wideband FM.
   (c) In AM why IF is selected 455 KHz?
   (d) What is aliasing? How it can be prevented?
   (e) Why AGC is required in radio receivers? Explain diode detector circuit with simple AGC.

2. (a) The antenna current of AM brodcast transmitter modulated to depth of modulation index 40% by an audio wae is 11A. It increase to 12A as a result of simultaneous modulation by another audio sine wave. What is modulation index due to this second wave? **5**
   (b) Compare FM and PM. **5**
   (c) Explain with neat block diagram the phase shift method for suppression of unwated sideband. **10**

3. (a) State and Prove sampling theroem for low pass band limited signals. **10**
   (b) Explain the principle and generation of indirect method of FM generation. **10**

4. (a) What are the drawbacks of delta modulation? Explain with neat block diagram working of Adaptive delta modulator. **5**
   (b) Explain how PPM is generated from PWM? **5**
   (c) Explain VSB transmission. **10**

5. (a) Explain the operation of Foster seely discriminator with the help of circuit diagram and phasor diagram. **10**
   (b) Draw a neat block diagram of super heterodyne radio receiver and explain function of each block with waveforms. **10**

6. Write short notes on (any **four**) :– **20**
   (a) Independent sideband system
   (b) FM noise triangle
   (c) μ-law and A-law companding
   (d) Double spotting
   (e) TDM and FDM

T.E: (V) (CBUS) (EXTC) 19/5/15

Microcontrollers & applications.

QP Code : 3378

(3 Hours) [Total Marks : 80

NB:

1) **Question No. 1 is compulsory.**
2) **Out of remaining questions, attempt any three questions.**
3) **In all four questions to be attempted.**
4) **All questions carry equal marks.**
5) **Answer to each new question to be started on a fresh page.**
6) **Figures in brackets on the right hand side indicate full marks.**
7) **Assume suitable data if necessary.**

Q1. A) Explain Special Function Registers (SFRs) of 8051. (5 Marks)
B) Explain features of ARM-7 microcontroller. (5 Marks)
C) Explain 8051 assembler directives. (5 Marks)
D) Explain Digital Camera as an embedded system application. (5 Marks)

Q2. A) For an 8051 system of 11.059MHz. Find how long it takes to execute each of the following instructions. (10 Marks)
a) MOV R3, #55 b) DJNZ R2, Target c) L JMP d)SJMP e) MUL AB

B) Design a microcontroller system using 8051 microcontroller, 4 Kbytes of ROM and 8 Kbytes of RAM. Interface the external memory such that the starting address of ROM IS 1000H and RAM is C000H. (10 Marks)

Q3. A) Draw and explain data flow model of ARM-7 (10 Marks)

B) Explain addressing modes of ARM-7 (10 Marks)

Q4. A) Explain IR communication system with basic transmitter setup. (10 Marks)
Write a program segment to vary speed of a DC motor using the remote transmitter keypad.

B) Write a program for a square wave is being generated at pin P1.2. This square wave is to be sent to a receiver connected in serial form to this 8051. (10 Marks)

Q5. A) What is stack? How stacks are accessed in 8051? Explain operations of PUSH and POP instructions with example. (10 Marks)

B) Write a program to blink all LEDs connected to port P1 at a slow rate so that the blinking is clearly seen. Assume a frequency of 22 MHz and that the system is using the 89C51. Use a crystal of frequency 22 MHz (10 Marks)

Q6. Write short notes on following (20 Marks)
A) Design metrics of embedded systems
B) PCON and SCON registers of 8051

T.E (EXTC) sem V CBGS R.S.A. 13/05/15

Q.P. Code : **3374**

(3 Hours) [Total Marks : 80

N.B.:
1) Question Number 1 is Compulsory
2) Attempt any Three questions from the remaining Five questions
3) Assumptions made should be clearly stated.
4) Use of normal table is permitted

1 **Answer the following** 20

a) **State and prove Bayes' s theorem.**

b) **A certain test for a particular cancer is known to be 95% accurate. A person submits to the test and the results are positive. Suppose that the person comes from a population of 100,000 where 2000 people suffer from that disease. What can we conclude about the probability that the person under test has that particular cancer?**

c) **Let X and Y be independent, uniform r.v.'s in (-1, 1). Compute the pdf of $V = (X + Y)^2$.**

d) **If the spectral density of a WSS process is given by**

$$S(w) = b(a-|w|)/a, \quad |w| \le a$$
$$= 0 \quad , \quad |w| > a$$

Find the autocorrelation function of the process.

2a) **State and prove Chapman-Kolmogorov equation.** 10

b) **The joint density function of two continuous r.v.'s X and Y is** 10

$$f(x, y) = cxy \quad 0 < x < 4, \ 1 < y < 5$$
$$= 0 \quad \text{otherwise.}$$

i) **Find the value of constant c.**
ii) **Find $P(X \ge 3, Y \le 2)$**
iii) **Find marginal distribution function of X.**

3a) **Explain strong law of large numbers and weak law of large numbers.** 05

b) **Explain the central limit theorem.** 05

c) **A distribution with unknown mean μ has variance equal to 1.5. Use central limit theorem to find how large a sample should be taken from the distribution in order that the probability will be at least 0.95 that the sample mean will be within 0.5 of the population mean.** 10

[TURN OVER

4a) Given a r.v. Y with characteristic function 10

$\Phi(w) = E\{e^{jwY}\}$

and a random process defined by $X(t) = \cos(\lambda t + Y)$, show that $X(t)$ is stationary in wide sense if

$\Phi(1) = \Phi(2) = 0$.

b) Define an ergodic process. Determine whether the stochastic process 10

$X(t) = A\sin(t) + B\cos(t)$ is ergodic. Here A & B are normally distributed independent r.v.'s with zero mean and equal standard deviation.

5a) The joint probability function of two discrete r.v.'s X and Y is given by $f(x, y) = c(2x + y)$, where x and y can assume all integers such that $0 \le x \le 2$, $0 \le y \le 3$ and $f(x, y) = 0$ otherwise. Find $E(X)$, $E(Y)$, $E(XY)$, $E(X^2)$, $E(Y^2)$, var(X), var(Y), cov(X, Y), and ρ. 10

b) State and explain various properties of autocorrelation function and power spectral density function. 10

6a) The transition probability matrix of Markov Chain is 10

	1	2	3
1	0.5	0.4	0.1
2	0.3	0.4	0.3
3	0.2	0.3	0.5

Find the limiting probabilities.

b) Write notes on any two of the following: 10

i) Markov chains

ii) Little's formula

iv)LTI systems with stochastic input

v) M/G/1 queuing system

T.E. Sem V (CBGS) (EXTC)
IC

4/6/15

Q.P. Code : 3387

(3 Hours) **[Total Marks :100**

N.B. : (1) Question **No. 1** is **compulsory**.
(2) Solve any **Three** out of remaining questions.
(3) Assume **suitable** data if required.

1. Solve the following: **20**
   (a) Design a circuit to keep LED 'ON' for 30 seconds once circuit is triggered.
   (b) What is CMRR for op-amp and how to measure it practically?
   (c) Explain first order active filter circuit.
   (d) Design a 0.5A current source using IC7805. Assume RL =10Ω.
   (e) Explain 7490 Decade counter.

2. (a) Design triangular waveform generator for frequency for 5 kHz and Vopp=6V using op-amp. **10**
   (b) Explain IC 741 based RC phase shift oscillator with proper waveforms. Design RC phase shift oscillator to produce sinusoidal frequency output of 5 kHz. **10**

3. (a) Design a high pass second order filter for the cut off frequency of 1 kHz and passband gain AF=2. **10**
   (b) Write the advantages of precision rectifier. Explain half wave precision rectifier along with neat waveforms. **10**

4. (a) Design a voltage regulator using IC 723 to give V0=5V and output current of 2A. **10**
   (b) Draw instrumentation amplifier using opamp and hence derive equation for output voltage. **6**
   (c) Explain zero crossing detector with neat diagram. **4**

5. (a) Draw and explain the functional diagram of IC 555 and explain its operation in astable mode. **10**
   (b) With the help of a neat circuit diagram explain the working of 74163 synchronous 4-bit binary counter. **10**
   Also illustrate the cascading connections for 74163 based counters.

6. Write short note on the following: **20**
   (a) 74181 Arithmetic Logic Unit.
   (b) Current foldback protection.
   (c) Any two applications of PLL 565.
   (d) Voltage to frequency converter.

T. E- Sem VI CBGS

EXTC 25/05/15

RFMA

Q.P. Code : 3380

(3 Hours) **[Total Marks : 80**

N.B. : (1) Question **No. 1** is **compulsory**.
(2) Solve any **Three** questions from the remaining.
(3) Assume suitable data wherer even necessary justify the assumption.
(4) Draw suitable diagrams wherever neede.

1. (a) Discuss principle of pattern multiplication with example. **5**
(b) Show that the directivity of an isotroptic antenna is unity. At what distance from 50 cycle circuit is radiation field approximately equal to induction field. **5**
(c) Draw electric equivalent for high frequency resistor, inductor and capacitor. **5**
(d) Explain the working principle of folded dipole antenna. What are advantages and applications. **5**

2. (a) Derive radiation resistance of infinitesimal dipole. Explain its significance. **10**
(b) Why Yagi Uda antenna is called parastic array. Why radiation pattern of this array is unidirectional. **10**

3. (a) Define image impedance. Design a composite high pass filter by image parameter method with following specifications. **5**
Cut off frequency : 50 MHz.
Infinite attenuation : 48 MHz.
Pole
Characterstic impedance $R_0 = 75\ \Omega$
(b) When is a dipole called Hertzian dipole. Explain how the radiation pattern of folded dipole can be modified with addition of directors & reflectors. **5**
(c) Explain radiation mechanism, by showing that a parallel wire can act as source of radiation. Calculate radiation resistance of $\frac{\lambda}{10}$ dipole in free space. **5**

4. (a) Derive Friss transmission formula. State its significance in wireless communication. What is maximum power received at a distance of 0.5 Km over free space for 1GHz frequency. The system consists of transmitting antenna with 2.5dB gain and receiving antenna with 20dB gain & antenna is fed with 150 W power. **10**
(b) Derive array factor of N-element linear array, wherr all elements are equally fed and spaced. Also find the expression for the position of principle maxima, nulls & secondary maxima. **10**

5. (a) Design a low pass filter with cut off frequency of 200MHz and attenuation of 50dB at 250 MHz. The flatness of filter response is not a design consideration. Choose the filter implementation that requires least number of components. **10**

   (b) What are binomial arrays. Give their significance. **10**

6. (a) Explain important features of loop antenna. Discuss use of loop antenna in radio direction finding. **8**

   (b) Draw & explain log periodic antenna. Why is it called so. Discuss advantages. **6**

   (c) Explain horn antenna with reference to its working, antenna field & applications. **6**
