TC / V / CBSGS / MCA / M-18

Q.P. Code :37934

[Time: Three Hours] [Marks:80]

Please check whether you have got the right question paper.

N.B: 1. Question.No.1 is compulsory.
2. Attempt any Three questions from remaining.

Q1	a)	Explain Program Status word Register of 8051 Microcontroller	04
	b)	Explain Current Program Status Register of ARM7.	04
	c)	Explain Assembler Directives in 8051 microcontroller	04
	d)	Explain Features of ARM7	04
	e)	Explain concept of Cortex-A, the Cortex-R and the Cortex-M.	04
Q2	a)	Explain the Memory Interfacing of 8051 with 8K*8 Data ROM & 8K*8 PROM	10
	b)	Draw & Explain data flow model of ARM7	10
Q3	a)	Interface ADC 0808 with 8051 microcontroller. write Assembly language Program to convert analog signal which is available on channel no 6	10
	b)	Write a program for 8051 microcontroller to generate square waveform of 2kHz & 50% duty cycle at pin P1.5. Assume 8051 is operating at frequency 11.059 MHz	10
Q4	a)	Explain 8051 Timer operating modes	10
	b)	Explain ARM interrupts along with Interrupt Vector Table.	10
Q5	a)	Explain Addressing modes of ARM7 Processor with example in each.	10
	b)	Discuss Digital camera as an Embedded System.	10
Q6		Write short notes on (Any Two)	
		1. Internal Structure of PORT 1	10
		2. SCON in 8051	10
		3. Interrupts in 8051	10

M-V (CBSGS) / EXTC / Random Signal Analysis / M-18

Q. P. Code: 32504

Duration- 3 Hours **Total Marks: 80**

Note:
1. **Question No. 1 is compulsory.**
2. **Out of remaining questions, attempt any three questions.**
3. **Assume suitable additional data if required.**
4. **Figures in brackets on the right hand side indicate full marks.**

Q.1 (A) A bag contains 7 red and 3 black balls and another bag contains 4 red and 5 black balls. One ball is transferred from the first bag to the second bag and then a ball is drawn from the second bag. If this ball happens to be red, find the probability that a black ball was transferred. **(05)**

(B) Check whether the Random Process given by x(t)=A sin (t) + B cos (t) is ergodic, where A, B are Random Variables normally distributed with zero means and unit variances. **(05)**

(C) Write a short note on " Markov Chain." **(05)**

(D) Find 'P' of Binomial Distribution if n=6 and 9 P(X=4)=P(X=2). **(05)**

Q.2 (A) The Power Spectral Density of a WSS Process is given by, **(10)**

$$S_X(W) = \begin{cases} \frac{b}{a}(a - |w|) & |w| \le a \\ 0 & |w| \ge a \end{cases}$$ Find the Autocorrelation Function.

(B) Let X1,X2,X3,..... be sequence of Random variables. **(10)**
Define (i) Convergence almost everywhere
(ii) Convergence in probability
(iii) Convergence in distribution
(iv) Convergence in mean square sense
for the above sequence of Random variable X.

Q.3 (A) Prove that if input to an LTI system is Wide sense stationary (WSS) process then output is also WSS. **(10)**

(B) A binary communication transmitter sends data as one of two types of signal denoted by 0 or 1. Due to noise, sometimes a transmitted 1 is received as 0 and vice versa. If the probability that a transmitted 0 is correctly received as 0 is 0.9 and the probability that the 1 is received as 1 is 0.8 and if the probability of transmitting 0 is 0.45. Find the probability that 1) A 1 is received. 2) A 0 is received. 3)1 was transmitted given that 1 was received. 4) 0 was transmitted given that 0 was received. 5) The error has occurred. **(10)**

Q.4 (A) A random variable has the following exponential probability density function: $f(x) = Ke^{-|x|}$. Determine **(10)**
i) The value of K and ii) Mean and variance.

(B) The transition probability matrix of Markov Chain is given is given by , **(10)**

$$P = \begin{array}{c} \\ 1 \\ 2 \\ 3 \end{array} \begin{array}{c} \begin{array}{ccc} 1 & 2 & 3 \end{array} \\ \begin{bmatrix} 0.5 & 0.4 & 0.1 \\ 0.3 & 0.4 & 0.3 \\ 0.2 & 0.3 & 0.5 \end{bmatrix} \end{array}$$

Find the limiting probabilities.

Q.5. **(A)** The joint probability density function of two continuous random variable X and Y is given by,

$$f_{xy}(xy) = \begin{cases} Ce^{-x}e^{-y} & 0 < x < \infty \\ & 0 < y < \infty \\ 0 & \text{elsewhere} \end{cases}$$

Find 1) The value of C.

2) $f_X(X)$, $f_Y(Y)$.

3) $f_{X/Y}(X/Y)$, $f_{Y/X}(Y/X)$.

4) $E\left[Y/X = X\right]$, $E\left[X/Y = Y\right]$

(B) Write a short note on " Little's Formula".

Q.6. **(A)** State and prove Chapman-Kolmogorov equation.

(B) Write a short note on the following distributions
i) Poisson Distribution and (ii) Gaussian Distribution

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May 2018

T.E Sem V | EXTC | CBSGS

RF Modeling & Antennas

Q.P.Code: 37720

(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 wherever necessary and justify the assumption.
4. Draw suitable diagrams wherever required.

1 a Compare Binomial filter with Chebyshev filter. 5

b What is reactive near field. Explain its importance in communication and its applications. 5

c Compare Broadside and Endfire array. 5

d Find the gain of an antenna when physical aperture is 5 m^2 at 2 GHz with efficiency 70%. 5

2 a Design a composite high pass filter by the Image parameter method with the following specification. 10
R_O=75 Ω, f_c=50 Mhz, f_∞=48Mhz

2 b Design a LPF whose input and output ports are matched to 50 Ω impedance with cutoff frequency of 3 GHz, equi ripple of 0.5 dB and rejection of atleast 40 dB at approx twice the cutoff frequency. 10

3 a Derive Friss transmission formula. State its significance in wireless communication. 10
gain and receiving antenna with 17dB gain and antenna is fed with 200 W power. What is maximum power received at a distance of 0.75 Km over free space for 1 GHz frequency. The system consists of transmitting antenna with 3 dB

3 b Derive radiation resistance of small dipole. Explain its significance. 10

4 a Find the radiation pattern for an array of 4 elements fed with same amplitude and opposite phase. Find its HPBW and BWFN. 10

4 b Design a rectangular microstrip antenna with coaxial feed at 2.45 Ghz. 10

5 a Describe parabolic reflector antenna and its different feeding methods. 10

5 b Explain important features of loop antenna. Discuss use of loop antenna in radio direction finding. 10

6 Write short notes on : 20
a. RF field effect transistor
b. Binomial array
c. RF behavior of resistor and capacitor.
d. Helical antenna

T.E/Sem V/ Extc/(C13SGS) May 2018
Integrated Circuits

Q.P. Code: 23103

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

N.B: (1) Question No. 1 is compulsory.
(2) Solve any three questions from the remaining five.
(3) Figures to the right indicate full marks.
(4) Assume suitable data if necessary and mention the same in answer sheet.

Q.1 **Attempt any 4 questions:** **[20]**

(A) How does precision rectifier differ from conventional rectifier?

(B) If the input to the ideal comparator shown in the Fig. 1(B) is a sinusoidal signal of 8 volt peak to peak without any DC component, then check whether the duty cycle of the output of comparator is 33.33% or 25% or 20%. Prove it.

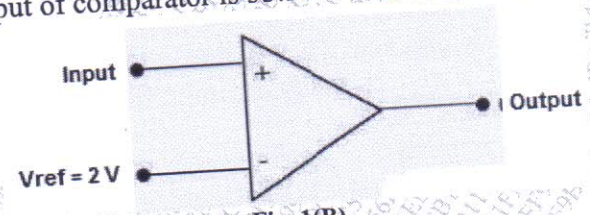


Fig. 1(B)

(C) With neat circuit diagram derive an expression for output current of a voltage to current converter with floating load.

(D) With the help of a neat circuit diagram explain any one application of PLL 565.

(E) What is CMRR? How to measure it practically?

Q.2 (A) Draw the circuit diagram of a square and triangular waveform generator using opamps and explain its working with the help of waveforms. For variation in duty cycle what is the modification needed in the circuit. **[10]**

(B) With the help of a functional block diagram explain the working of voltage regulator LM317 to give an output voltage variable from 5 V to 10 V to handle maximum load current of 500 mA. **[10]**

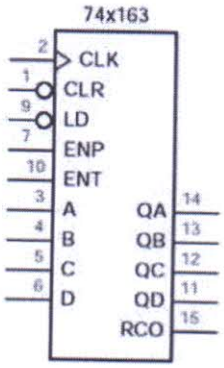
Q.3 (A) Draw a neat circuit diagram of a Wein bridge oscillator using opamp. Derive its frequency of oscillation. What are the values of R and C if its frequency of oscillation is 1 kHz? **[10]**

(B) Design a voltage regulator using IC 723 to give V_o = 3 V to 37 V and output current of 2A. **[10]**

Q.4 (A) Design a second order Butterworth high pass filter for cut off frequency of 1 kHz and pass-band gain of AF=2. **[10]**

P.T.O.

(B) Design a counter for counting a sequence 3, 4, 5, 6…12, 3... using IC M 74163. The pin terminology and functionality of IC MSI 74163 is given in F 4(B).



	Inputs				Current State				Next State			
	CLR	LD	ENT	ENP	QD	QC	QB	QA	QD+	QC+	QB+	QA
clear	0	x	x	x	x	x	x	x	0	0	0	0
load	1	0	x	x	x	x	x	x	D	C	B	A
hold	1	1	0	x	x	x	x	x	QD	QC	QB	QA
hold	1	1	x	0	x	x	x	x	QD	QC	QB	QA
	1	1	1	1	0	0	0	0	0	0	0	1
	1	1	1	1	0	0	0	1	0	0	1	0
	1	1	1	1	0	0	1	0	0	0	1	1
	1	1	1	1	0	0	1	1	0	1	0	0
	1	1	1	1	0	1	0	0	0	1	0	1

Fig. 4(B)

Q.5 (A) With the help of a neat diagram and voltage transfer characteristics explain the working of a non-inverting Schmitt trigger. Derive the expressions for its threshold levels.

(B) Draw and explain the functional block diagram of IC 555 and explain its operation in monostable mode. Draw its various waveforms.

Q.6 Write short notes on: (Attempt any two)

(A) Voltage to frequency converter.

(B) IC 74181 Arithmetic Logic Unit.

(C) Waveform generator XR 2206.