Ref V-ETRX / New

Paper / Subject Code: 32301 / Micro-controllers and Applications

T.E / ETRX / Sem V / Choice based / 9th May 2019

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

Note:-1. Q.1 is compulsory

2. Out of remaining 5 solve any 3 questions
3. Figures to the right indicate full marks

Q.1 Solve **any 4**

a. Explain following instructions of 8051 5

i) INC @R0 ii) MOVX A, @R1 iii) ACALL address iv) RRC A v) XRL direct, data

b. A switch is connected to pin P2.0 and an LED to pin P1.7 .Write a program to get status of the switch and send it to the LED. 5

c. What is Thumb2 mode of operation of Cortex M3? State its advantages. 5

d. Ten 8 bit numbers are stored in internal data memory from location 50H. Write a program to increment the data.

e. Show Interfacing of a dc motor to microcontroller. 5

Q.2 a. Explain various addressing modes of 8051 with examples 10

b. Assume that the stack pointer points to memory location 3FH and the contents of the memory location 30H, 31H and 32H are 00, 88,and FF respectively. Illustrate the stack contents after the execution of each of the following instructions. 5

PUSH 30H

PUSH 31H

PUSH 32H

c. Write an assembly language program to generate a delay of 100 msec. 5

Q.3 a. Write a program to transfer message 'NO' serially with baud rate of 9600 continuously. 10

b. Explain various timer modes for 8051 10

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Q.4 a. Explain various operating states of Cortex-M3 with thread and handler modes. 10

b. Explain interfacing of stepper motor to 8051 and write a assembly language program to rotate it in clockwise direction. 10

Q.5 a. Write an assembly language program for 8051 to display predefined message on LCD. 10

b. Explain register architecture of Cortex-M3 10

Q.6 Write short notes on **any 4** 20

a. NVIC in Cortex-M3

b. Interrupts in 8051

c. Interfacing ADC to 8051

d. Internal memory organization of 8051

e. Assembler directives in 8051

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TE | sem V | ETRx | Choice Based | 15th May 2019

Paper | Subject Code: 32302 | Digital Communication

(3 hours) Total Marks=80

NB:.
1 Question number 1 is compulsory.
2. attempt any 3 questions front the remaining five questions.
3. Assume suitable data wherever needed.

Q.1 **Attempt any four questions :** 20

a) Explain why digital communication is preferred over analog communication?

b) A rate 1/3 convolutional coder with constraint length of '3' uses the generating vectors as given : $g_1 = 100$, $g_2 = 101$, $g_3 = 111$.
Draw the encoder, state diagram and trellis diagram.

c) Represent the following bit sequence, 1011101011, using i) Unipolar RZ, ii) Unipolar NRZ, iii) Bipolar NRZ, iv) AMI RZ, v) Manchester

d) In the presence of White Gaussian noise, with a constant signal power the channel capacity reaches its upper limit with the increase in the bandwidth B. Prove that this upper limit of C is given by $C_\infty = 1.44(S/N_0)$.

e) Write a note on optimum receiver.

Q.2.a) Why MSK is called 'shaped QPSK'? explain. 10
For the bit sequence, 10110101100 ,draw the MSK waveform (let m=5)

b) A discrete memory less source generates symbols **every one millisecond** as given below: 10

S	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8
P	1 /4	1/8	1/16	1/16	1/16	1/4	1/16	1/8

Construct Shannon-Fano code. Also find the source entropy, information rate and code efficiency.

Q.3.a) What is ISI? Derive an expression for ISI and explain methods to overcome ISI. State the Nyquist's condition for zero ISI. 10

b) Show that duobinary signaling suffers from error propagation while pre-coded duobinary signaling does not. Explain with encoder and decoder block diagrams and decoding logic. 10

Q.4.a) Explain with the help of a neat block diagram, the transmitter and receiver of M-ary FSK. Also sketch the PSD of M-ary FSK. What is the bandwidth requirement of M-ary FSK? 10

b) Find the generator matrix G for a systematic (7, 4) cyclic code using generator polynomial $g(x)=1+x^2+x^3$ .Design an encoder for the code and verify its operation to determine the codeword for the message vector (1100). 10

Q.5.a) The parity check matrix H of a linear (7,4) block code is given as : 10

$$H = \begin{bmatrix} 1 & 0 & 10 & 1 & 00 \\ 1 & 0 & 11 & 0 & 10 \\ 1 & 1 & 01 & 0 & 01 \end{bmatrix}$$

Determine the code words for the messages: (i) 0011 (ii) 0100 and (iii) 0110
Also show how error is detected when 2nd bit is detected erroneously for data word 0011?

b) Compare BASK, BPSK and BFSK, based on following parameters: Bandwidth, detection method, noise immunity, transmission rate and signal space representation. 5

c) Compare OQPSK with MSK. 5

Q.6.a) Write short notes on : 10
i) optical communication system
ii) Satellite Communication System

b) Sketch the signal constellation diagram (d=2a) for 16-QAM system and Derive the expression for its Symbol energy, E_S. Prove that the noise immunity of 16-QAM is better than that of 16-PSK system. 10

E (Electronics) (Sem V) Choice Based - 21/5/19

(3 HOURS) TOTAL MARKS:80

N.B
1. Question No. 1 is compulsory.
2. Solve **any three** questions from remaining five questions.
3. Draw neat diagrams wherever necessary.
4. Assume suitable data if required.

Q 1 Answer **any four** of the following: (20)

a) Three equal point charges of 2μC are located at (0,0,0)m, (2,0,0)m and (0,2,0)m respectively in free space. Find out net force on Q4 = 5μC at (2,2,0)m.

b) Derive the wave equation for time varying Harmonic Fields in free space.

c) Compare MOM, FDM and FEM.

d) Explain Beam Width of an antenna.
An antenna has a field pattern given by $E(\theta)= \cos^2 \theta$ for $0^o \leq \theta \leq 90^o$. Find its Half Power width.

e) Define Critical Frequency and MUF. Calculate the critical frequency where the maximum value of n is 0.9 with a MUF of 10MHz.

Q 2

a) Given $V= 2x^2y-5xz$, find: V, **E** , **D** and ρ_v at P(-4,3,6)m. (10)

b) Given $\vec{E} = 1.5 \cos(10^8 t-\beta z)\, \overrightarrow{a_x}$ V/m , Obtain **B, H** and **D**. Assume $\varepsilon_r=1$ and $\mu_r=1$, $\sigma=0$ (10)

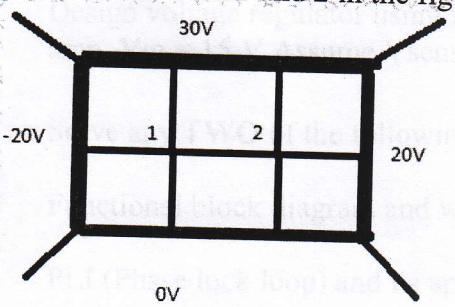
Q 3

a) Derive the boundary conditions for Electric and Magnetic fields at the boundary of two dielectric media. (10)

b) In free space, a plane wave with $\overrightarrow{H_i}= 10\cos(10^8 t-\beta z)\, \overrightarrow{a_x}$ mA/m is incident normally on a lossless medium with $\varepsilon=\varepsilon_0$, $\mu=\mu_0$ in region $z\geq 0$. Determine H_r, E_r for the reflected wave and H_t, E_t for the transmitted wave. (10)

Q 4

a) Use the Iterative finite difference method and band matrix method to calculate potential at nodes 1 and 2 in the figure shown below: (10)



b) State Poynting Theorem and derive an expression for the Poynting vector. Explain the power terms mentioned in the derivation.

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Q 5

a) An electric field strength of 10μV/m is to be measured at an observation point $\Theta=\pi/2$, 500km from a half wave dipole antenna operating in air at 50 MHz. What is the length of the dipole? If the transmission line with $Z_O=75\Omega$ is connected to the antenna, determine Γ and standing wave ratio using Smith Chart. (10)

b) A distortion less line has $Z_O = 50\ \Omega$, $\alpha = 50$ Np/m, $v = 0.6c$ where c is the speed of light in vacuum. Determine R, L, G, C and λ at 100MHz. (10)

Q 6

a) Explain the factors affecting the field strength of space wave signal. (05)

b) Explain the concept of retarded potential. (05)

c) Derive the relationship between effective area and Directivity. (05)

d) Write the generalized Maxwell's Equations in point form and integral form. (05)

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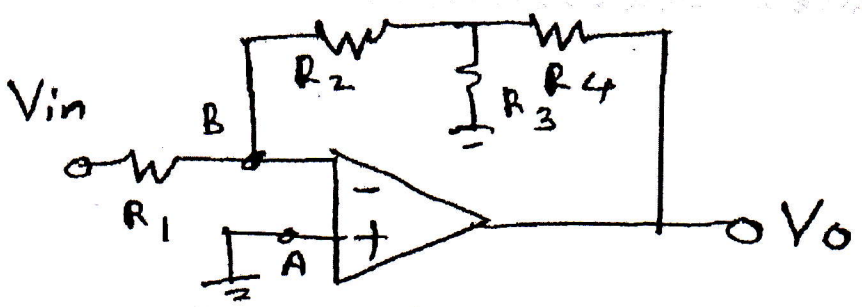
TE/SemV/ETRX/choise based/27-05-19.

Q3(A)	Draw the circuit diagram and explain the operation of precision full wave rectifier. Derive the expression of output voltage.	10
Q3(B)	Design triangular wave generator using opamp to have output voltage = 7VPP volts,frequency 2 kHZ,with supply voltage +/- 14 V.	10
Q4(A)	Draw neat circuit diagram and explain the operation of successive approximation type analog to digital converter. What are its advantages and disadvantages.	10
Q4(B)	Draw neat circuit diagram and explain the operation of monostable multivibrator using IC 555.	10
Q5(A)	Design a IC 555 based symmetrical square wave generator for 1 KHz frequency of Vcc= 5 V.Draw waveforms for voltage across timing capacitor and output.	10
Q5(B)	Design voltage regulator using IC 723 to have Io = 50mA,Isc = 75 milli amp.,Vin = 15 V.Assume Vsense = 0.6 V and Vo = 5 V.	10
	Solve any **TWO** of the following.	
Q6(A)	Functional block diagram and working of IC 723.	10
Q6(B)	PLL(Phase lock loop) and its applications.	10
Q6(C)	Wein bridge oscillator using opamp.	10

Duration: 3 Hours **Marks: 80**

Instructions:
(1) Question 1 is compulsory, solve any three from remaining questions
(2) Assume suitable data if necessary.
(3) Diagrams to be drawn neatly.

Q1(A) Determine Vo/ Vin for the circuit shown below – 05



Q1(B) Draw the circuit diagram and explain the operation of zero crossing detector. 05

Q1(C) Explain specifications of ADC. 05

Q1(D) What are active filters? State its advantages over passive filters 05

Q2(A) Draw the circuit diagram and explain the operation of differentiator. What are limitations of ideal differentiator? How they are overcome in practical circuit ,state its application areas. 10

Q2(B) Design first order low pass fitter using opamp at a cut off frequency of 1Khz ,having pass band gain of 2. 10

Paper / Subject Code: 32305 / Elective - I Data Base and Management System

TE/ ETRx / SEM-V / Choice based / 31st may 2019

(3 Hours) **Marks :80**

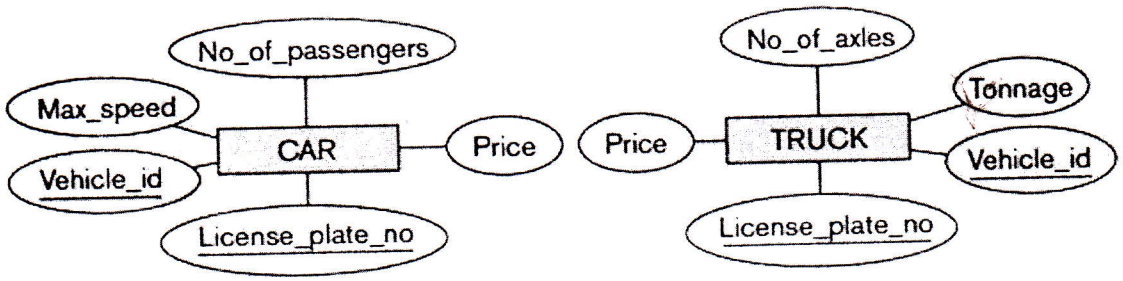
NB:

1. Question No. 1 is compulsory and solve any THREE questions from remaining questions
2. Assume suitable data if necessary
3. Draw clean and neat diagrams

Q1. Attempt any four

a. Discuss the duties of database administrator **5**

b. **5**



Generalize CAR and TRUCK into the superclass VEHICLE

c. Explain Transaction Control Commands (TCL) **5**

d. Discuss partial dependency and transitive dependency with the help of an example **5**

e. Discuss various types of transaction failures **5**

Q2. a. A database is being constructed to keep track of the teams and games of a sports league. A team has a number of players, not all of whom participate in each game. It is desired to keep track of the players participating in each game for each team, the positions they played in that game, and the result of the game. Design an ER schema diagram for this application, stating any assumptions you make. Choose your favorite team sport (e.g., baseball, curling, kabbadi, ...). Be sure your design is described in a way understandable by someone not familiar with that sport. **15**

Show clearly following things in E-R diagram

1. Mapping cardinalities
2. Weak / Strong entity (if any)
3. Relationship set
4. Primary key

b. Explain Two-tier and Three-tier architectures of database system **5**

Q3. a. Consider following relations **10**

STUDENT

Fn	Ln
Susan	Yao
Ramesh	Shah
Johnny	Kohler
Barbara	Jones
Amy	Ford
Jimmy	Wang
Ernest	Gilbert

INSTRUCTOR

Fname	Lname
John	Smith
Ricardo	Browne
Susan	Yao
Francis	Johnson
Ramesh	Shah

Write the output for the following queries

1. STUDENT ∪ INSTRUCTOR
2. INSTRUCTOR – STUDENT
3. STUDENT – INSTRUCTOR
4. STUDENT ∩ INSTRUCTOR

b Explain SQL aggregate functions with the help of an example **10**

Q4 a. Explain the need of database normalization. Discuss the steps to convert the given database in 3NF **10**

b. Explain following types of attributes with the help of an example for each type: i) single valued ii) multivalued. Define weak entity and strong entity **10**

Q5 a. Discuss ACID properties of transaction in detail **10**

b. Consider the following database:

Movies(title, year, length, genre, studioName, producer) **10**
Starsln(movieTitle, movieYear, starName)
MovieStar(name, address, gender, birthdate)
MovieExec(name, address, cert#, netWorth)
Studio(name, address, pres)

With reference tom above database write SQL queries for the following: (any FIVE)

1. Who were the male stars in Titanic?
2. Find the title of all MGM movies produced after 1970 or that run for less than 90 minutes
3. Find all the stars that appeared either in a movie made in 1980 or a movie with "Love" in the title.
4. Which movies are longer than Gone With the Wind?
5. Find all the stars who either are male or live in Miami
6. Find all executives worth at least $10,000,000.

Q6 a. What do you mean by deadlock with respect to transaction? Explain the procedure for deadlock handling **10**

b. Write short notes on EER model. **10**
