Total No. of Printed Pages:2

SUBJECT CODE NO:- E – 163
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E.(EC/ECT/IEC/E&C) Examination Nov/Dec 2017
Feedback Control System
(REVISED)

[Time: Three Hours] **[Max.Marks:80]**

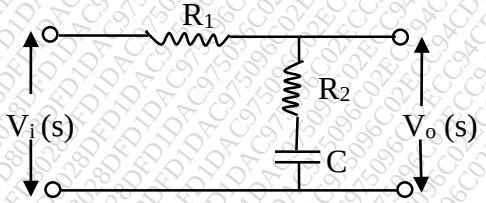
Please check whether you have got the right question paper.

N.B
1) Q. No. 1 from section A & Q. No. 6 from section B are compulsory.
2) Attempt any two questions from the remaining questions in each section A & B
3) Assume suitable data, if necessary.
4) Number indicate in right side indicate full marks.

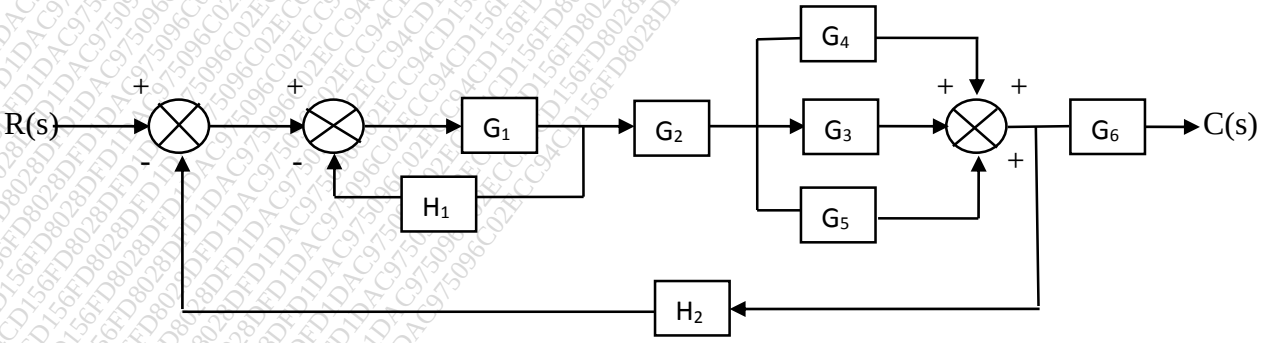
Section A

Q.1 Solve any two 10
a) Explain the pneumatic system.
b) How you define type of system.
c) Explain with Laplace transform form with graphical representation of standard test signal.
d) What is Mason's gain formula?

Q.2 a) Explain closed loop and open loop system with two examples each. 08
b) Find the transfer function of circuit. 07



Q.3 a) Find the single block equivalent by block diagram reduction for example. 08



b) What is position, velocity and acceleration error constant? For a system. $G(S)H(S) = \frac{K}{S^2(S+2)(S+3)}$. Find the value of K to limit the steady state error. 07

2017

Q.4 a) Explain transient and steady state error. 07

b) For a system $G(S).H(S) = \frac{20\,(S+2)}{S^2\,(S+1)(S+5)}$. Determine type of system and steady state error for input $1 + 3t + \frac{t^2}{2}$. 08

Q.5 Write short notes on 15

1) transfer function and its properties
2) hydraulic system
3) Synchro transmitter and receiver.

Section B

Q.6 Solve any two. 10

1) What is meant by Relative stability?
2) What is meant by observability?
3) Decide the system is stable or unstable using R – H criterion $s^4 + 2s^3 + s^2 + 4s + 2 = 0$.

Q.7 a) Explain different types of stability system. 07

b) Draw the root locus for the system $G(S).H(S) = \frac{K}{S\,(S+3)(S+6)}$. Obtain value of K when $\zeta = 0.6$ from root locus. Determine value of K for marginal stability and critical damping. 08

Q.8 a) Draw the bode plot for following and determine Gain and Phase margin. $\frac{10\,(S+10)}{S\,(S+2)(S+5)}$. 15

Q.9 a) Sketch the Nyquist diagram of the unity feedback system where $G(S) = \frac{(S+2)}{S^2}$. 08

b) Evaluate controllability and observability of the system represented in state space model 07

with. $x = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{bmatrix} x + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u$

$y = [20 \quad 9 \quad 1]x$

Q.10 Write short note on (Any three) 15

1) Fuzzy logic control system
2) PLC
3) Polar plots
4) Special cases in R –H stability criteria.

Total No. of Printed Pages:2

SUBJECT CODE NO:- E-07
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E.(EC/ECT/IE/E&C) Examination Nov/Dec 2017
Power Electronics
(REVISED)

[Time: Three Hours] **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B i) Q.1 & Q.6 are compulsory.
ii) Solve any two questions from Q.2 to Q.5 & also any two from Q.7 to Q.10.
iii) Assume suitable data, if necessary.

Section "A"

Q.1 **Solve any two.** 10
i) Integral cycle control method.
ii) Reverse Recovery characteristics of diode.
iii) Power IGBT.
iv) Dual converter

Q.2 a) Explain the V –I characteristics of DIAC. 07
b) Draw & Explain working & characteristics of UJT triggering. 08

Q.3 a) Draw & Explain 3Ø to 1Ø cycloconverter in detail. 07
b) Draw & Explain continuous & Discontinuous current mode in converters with w/F. 08

Q.4 a) A 1Ø, 230V, 1.5 kw heater is connected across 1Ø, 230V, 50Hz supply through an SCR. For firing angle decay of 40^o & 90^o. Calculate the power absorbed in the heater element. 07

b) 1Ø AC Voltage controller has R = 20Ω & i/p voltage is V_s = 230V,50Hz. The decay angle of T_1 is $\alpha = \frac{\pi}{3}$. 08
Determine.
i) RMS value of o/p voltage. V_{rms}.
ii) i/p power factor
iii) Average i/p current
iv) The average & RMS current rating.

Q.5 a) What are the performance parameter of AC to DC converter in detail. 07
b) Explain cycloconverter? Its type? State factor affecting the harmonics in cycloconverter. 08

Section "B"

Q.6 **Solve any two.** 10

i) Current Limit Control Method
ii) Boost converter
iii) SCR Time delay
iv) Flasher circuit

Q.7 a) Comparison between VSI & CSI. 08
b) Explain principle operation of frequency heating. Also merit & demerit of Induction heating. 07

Q.8 a) Explain Parameters, Features, Merit & Demerit of current commutated chopper. 08
b) Comparison between series & parallel Inverter. 07

Q.9 a) A battery driven vehicle is controlled by a voltage commutated chopper. The battery voltage is 200V & Starting current 125 A. The SCR T_{off} = 20 μ sec; Chopper frequency 200Hz. Calculate values of the commutating capacitor & Inductor. 08
b) A parallel Inverter has a dc i/p voltage of 100V & maximum commutating current is 5A. Obtain the values of commutating components. Given that minimum turn – off time of the SCR is 25μ sec. 07

Q.10 a) Draw & Explain Ring Counter with its waveform. 08
b) Explain servo controlled voltage stabilizer. 07

Total No. of Printed Pages:02

SUBJECT CODE NO: E-30
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E.(EC/ECT/E&C) Examination Nov/Dec 2017
Signal Coding & Estimation Theory
(REVISED)

[Time: Three Hours] **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B i) Q.No.1 and Q.No.6 are compulsory.
ii) Solve any two questions from each section from Q.no.2 to 5 & Q.No.7 to Q.no 10

Section A

Q.1 Write short notes on following (any two) 10

a) Mutual information and it's properties

b) Source coding Theorem (Shannon's 1st Theorem)

c) LWZ algorithm.

Q.2 a) Prove that mutual information of a channel is symmetric i.e. I (x , y) = I (y , x) 07

b) An analog signal is baud limited to 100 MHz and sampled at Nyquist rate. The samples are quantized into 4 levels. Each level represents one symbol. Probability of occurance of these 4 levels (symbols) are 08

$P(x_1) = P(x_4) = \frac{1}{8}$ *and* $P(x_2) = P(x_3) = \frac{3}{8}$

Obtain entropy of source and information rate of the source.

Q.3 a) Derive an expression for channel. Capacity of Binary symmetric channel. 07

b) State and explain channel coding theorem 08

Q.4 a) Explain Shannon fano algorithm with one example. 08

b) Determine the Huffman code for a DMS having seven symbols x_1 , x_2, x_3, x_4, x_5, x_6 , x_7 with probabilities 07

$$P(x_1) = 0.05\,,\quad P(x_2) = 0.05\,,\quad P(x_3) = 0.2\,,\quad P(x_4) = 0.1$$

$$P(x_5) = 0.15\,,\quad P(x_6) = 0.15\,,\quad P(x_7) = 0.3$$

Also calculate efficiency of code.

Q.5 a) Explain arithmetic coding 05

b) For the joint probability matrix given below, 10
Compute $H(x), H(y), H(x,y), H\,(x/y)$ and $H\,(y/x)$

$$P(x,y) = \begin{bmatrix} 0.27 & 0.03 & 0 \\ 0 & 0.2 & 0.05 \\ 0 & 0.135 & 0.315 \end{bmatrix}$$

Section B

Q.6 Write short notes on following (any two) 10

a) CRC (Cyclic Redundancy check)

b) Maximum Likely hood Estimation

c) Tree Diagram and Trellas diagram

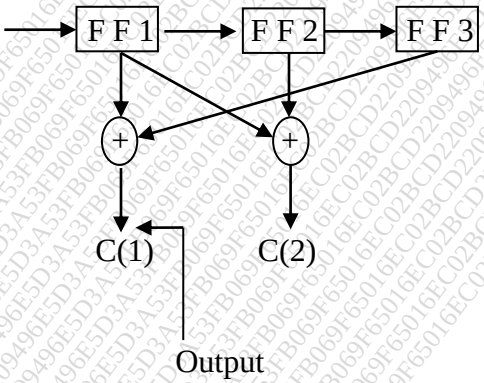
Q.7 a) For a (6,3) Linear block code, the coefficient matrix [P] is as follows the received code words at the receiver are i) 001110 ii) 111011 Check whether they are correct or contain errors. 08

b) Explain syndrome decoding for linear block codes with neat diagram 07

Q.8 a) Consider a (15 , 11) cyclic code $g(x) = 1+ x + x^4$. Draw encoder circuit. Also explain encoding procedure with message 10010110111 08

b) Explain matrix description of cyclic codes 07

Q.9 a) For the convolutional encoder shown in figure determine the output for input sequence = 11010100 08



b) Explain Viterbi decoding algorithm 07

Q.10 a) What is estimation theory? Explain any one estimation method 07

b) Explain B CH codes and R S codes in detail. 08

Total No. of Printed Pages:2

SUBJECT CODE NO:- E-62
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E.(EC/ECT/IEC/E&C) Examination Nov/Dec 2017
Microcontroller & Advanced Processors
(REVISED)

[Time: Three Hours] **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B
1) Question No.1 and 6 are compulsory
2) Answer any two questions from each section
3) Assume suitable data if necessary

.

Section A

Q.1 Solve any two 10

a) Differentiate and explain conditional and control flags of 8086
b) With suitable examples explain various addressing modes of 8086
c) Compare and contrast minimum mode and maximum mode configuration in 8086

Q.2 a) Explain following 8086 instructions 08
i) XCHG
ii) NEG
iii) MUL
iv) ROL

b) Write 8086 based program to find the average of two data buffers stored in memory. store the result at suitable memory location 07

Q.3 a) What is interrupt vector table? With the help of neat diagram explain the purpose of it 08
b) Explain 8086 memory bank techniques 07

Q.4 a) Explain an 8255 interfacing with 8086 with the help of neat diagram 08
b) Interface a stepper motor to 8086 write a program to rotate stepper motor in clockwise direction 07

Q.5 Write short notes (any three) 15

a) ADC interfacing with 8086
b) Assembler directives
c) 8086 programming model
d) Physical address generation in 8086

Section – B

Q.6 Solve any two 10

1) Explain salient features of 80286 processor
2) Explain addressing modes of 8051 microcontroller
3) Explain the functions of following registers of 8051
   1) PC
   2) DPTR

Q.7

a) Compare 80286, 80386 and 80486 processors on different parameters 08

b) Explain virtual 8086 mode of 80386 processor 07

Q.8

a) Explain following instructions of 8051 08
   1) SWAP
   2) MUL AB
   3) DJNZ
   4) CJNE

b) Draw a neat diagram to interface a LED with 8051 and write a program to blink it . 07

Q.9 Design an 8051 based system with the following specifications give the memory map for the same 15

1) 16 KB of EPROM
2) 4 KB of RAM
3) 12 MHZ frequency and power on reset

Q.10 Write short notes (any three) 15

a) DAC interfacing with 8051
b) Keyboard interfacing with 8051
c) Programming model of 8051
d) Salient features of Pentium

Total No. of Printed Pages:4

SUBJECT CODE NO:- E-94
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E.(EC/ECT/IEC/E&C) Examination Nov/Dec 2017
Electronics System Design
(REVISED)

[Time: Three Hours] **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B
i. Question no.01 and question no.06 are compulsory.
ii. Solve any two questions from the remaining questions of each section A & B.
iii. Assume suitable components and data wherever necessary.
iv. Figures to the right indicate full marks.
v. Required datasheet is provided.

Section A

Q.1 **Solve any two** **10**

i) What is measurement and signal conditioning?
ii) Explain types and selection criteria of transistor.
iii) Explain features of variable voltage regulator LM317.
iv) Derive the output equation of op-amp based differentiator.

Q.2
a) Design a regulated DC power supply with given specification **07**
V_o=±12V, load current =±1A (use 7812 & 7912).
b) Design a regulated variable DC power supply using LM 337 with given specifications **08**
V_o=-3V to -21V, load current=-1A.

Q.3
a) Design an integrator circuit, with dc gain of 10 to integrate square wave of 10 kHz. Draw i/p & o/p waveform one below the other. **08**
b) Explain op-amp characteristics in detail with equivalent ckt of op-amp. **07**

Q.4
a) Design an op-amp Schmitt trigger for following specifications **08**
V_o=±10V, V_{LT} =-2V, triggering voltages are +4V & -2V.
b) Design a temperature measurement by means of op-amps and thermistor. **07**

Q.5
a) Design a diode detector ckt for AM wave with following specifications R_i=10KΩ, **07**
f_m=5KHz, f_c=550KHz.
b) Design a step up switching regulator using 78540 to meet the following specifications. **08**
V_{in}=10V, V_o=20V, $I_{o(max)}$=100mA,V_{ripple} =20mV, use suitable data.

Section B

Q.6 **Solve any two** **10**

- **i)** Explain the various noise energy coupling mechanisms in circuit.
- **ii)** Explain the importance of grounding and shielding.
- **iii)** Explain pin diagram of LM565.
- **iv)** Explain optocoupler and relay in electronic circuit.

Q.7

- **a)** Design decade counter using 7490 **07**
- **b)** Design a Astable multivibrator using IC 555 with following specifications amplitude of square wave is 8V,f_o=4KHz, Duty cycle=80%. Draw waveforms one below the other at pin 2,7 & 3. **08**

Q.8

- **a)** Explain finite state machine in detail. **07**
- **b)** Draw and explain block diagram of ICL 8038. **08**

Q.9

- **a)** Discuss MTTR, MTBF and MTTF. **08**
- **b)** Explain exponential law of reliability **07**

Q.10 **Write short notes on:** **15**

- **a)** Mealy & Moore FSM
- **b)** Features of IC 555
- **c)** Heat sink

Data sheet

1. General purpose transistors:

	Device	Type	Icmax	VcEo	Vcbo	Ptmax	Life min	Fr
1)	2N 2996	NPN	100mA	18V	18V	200MW	200	200MHz
2)	BFY 51	NPN	1Amp	30V	60V	800MW		50MHz
3)	2N 3702	PNP	200mA	25V	40V	300MW		100MHz
4)	BCY 70	PNP	20mA	40V	50V	300MW		200MHz

2. Small Signal Transistors:

1)	BC 107	NPN	100mA	45V	50V	300MW	110	
2)	BC157	PNP	100mA	45V	50V	300MW	470	

3. Switching transistors:

1)	2N 2219A	NPN	800 mA	40 V	75 V	800 MW	75	200 MHz
2)	2N 2905	PNP	600 mA	40 V	60 V	600 MW	150	

4. RF Transistors :

1)	2N 2969 A	NPN	200 mA	15 V	40 V	360 MW	40	500 MHz
2)	BFY 90	NPN	50 mA	15 V		200 MW		14 GHz
3)	BC 177	PNP	100 mA	45 V	50 V	300 MW	75	130 MHz
4)	BC 178	PNP	100 mA	25 V	30 V	300 MW	75	130 MHz

5. Driver Transistors:

1)	2N 3053	NPN	700 mA	40 V	60V	800 MW	125	100 MHz
2)	2N 2905	PNP	1 A	40 V		600 MW	100	

6. Power transistors:

1)	2N 3055	NPN	15 A	60 V	100 V	115 W	20	1 MHz
2)	BD 131	NPN	3 A	45 V	70 V	15 W	20	60 MHz
3)	BD 132	PNP	3 A	45 V	45 V	15 W	20	60 MHz
4)	TIP 31 A	NPN	3 A	60 V	60 V	40 W	10	8 MHz
5)	TIP 32 A	PNP	3 A	60 V		40 W		8 MHz
6)	SL 100	NPN	0.5 A	50 V		4 W	40	
7)	SK 100	PNP	0.5 A	50 V		4 W	40	

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7. Darlington Transistors:

1)	TIP 132	NPN	8 A	100 V	100 V	70 W	1000	1 MHz
2)	TIP 137	PNP	8 A	100 V	100 V	70 W	1000	1 MHz

1. Resistor Std. Values ($\Omega, K\Omega, M\Omega$, with fixed values):

1.0, 1.1, 1.2, 1.3, 1.5, 1.6, 1.6, 2.0, 2.2, 2.4, 2.7, 3.0, 3.3, 3.6, 3.9, 4.3, 4.7, 5.1, 5.6, 6.2, 6.8, 7.5, 8.2, 9.1

2. Capacitance values($\mu F, nF, pF$):

0.1, 0.15, 0.22, 0.33, 0.47, 0.60 and multiplies of 10

3. Inductance Values(H,mH, μH):

1.0, 1.1, 1.2, 1.3, 1.5, 1.6, 1.8, 2.0, 2.2, 2.4, 2.7, 3.0, 3.3, 3.6, 3.9, 3.9, 4.7, 5.1, 5.6, 6.2, 6.8, 7.5, 3.2, 9.1

4. Diodes :

	Device	PIV	I_f
Normal :	EC 103	100 V	3 Amp
	EC 403	400 V	3 Amp
Rectifier :	IN 4001	50 V	1 Amp
	IN 4007	1000 V	1 Amp

5. Zener Diodes:

Types No:	V_s	I_n (mA)	Z_n (Ω)	I_m(mA)
1N 4370	2.4 V	20	30	150
1N 4371	2.7 V	20	30	135
1N 4372	3.0 V	20	29	120
1N 746	3.3 V	20	20	110
1N 747	3.6 V	20	24	100
1N 748	3.9 V	20	23	95
1N 749	4.3 V	20	22	85
1N 750	4.7 V	20	19	75

Total No. of Printed Pages:2

SUBJECT CODE NO: E-187
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E.(EC/ECT/IEC/E&C) Examination Nov/Dec 2017
Electromagnetic Engineering
(REVISED)

[Time: Three Hours] **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B i) Q.No.1 and Q.No.6 are compulsory.
ii) Solve any two questions from Q.2, Q.3, Q.4 and Q.5 in section A
iii) Solve any two questions from Q.7, Q.8, Q.9 and Q.10 in section B
iv) Figures to the right indicate full marks
v) Assume suitable data wherever necessary and mention it clearly.

SECTION A

Q.1 Solve any two questions. 10

a) Explain divergence theorem

b) Derive boundary conditions for a conductor free space interface.

c) Explain Potential Gradient

Q.2 a) The vector R_{AB} extends from A (1, 2, 3) to B. if the length of R_{AB} is 10 units and its direction is given by $a = 0.6\, a_x + 0.64\, a_y + 0.48\, a_z$. Find the coordinates of B. 07

b) Derive expression for Electric flux density due to a) Point charge & b) line charge 08

Q.3 a) In free space let $Q_1 = 10$nC be at P_1 (0, -4, 0) and $Q_2 = 20$ nC be at P_2(0, 0, 4). 07
i) Find E at origin.
ii) Where should a 30 nC point charge be located so that E = 0 at the origin.

b) Derive the expression of work done in moving a point charge in an electric field. 08

Q.4 a) Two uniform line charges 8 nC/m each are located at x =1, z = 2 and at x = -1, y = 2 in free space. If the potential at the origin is 100 V find V at P (4, 1,3) 07

b) If $E = -8xy\, a_x - 4x^2\, a_y + a_z$ V/m find the work done in carrying a 6 C charge from M(1, 8, 5) to N(2, 18, 6) along the path $y = 3x^2 + z$, $z = x + 4$ 08

Q.5 a) Given the potential $V = 100(x^2 - y^2)$ and a point P (2, -1, 3) that is stipulated to lie on a conductor free space boundary. Find V, $\bar{E}$, $\bar{D}$ and ρ_s at point P. 07

b) Consider a parallel plate capacitor having d =5 mm, S = 80 cm^2 and ϵ_r =10. 08
A dc voltage source of 50 V is placed across the capacitor. Find C, E, D, Q and total energy stored.

SECTION B

Q.6 Solve <u>any two</u> questions. 10

a) Write Maxwells equations in point from and integral from for time varying fields.

b) Explain Biot Savart law

c) Explain significance of loss tangent

Q.7 a) A current filament carries a current of 10 A in the a_z direction on the z axis. 07
Find the magnetic field intensity $\bar{H}$ in Cartesian coordinates at point P(1, 2, 3)
due to this filament if it extends from i) z = 0 to 5m ii) z =5 to infinity

b) Find H at P (2,3,5) in Cartesian coordinates if there is an infinitely long current 08
Filament passing through the origin and point C. the current of 50 A is directed
From the origin to C where the location of C is C(0, 0, 1)

Q.8 a) The displacement current density is 5 cos (2×10^8 t – k z) a_x μA/m^2 in a material 07
For which $\sigma = 0$, $\epsilon_r = 5$, $\mu_r = 4$. Find D and E

b) Using Amperes circuital Law find $\bar{H}$ due to infinitely long straight conductor along 08
The z axis.

Q.9 a) A 9375 MHz uniform plane wave is propagating in polyethylene with $\epsilon_r = 2.26$, 07
$\mu_r = 1$. if the amplitude of electric field intensity is 500 V/m and the material is
Assumed to be lossless.
Find i) phase constant ii) wavelength iii) velocity iv) Intrinsic impedance
v) propagation constant.

b) Derive force on a straight conductor in a uniform magnetic field. 08

Q.10 a) In a given lossy dielectric medium conduction current density 07
$J_c = 0.02 \sin (10^9 t)$ A/m^2.
Find the displacement current density if $\sigma = 10^3$ S/m and $\epsilon_r = 6.5$.

b) Derive the equation of reflection coefficient when the uniform plane wave is 08
incident on boundary between regions composed of two different material.

Total No. of Printed Pages:2

SUBJECT CODE NO: E-213
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E.(EC/ECT/IEC/E&C) Examination Nov/Dec 2017
Microprocessors & Peripheral
(REVISED)

[Time: Three Hours] **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B
i. Q.No.1 and Q.No.6 are compulsory.
ii. Solve any two from Q. 2 & Q.3 & Q.4 & Q.5
iii. Solve any two from Q. 7 & Q.8 & Q.9 & Q.10
iv. Assume suitable additional data if necessary

Q.1 Attempt any two of the following

i)	Explain the concept of bus oriented structure in microprocessor.	05
ii)	Explain flag structure of 8085.	05
iii)	Explain the concept of stack	05
iv)	What are the different types of memory mapping?	05

Q.2 a) Write the different addressing modes of 8085 07

b) Draw & explain architectures of 8085 microprocessor. 08

Q.3 a) Draw and explain Timing diagram for ADD B 07

b) Write a 8085 based program to compare two numbers. 08

Q.4 a) Write a delay sub routine to generates a delay of 100ms. Assume clock frequency of 8085 3MHz 07

b) Design a fully decoded memory system that provides 2kB of EPROM immediately followed by 4kB of RAM. The EROM starts at address OOOOH 08

Q.5 a) Write a pregame to multiply two 8 bit Nos. 07

b) Explain the following pins of 8085 08
i) $IO/\overline{M}$
ii) $AD_0 - AD_7$
iii) CLKOUT
iv) ALE

Q.6 Attempt any two of the following:

i) Enlist the silent features of 8155 05

ii) Write the different between serial & parallel data communication 05

iii) How to measure voltage with the help of microprocessor 05

iv) With help of near diagram explain logic analyses 05

Q.7 a) With the help of interfacing diagram explain LED interfacing with 8255 & write program to turn off & ON LED. 07

b) With the help of neat diagram explain ADC 0809 interfacing with 8085 08

Q.8 a) Draw & explain 8259 Block Diagram 07

b) Interface 8255 with 8085 & explain how you can transmit data bytes Parallely. 08

Q.9 a) Explain speed control of DC motor using microprocessor 07

b) Explain how to implement a digital IC tester using microprocessor 08

Q.10 a) How we can use 8155 times to generate a square wave. 07

b) Write a feature of 8355 with neat Block Diagram & explain it. 08

Total No. of Printed Pages:2

SUBJECT CODE NO:- E-254

FACULTY OF ENGINEERING AND TECHNOLOGY

T.E.(ECT/E&C) Examination Nov/Dec 2017

Digital Communication

(REVISED)

[Time: Three Hours] **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B i. Q.No.1 from Section A and Q.No.6 from Section B is compulsory.
ii. Solve any two questions from remaining questions in each section.

Section A

Q.1 Attempt any two. 10

1. Explain Random variable and random process
2. Explain A Law and μ Law companding in brief.
3. Differentiate analog communication and digital communication.

Q.2 a) Sketch and Explain How digital communication is occurred? 08
b) Explain generation and detection of pulse with modulation in detail. 07

Q.3 a) State and prove sampling theorem for lowpass signal. 07
b) Find Nyquist criteria and Nyquist interval for the following signal. 08
i) $X(t)= 10\cos(4000\ \pi t).\cos(1000\ \pi t)$
ii) $X(t)= 6\cos(50\ \pi t)+ 20\ \sin(300\ \pi t)-10\cos(100\ \pi t)$.

Q.4 a) Explain how practical sampling is different from ideal sampling? Which problems are occurred during practical sampling? How to overcome those problems. 07
b) What is quantization? Explain quantization in details with its different types. 08

Q.5 a) Explain how generation and detection of PCM. 07
b) Explain Companding with its characteristic. 08

Section B

Q.6 Solve any Two. 10
a) Explain Inter symbol interference. How ISI can be removed from system.
b) Explain the drawbacks of delta modulation.
c) Explain ASK in details.

Q.7 a) Explain adaptive delta modulation with application. 08
b) Derive expression for probability of error for the system of match filter. 07

Q.8 a) Explain white Gaussian noise in details. Also explain its effect on bipolar signal with waveform. 07
b) Explain generation and detection of frequency shift keying with its waveform. 08

Q.9	a)	Explain offset QPSK with its generation and detection block diagram.	08
	b)	Explain direct sequence spread spectrum in details?	07
Q.10	a)	Explain MSK in detail.	08
	b)	Explain frequency hopping in detail.	07

Total No. of Printed Pages:2

SUBJECT CODE NO:- E-337
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E.(EC/ECT/IEC/E&C) Examination Nov/Dec 2017
Digital Signal Processing
(REVISED)

[Time: Three Hours] **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B
1. Q.No.1 & Q.No.6 are compulsory from each section A & B respectively.
2. Solve any two questions from Q.No.2 to Q.No.5.
3. Solve any two questions from Q.No.7 to Q.No.10.
4. Figures to the right indicate full marks.
5. Assume suitable data if necessary.

Section A

Q.1 Attempt any two of the following. 10

a) Explain decimation in time (DIT) algorithm.
b) Relation between Laplace and Z-transform.
c) What is aliasing? How do we avoid aliasing?
d) Differentiate between circular convolution and linear convolution.

Q.2 a) Determine the convolution of the sequences 07

$x(n) = 1$ for $0 \leq n \leq 4$
$= 0$ elsewhere
$h(n) = \{1, 1, 1, 1, 1\}$

b) Determine the cross correlation of sequences 08

$x(n) = \{- - -, 0, 0, 2, -1, 3, 7, \underset{\uparrow}{1}, 2, -3, 0, 0, - -\}$

$y(n) = \{- - , 0, 0, 1, -1, 2, -3, \underset{\uparrow}{4}, 1, -2, 5, 0, 0 - --\}$

Q.3 a) State and prove any two properties of Z-transform. 07

b) Determine the Z-transform of the signals 08
i) $x(n) = \cos w_o n \, u(n)$
ii) $x(n) = u(-n)$

Q.4 a) State and explain properties of DFT. 07

b) Find the Fourier-Transform of the signal 08
$x(n) = a^n u(n) \quad -1 < a < 1$
And its magnitude response for $a = .9$

Q.5 a) Perform the circular convolution of the following two sequences. 08

$x_1(n) = \{2,1,2,1\}$

$x_2(n) = \{1,2,3,4\}$

b) Explain fast convolution techniques overlap add method 07

Section B

Q.6 Attempt any two of the following. 10

a) Product quantization error

b) Ideal filter requirements

c) Warping effect

d) Compare FIR with IIR

Q.7 a) Explain structure of realization of IIR system. 07

b) Convert the analog filter into digital filter whose system function is 08

$H(s) = \frac{s+0.2}{(s+0.2)^2+9} \quad T_s = 1sec$

Using impulse invariant

Q.8 a) Design a FIR high pass filter to meet the following specification 08

Cutoff frequency =250 Hz

Sampling frequency = F_s = 1 KHz &

Filter length =7

b) Explain Fourier series method to design of FIR filter 07

Q.9 a) Explain the product round off error. 07

b) Explain limit cycles oscillation in recursive system 08

Q.10 a) Explain Gibb's phenomenon. 07

b) Design a linear phase FIR filter using Hanning window for the following desired frequency response. 08

$$H_d(w) = \begin{cases} e^{-j3w}, \frac{\pi}{4} \leq |w| \leq \pi \\ 0 \quad otherwise \end{cases}$$