Q.P. Code :13162

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

Please check whether you have got the right question paper.

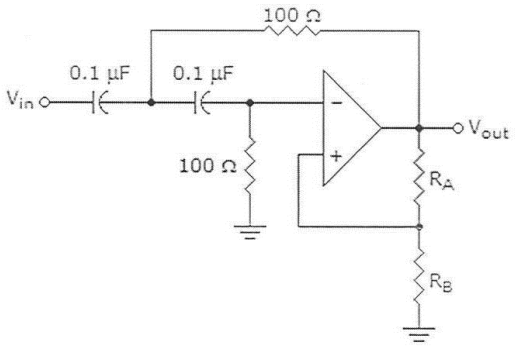
N.B:
1. Question no.1 is compulsory
2. Solve any three out of remaining
3. Assume suitable data wherever necessary and draw diagrams

Q.1 Solve **any five.** **20**

a) Define (i) CMRR; (ii) Slew rate; (iii) Offset voltage (iv) Input Bias current

b) Implement (i) V0= 2V1+V2 (ii) VO=dvin/dt using opamp uA741.

c) For the following circuit identify type of filter and find cutoff frequency



d) Describe performance parameters of DAC.

e) Draw functional block diagram of IC 555

f) What are various protection circuits used for Voltage regulators?

Q.2 a) Derive expression for Av for Non-Inverting amplifier. Design this amplifier for Av=15. **10**

b) What is window detector? Explain with proper waveforms. **10**

Q.3 a) Explain with necessary diagrams and waveforms the principle of operation of a Monostable multivibrator using OP-AMP. **10**

b) Explain Schmitt Trigger circuit. Design same for UTP and LTP= $\pm$2V **10**

Q.4 a) Explain with necessary diagrams the operation of a triangular wave generator using OPAMP. **10**

b) Explain with a functional block diagram the principle of operation of 723 regulator. What are the important characteristics of this voltage regulator IC? **10**

Q.5 a) Explain with proper circuit diagram the principle of operation of dual slope converter. **10**

b) Explain working of Astable multivibrator using IC 555 **10**

Q.6 Write short notes on all. **20**

a. Log-Antilog Amplifier
b. Instrumentation amplifier and it's applications
c. Precision Rectifiers
d. PLL 565 and its applications

Time:-3 Hours **Marks:-80**

Note:-1. Q.1 is compulsory
2. Out of remaining 5 solve any 3
3. Figures to the right indicate full marks

Q.1 **Solve any 4**

a. Write a assembly language program to find square of a number 5
b. Explain Thumb mode of operation of ARM 7 TDMI 5
c. Explain following assembler directives ORG,DB, EQU, Public and Extern 5
d. Write a program for 8051 to subtract 2 ,16 bit numbers 5
e. Explain following instructions of 8051 µc 5
i) DA A ii) SETB bit iii) AJUMP iv) JB b v) SWAP A
f. Explain CPSR register in ARM 7 TDMI 5

Q.2 a. Draw and explain memory organization of 8051 µc 10
b. Explain interrupt structure in 8051 10

Q.3 a Explain ADC interfacing and operation in 8051 10
b. Explain the structure of port 0 and port 1 in 8051 µc with neat diagram. 10

Q.4 a. Show LCD interfacing to 8051 and program to display 'GO'. 10
b. Write an assembly language program for sending message "HI" serially 10
at 4800 baud 8 bit data,1 stop bit, continuously using 8051 .

Q.5 a. Explain various processor modes of ARM7 TDMI 10
b. Design 8051 based system with following specifications 10
i) 8 KB RAM using 4 Kb devices
ii) 8 KB EPROM using 4 Kb devices
show detailed memory map and chip select logic .Draw interfacing diagram.

Q.6 Write short notes on **any 3** 20

a. Timer modes of 8051
b. Addressing modes of ARM7 TDMI
d. Interfacing seven segment display to 8051
e. Addressing modes of 8051

Time: 3 Hours **Max. Marks: 80**

Note: (1) Question number 1 is compulsory.
(2) Solve any THREE out of remaining.
(3) Assume suitable data if necessary.
(4) Figures to the right indicate full marks.

Q.1 Attempt any **FOUR**

(A) State and explain Gauss's Law. **(5)**

(B) Explain ground wave propagation. Which type of polarization is used for ground wave? **(5)**

(C) Explain FDM importance and advantages **(5)**

(D) Explain isotropic, omnidirectional and directional antenna with suitable examples. **(5)**

(E) In free space, $E=e^{j(wt-4x)}$ az V/m .Find H **(5)**

Q. 2 **(A)** Derive Maxwell's equation in integral & Point form for time varying field. **(10)**

(B) An electric field in a medium which is source free given by $E=1.5\cos(10^{8t} - \beta z)ax$ V/m where Em is given amplitude of E, ω is angular frequency & β is phase constant .Obtain D, B, H. Assume $\varepsilon_r=1$, $\mu_r=1$. **(10)**

Q.3 **(A)** Explain Poynting vector. Derive Poynting theorem and describe significance of each term. **(10)**

(B) Explain MOM method in detail. State its advantages and drawbacks in detail. **(10)**

Q.4 **(A)** Derive the expression for radiation resistance in far field region of an infinitesimal dipole **(10)**

(B) Explain ionospheric propagation. A high frequency radio link has to be established between two points at a distance of 2000 km. on the earth's surface. Considering the height of 200 km and critical frequency of 5 MHz. Calculate MUF for given path. **(10)**

Q.5 **(A)** Classify and Explain different types of wave propogation. **(10)**

(B) What is line of sight propagation? Obtain expression for range of line of sight for space wave propagation in terms of antenna's transmitting and receiving heights. **(10)**

Q.6 Attempt any **TWO**

(A) Explain folded dipole antenna and its applications. **(10)**

(B) Boundary conditions for static E and M fields. **(10)**

(C) Give the comparison of FDM, FEM and MOM. **(10)**

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Time : 3 Hours **Marks: 80**

N.B.
1) Question number ONE is compulsory.
2) Attempt any THREE questions from remaining questions.
3) All questions carry equal marks.

Q1
a) What is random variable? Explain mean and variance 5
b) Compare QPSK and QASK 5
c) Explain with block diagram Optimum Receiver 5
e) Syndrome generator and decoder for linear block code 5

Q2 a) A communication system transmits 5 digits over a noisy channel with per digit error probability of 0.01. What is the probability that upto 2 digits will be in error? Also calculate mean and variance of the error. Use Binomial probability distribution. 10

b) Explain Direct Sequence and Frequency Hop Spread Spectrum Techniques. 10

Q3 a) A DMS emits six messages m1, m2, m3, m4, m5 and m6 with probabilities 0.30, 0.25, 0.15, 0.12, 0.10 and 0.08 respectively. Find
1. Huffman code
2. Average code word length
3. Entropy of source
4. Efficiency and redundancy of code. 10

b) Compare Shannon Fano and Huffman Coding 10

Q4 a) Explain the necessity of line codes. State different types of line codes. Plot power spectral density of NRZ signal. 10

b) Show that the duobinary signalling suffers from error propagation while precoded duobinary signalling doesnot. Explain with encoder and decoder block diagram and decoding logic 10

Q5 a) Draw block diagram of BPSK transmitter and receiver and explain. Sketch signal space diagram and PSD of BPSK. 10

b) The generator polynomial of a (7,4) cyclic code is given by $G(D)=1+D+D^3$ Compute all the non-systematic code words. 10

Q6 Write short notes on following 20
a) Central Limit Theorem
b) Eye Pattern
c) Gray Code
d) Correlator

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

1) Question No. 1 is compulsory.
2) Out of remaining questions, attempt any three questions.
3) Assume suitable data, if required.

Q1 Attempt any four of the following **(20)**

a Verify whether the following signals are periodic. If periodic, find the fundamental period. **(05)**

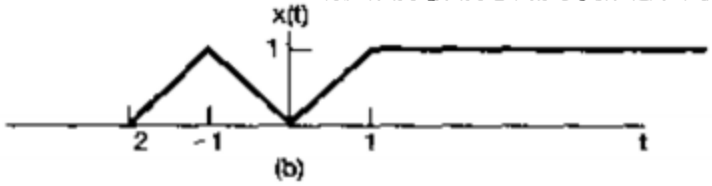
(a) $x(t) = [\sin(4t-1)]^2$

(b) $x[n] = \cos(4n + \pi/4)$

b State and prove differentiation property of Z transform and Laplace transform. **(05)**

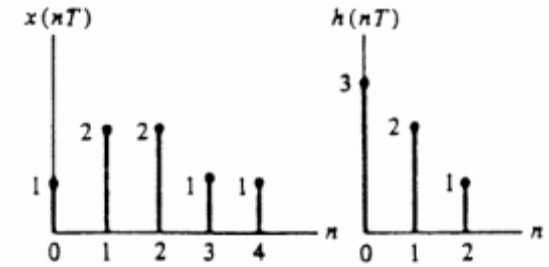
c Determent energy or power of following signals **(05)**
1. X(t) = x(t)= 0.9 e^{-3}t u(t) 2. x[n] = u[n]

d Determine and draw the even and odd part of the signal **(05)**



e State and prove final value theorem of Laplace transform **(05)**

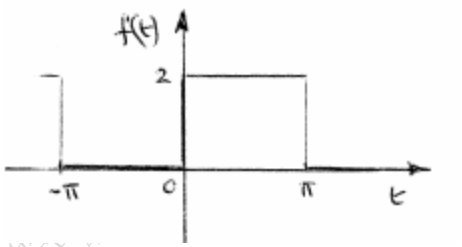
Q2 a Perform convolution on following signals. **(10)**



b Find the inverse Laplace transform of and draw possible ROCs **(10)**

$$\frac{30}{s^7} + \frac{8}{s-4}$$

Q3 a Determine the complex Fourier series for the function defined by - **(10)**



f (t) = 0, when $-\pi <= t <= 0$
2, when $0 <= t <= \pi$
The function is periodic outside of this range of period 2π.

b Explain role of ROC and properties of ROC with respect to Z transform **(10)**

Q4 a Determine the Fourier transform of the signal shown below. Draw the frequency domain signal.
f(t) = cos(2πst)

b Find the autocorrelation, power and power spectral density of the signal **(10)**
X(t) = 3cos t + 4cos 3t.

Q5 a Calculate z-transform of the following signal: **(10)**

$$(i)\ x[n] = n(\frac{-1^n}{4})u(n) * (\frac{-1^{-n}}{6})u(-n)$$

$$(ii) x[n] = u[n-5] - u[n-10]$$

b State duality property of Fourier Transform. If FT of $e^{-t}u(t)$ is $1/(1+j\Omega)$, find the FT of 1/(1+ t) using duality property. **(10)**

Q6 a An LTI system is characterized by the system function: **(10)**

$$\frac{z}{(z-\frac{1}{4})(z+\frac{1}{4})(z-\frac{1}{2})}$$

Write down possible ROCs for different possible ROCs. Determine causality and stability and impulse response of the system.

b Check if the system is linear and time variant **(10)**
1. $y(t) = t^2x(t) + 3$
2. y(n) = x(-n) + 3 X(n+1)
3. y(n) = u(n) + u(n-1)
4. y(t) = r(t)
5. y(n) = delta(t)
