Electronics & Tele.Department

Bachelor Of Engineering

Question Papers May-June 2019

Sem III to VIII

SE (E/T) (III) (choice based)

8th May 2019 **(3 Hours)** **[Total Marks: 80]**

N.B. : 1) Question No. 1 is Compulsory.

2) Answer any THREE questions from Q.2 to Q.6.

3) Figures to the right indicate full marks.

Q 1. a) Evaluate the Laplace transform of $L[(\sin 2t - \cos 2t)^2]$ [5]

b) Determine the constants a, b, c, d so that the function $f(z) = x^2 + axy + by^2 + i(cx^2 + dxy + y^2)$ is analytic [5]

c) If $\phi = 3x^2y - y^3z^2$ find $\nabla \phi$ at the point P (1,-2,-1) [5]

d) Obtain half range sine series for $f(x) = x^2$ in $0 < x < 3$ [5]

Q 2. a)Construct analytic function whose real part is $e^x \cos y$ [6]

b) Find the Fourier series for $f(x) = |x|$ in $(-2,2)$. [6]

c) Find the Laplace transform of the following

i) $L[t\sqrt{1+\sin t}]$ ii) $L\left\{\frac{\sin t \sin 5t}{t}\right\}$ [8]

Q 3. a) Prove that $J_{1/2}(x) = \sqrt{\frac{2}{\pi x}} \sin x$ [6]

b) Evaluate inverse Laplace transform using Convolution Theorem $L^{-1}\left[\frac{s}{(s^2+a^2)^2}\right]$ [6]

c) Show that the vector field $\overline{F} = (2xy + z^3)\,\hat{i} + x^2\,\hat{j} + (3xz^2 + 2z)\,\hat{k}$ is conservative and find $\phi(x,y,z)$ such that $\overline{F} = \nabla \phi$. [8]

Q 4 a)Find bilinear transformation which maps the points z=0,i,-2i of z plane onto the points $w = -4i, \infty, 0$ of w plane [6]

b) Prove that $f_1(x) = 1, f_2(x) = x, f_3(x) = \frac{3x^2 - 1}{2}$ are orthogonal over $(-1,1)$. [6]

c) Find the Fourier transform of $f(t) = e^{-|t+1|}$ [8]

Q 5 a) Solve Using Laplace transform $\frac{d^2y}{dt^2} - 4y = 3e^t$ where $y(0) = 0$ & $y'(0) = 3$ [6]

b) Find Complex form of the Fourier series for $f(x) = e^{ax}$ in $-\pi < x < \pi$ [6]

c) Verify Green's Theorem for $\oint_C 2y^2\,dx + 3xdy$ where C is the boundary of the closed region bounded by $y = x^2$ and $y = x$. [8]

Q 6. a) Evaluate $L^{-1}\left[\frac{se^{-\frac{s}{2}} + \pi e^{-s}}{(s^2 + \pi^2)}\right]$ [6]

b) Find the map of the line x-y=1 by transformation $w = \frac{1}{z}$ [6]

c) Using Stoke's theorem evaluate $\oint_C (y\,dx + z\,dy + x\,dz)$ where C is the curve of intersection of the sphere $x^2 + y^2 + z^2 = a^2$ and plane $x + z = a$ [8]

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S.E (EXTC) Choice Base CBCGS II Sem

(Time: 3 Hours) 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) Explain bleeder resistor and critical inductance.
(b) Explain zero temperature drift biasing.
(c) Explain effect of bypass capacitor and coupling capacitors on frequency response of amplifier
(d) Draw and explain high frequency model of BJT for CE configuration.
(e) Draw and explain small signal model of FET.

Q.2 (a) Design single stage *RC* coupled CS amplifier using self-bias method to meet following specifications: $|Av|$ =18, Vo= 2.5 Vrms, I_{DSS} = 7 mA, g_{mo} = 5600 µS, Vp=2.5 V, r_d=50 kΩ. [15]
(b) Calculate *Av*, *Zi* and *Zo* for the circuit designed in Q.2(a). [05]

Q.3 (a) A full wave rectifier using a centre tapped transformer with two diodes gives output of 250 V and current is 100 +/- 25 mA. If the ripple factor is 0.001.Calculate the specification of the devices and components required if the filter used is *LC* filter. [12]
(b) Explain the basic fabrication steps of passive elements. [08]

Q.4 (a) What is biasing? What is the need of biasing? Derive the expression for stability factor of collector to base bias circuit. [10]
(b) Calculate *Q*-point (I_{CQ} & V_{CEQ}) and stability factor (*S*) for the circuit shown in Fig. 4(b). [10]

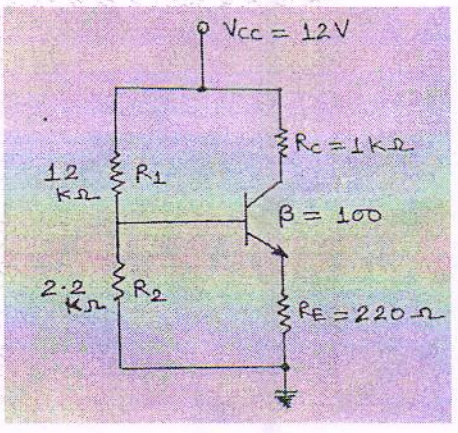

Fig. 4(b)

Q.5 (a) Derive the expressions for *Ai*, *Av*, *Zi*, *Zo* for CE amplifier with unbypassed R_E. [15]
(b) State and explain Miller's Theorem. [05]

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Q.6 (a) Sketch the frequency response for the circuit shown Fig. 6(a) where $C_1 = 0.5$ μF, $C_2 = 1$ μF, $C_S = 10$ μF, $C_{gs} = 5$ pF, $C_{gd} = 2$ pF, $C_{ds} = 3$ pF. Take $I_D = 3$ mA. [15]

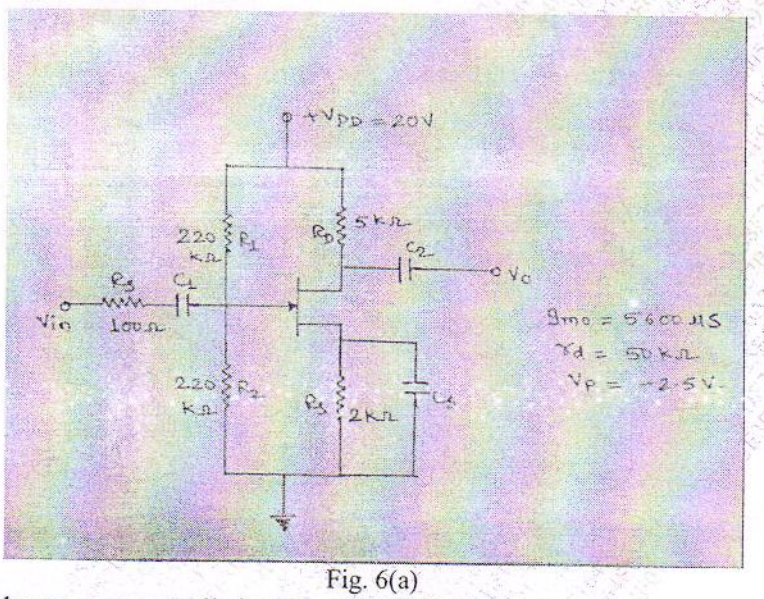

Fig. 6(a)

(b) Write a short note on small signal model of diode. [05]

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SE(Extc)/ Sem-III/ Choice based 20/5/2019

Q. P. Code: 27582

(3 Hours) 80 Marks

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 a) Perform the following operation using 2's compliment [20]

i) $(14)_{10} - (24)_{10}$

ii) $(24)_{10} - (14)_{10}$

Comment on results of (i) and (ii)

b) If $F(A,B,C) = \sum m(0,3,5,7)$ with its truth table and express F in SOP and POS form

c) Compare FPGA and CPLD.

d) Explain Static RAM

Q.2 a) Write VHDL code for 3 bit up counter. [10]

b) Minimize the following expression using Quine McClusky Technique [10]

$F(A,B,C,D) = \sum m(1,3,7,9,10,11,13,15)$

Q.3 a) Design 3 bit Binary to Gray code Converter [10]

b) Draw and explain a neat circuit diagram of BCD adder [10]

Q.4 a) Draw and explain two input TTL NAND gate. [5]

b) Compare combinational circuits and sequential circuits [5]

c) Explain Full Adder circuit using PLA having three inputs, 8 product terms and two outputs. [10]

Q.5 a) What is excitation table? Explain the excitation table of SR flip flop. [5]

b). Convert D flip flop to T flip flop. [5]

c) Draw and explain 3 bit asynchronous binary counter using positive edge triggered JK flip flop. Draw the waveforms. [10]

Q.6 a) Implement following Boolean function using 8:1 multiplexer [6]

$F(A,B,C,D) = \overline{A}B\overline{D} + ACD + \overline{B}CD + \overline{A}\overline{C}D$

b) State and prove Demorgan's theorem [4]

c) What are shift registers? How are they classified? Explain working of any one type of shift register. [10]

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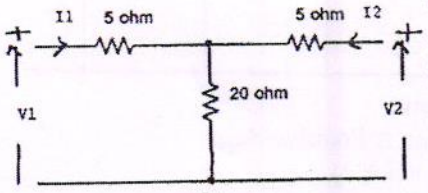
S.E (ExtC) Choice Based. sem-III 24/5/2019.

[Time: 3 Hours] [Marks:80]

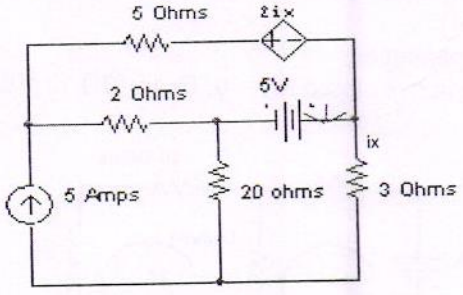
Please check whether you have got the right question paper.

N.B:
1. Question one is compulsory.
2. Answer any three questions from the remaining five.
3. Assume suitable data if required.

1. a) Find y parameters. 05



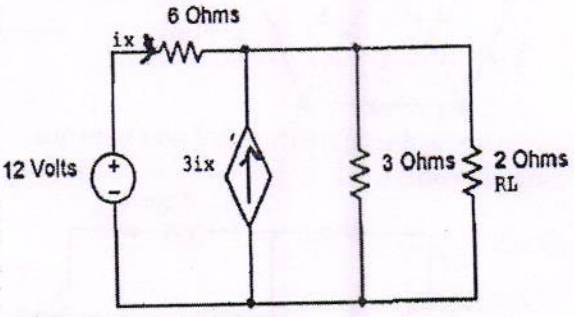
b) Find the current through 5Ω resistor 05



c) What is a Positive Real function? What are the properties of PR function? 05

d) Realize the following function in Cauer-I and Cauer-II forms 05
$Z(s) = S(S+3) / (S+1)$

2. a) Find the current through RL, in the circuit given below using Norton's theorem and also find power dissipated in R_L. 08

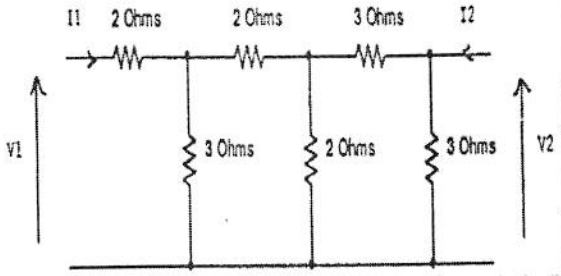


b) Check whether the following functions are Hurwitz 06
i) $P(s)= S^4+6S^3+10S^2+18S+36$
ii) $P(s)=S^6+ 2S^5+5S^4+8S^3+8S^2+8S+ 1$

c) Draw the graph of the network whose incidence matrix is given below. 06

$$\begin{bmatrix} 1 & 0 & 1 & 0 & 0 & 0 & 0 & -1 \\ 0 & -1 & 0 & -1 & 0 & -1 & 0 & 0 \\ 0 & 1 & 0 & 0 & 1 & 0 & 0 & 1 \\ 0 & 0 & -1 & 0 & -1 & 0 & 1 & 0 \end{bmatrix}$$

3. a) Find the overall ABCD parameters of the following network, by dividing the network into two or more sections. 10



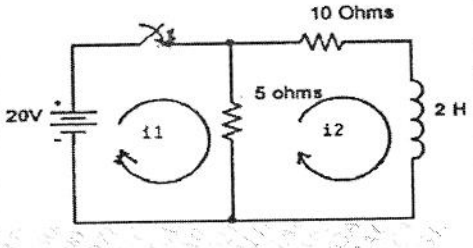
b) State and prove final value theorem. 05

c) Test whether the following function is Positive Real 05
$F(S) = (2S^2 + 2S + 1) / (S^3 + 2S^2 + S + 2)$

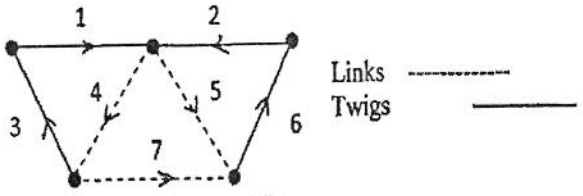
4. a) Synthesize the following function in Foster I and Foster-II forms 08
$Z(S) = 4(S + 2)(S + 7) / S(S + 4)$

b) Find h parameters in terms of z parameters 06

c) In the following network the switch is closed at t = 0, find $i_1(0^+)$, $di_1(0^+)/dt$, $d^2i_1(0^+)/dt^2$, $i_2(0^+)$, $di_2(0^+)/dt$ 06

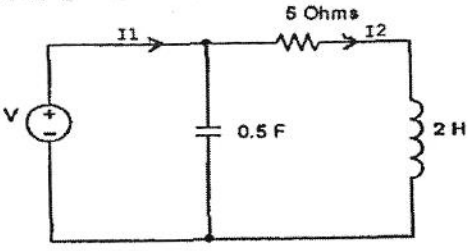


5. a) Obtain the tieset and f-cutset matrix for the graph given below. 10

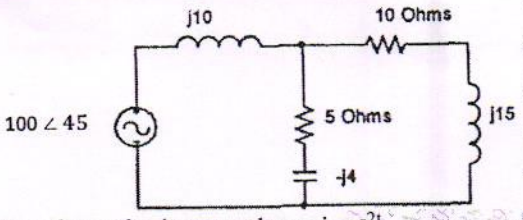


b) Find the condition for symmetry and reciprocity of a 2 port network 06

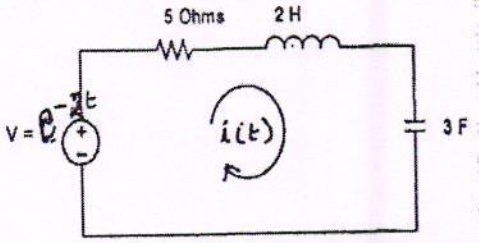
c) Find I_2/I_1 for the following network. 04



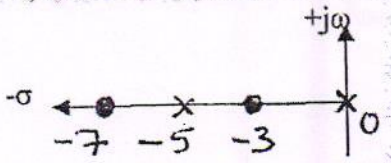
6. a) Find the voltage across 10Ω resistor using mesh analysis 08



b) Find i(t) using Laplace Transform the input voltage is e^{-2t}. 08



c) The pole zero plot of a driving point admittance function is give below. Find the function if Z (-4) = 5 and state whether it is RL, RC or LC function. 04



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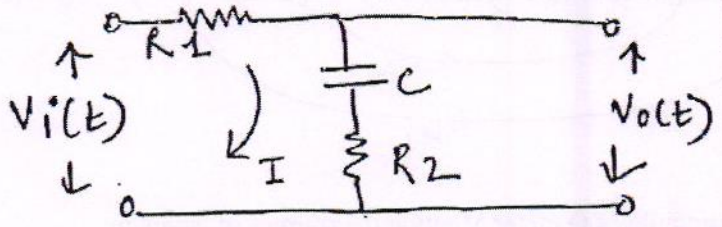
SE (E/T) sem-III Choice base 30/5/2019 Evening

Time: 3 Hours **Total Marks: 80**

N.B:

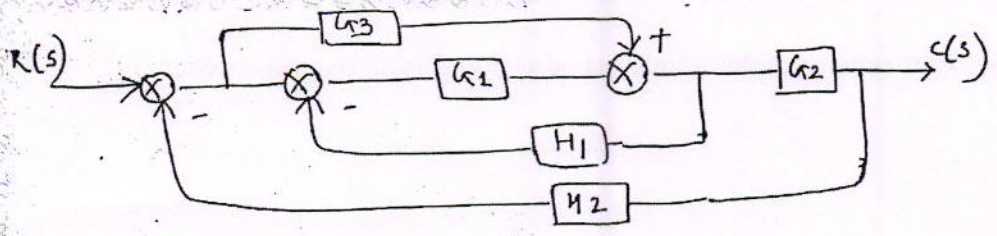
(1) Attempt **four** questions, question **no:1** is Compulsory.
(2) Assume suitable datawherever required.
(3) Answers to the questions should be grouped together.
(4) Figure to the **right** of question indicates **full** marks.

1. Attempt **all:** 20
   (a) Define accuracy, precision, linearity and sensitivity
   (b) Find the transfer function of the given electrical network



   (c) List various types of temperature transducers and write the applications of each transducers
   (d) Explain basic telemetry system
   (e) $s^3 - 4s^2 + s + 6 = 0$ is the characteristic equation of a certain control system. Determine its stability by Hurwitz method

2.
   (a) Explain measurement of inductance using Maxwell bridge .Also list the applications of it **10**
   (b) Using Block diagram reduction techniques, find closed loop transfer function **10**



3
   (a) Sketch the root locus of a unity feedback control system with $G(s) = \frac{K}{s(s+5)(s+10)}$ .Comment on the stability **10**
   (b) A Unity feedback control system has $G(S) = \frac{80}{s(s+2)(S+20)}$. Draw the bode plot and predict stability y

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(a) Explain the components of analog data acquisition system 05

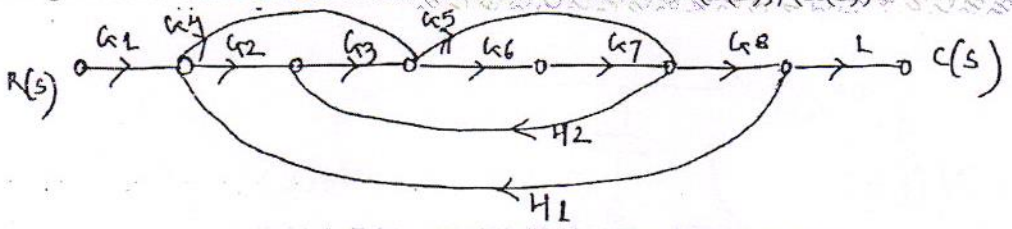
(b) For a unity feedback system

$$G(s) = \frac{k}{s(1+0.4s)(1+0.25s)}$$ find range of values of K, marginal value of K and frequency of sustained oscillations 05

(c) Explain in detail the working principal of LVDT with neat diagram and explain its application 10

5

(a) Using Mason's Gain formula evaluate the transfer function $(C(S))/(R(s))$ 10



(b) Explain the working principle of Q meter Mention the sources of errors in Q meter 10

6

(a)

(i) Explain multiplexing and discuss any one multiplexing system 05

(ii) For a unity feedback system having open loop transfer function

$$\frac{K(s+2)}{s(s^3+7S^2+12S)}$$

Find the type of system and all error coefficients 05

(i) Draw and explain the working of capacitive transducer for pressure measurement 05

(ii) How stability of the system can be analyzed using Nyquist criterion 05

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S. E. (IV) (CBCS) (E/T) 7th May 2019

Choice based

Q. P. Code: 37525

(3 hours) Total marks: 80

N.B.: (1) Question **No. 1** is **compulsory**

(2) Attempt **any Three** from remaining

Q1 a) If X_1 has mean 4 and variance 9 & X_2 has mean -2 and variance 4 where X_1 & X_2 are independent, find $E(2X_1 + X_2 - 3)$ and $V(2X_1 + X_2 - 3)$. [5]

b) Find the extremals of $\int_{x_1}^{x_2}(x + y')y'dx$ [5]

c) Verify Cauchy Schwartz inequality for the vectors $u = (-4, 2, 1)$ and $v = (8, -4, -2)$ [5]

d) Check whether $A = \begin{bmatrix} 2 & -2 & 3 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{bmatrix}$ is derogatory or not. [5]

Q2 a) Using Cauchy's Residue theorem evaluate $\int_C \frac{z-1}{(z+1)^2(z-2)}$ where C is $|z| = 4$ [6]

b) Show that the extremal of the isoperimetric problem $I[y(x)] = \int_{x_1}^{x_2}(y')^2\,dx$ subject to the condition $\int_{x_1}^{x_2} y\,dx = k$ is a parabola. [6]

c) Is the matrix $A = \begin{bmatrix} 2 & 1 & 1 \\ 1 & 2 & 1 \\ 0 & 0 & 1 \end{bmatrix}$ diagonalisable? If so find the diagonal matrix and the transforming matrix. [8]

Q3 a) Verify Cayley-Hamilton theorem for $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & -1 & 4 \\ 3 & 1 & -1 \end{bmatrix}$ hence find A^{-1} [6]

b) Check whether the following are subspaces of $\mathbb{R}^3$ [6]

(i) $W = \{(a, 0, 0) \mid a \in \mathbb{R}\}$

(ii) $W = \{(x, y, z) \mid x = 1, z = 1, y \in \mathbb{R}\}$

c) Expand $f(z) = \frac{1}{(z-1)(z-2)}$ in Taylors & Laurent's series indicating regions of convergence. [8]

Q. P. Code: 37525

Q4 a) Using Rayleigh-Ritz method to solve the boundary value problem [6]

$I = \int_0^1 (2xy + y^2 - (y')^2)\ dx\ ;\ 0 \le x \le 1$ given $y(0) = y(1) = 0$

b) If $A = \begin{bmatrix} -1 & 4 \\ 2 & 1 \end{bmatrix}$ then prove that $3 \tan A = A \tan 3$. [6]

c) If sizes of 10,000 items are normally distributed with mean 20 cms & standard deviation of 4 cms. Find the probability that an item selected at random will have size : [8]

(i) between 18 cms and 23 cms , (ii) above 26 cms

Q5 a) Find orthonormal basis of $\mathbb{R}^3$ using Gram-Schmidt process where [6]

$S = \{(1,0,0)\ ,\ (3,7,-2)\ ,\ (0,4,1)\}$

b) In a factory, machines A , B & C produce 30%, 50% & 20% of the total production of an item. Out of their production 80% , 50% & 10% are defective respectively. An item is chosen at random and found to be defective. What is the probability that it was produced by machine A. [6]

c) Evaluate $\int_{-\infty}^{\infty} \frac{dx}{(x^2+4)(x^2+9)}$ [8]

Q6 a) Evaluate $\int_C \frac{dz}{z^3(z+4)}$ where C is the circle [6]

(i) $|z| = 2$ and (ii) $|z - 3| = 2$

b) Two unbiased dice are thrown three times, using Binomial distribution find the probability that the sum nine would be obtained (i) once , (ii) twice [6]

c) For the following data [8]

X	100	110	120	130	140	150	160	170	180	190
Y	45	51	54	61	66	70	74	78	85	89

Find the coefficients of regression b_{xy} & b_{yx} and the coefficient of correlation (r)

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13/05/19.

B.E. EXTC (Choice Base) Sem IV

(Time: 3 Hours) Total Marks : 80

N.B.: (1) Question No. 1 is compulsory.

(2)Attempt any three questions out of remaining five.

(3)Figures to the right indicate full marks.

(4)Assume suitable data if required and mention the same in answer sheet.

Q.1 Solve any four (20)

a) Draw and explain operation of Depletion type MOSFET.
b) Compare RC coupled,TC coupled and DC coupled amplifier.
c) Explain design consideration of heat sinks in power amplifier.
d) Give the advantages of negative feedback .
e) State and explain Barkhausen's Criteria .

Q.2 (a) Design a two stage RC coupled CE Amplifier to meet following specifications: (15)

Av ≥1000,Vo=4V, S=10,f_L=20 Hz.Select BC147B.

(b) Explain the effect of source and load resistance on amplifier . (05)

Q.3 (a) Draw circuit diagram of Class B Push Pull Power amplifier and explain its working. Find its maximum efficiency and maximum power dissipation in each transistor. What is cross-over distortion? How it can be overcome? (10)

(b)Draw and explain Cascode amplfier in detail . (10)

Q.4 (a)Design a class A transformer coupled power amplifier for the following requirements: Output A.C.power = 5 watts,Load resistance = 12 ohms, DC supply voltage = 12 volts $S_{ICO} \leq 8$.Calculate overall efficiency at full load. (10)

(b) Explain the different types of biasing of Depletion MOSFET. (10)

Q.5 (a) Explain the different feedback topologies in detail. (15)

(b)Write a short notes on Darlington pair amplifier. (05)

Q.6 (a) Draw RC phase shift oscillator using BJT and derive the frequency of oscillation for same. (15)

(b) For Hartley oscillator calculate the frequency of oscillation if L1=L2= 1 mH and C=0.2 μF. (05)

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V_{CES} V_{CEO} V_{EBO}

Transistor type	P_{dmax} @ 25°C Watts	I_{cmax} @ 25°C Amps	V_{CE} sat volts d.c.	V_{CBO} volts d.c.	V_{CEO} (Sus) volts d.c.	V_{CER} (Sus) volts d.c.	V_{CEV} volts d.c.	V_{EBO} volts d.c.	T_j max °C	D.... current gain min	typ.	max.	Small Signal min.	typ.	h_{fe} max.	V_{BE} max.	θ_{j-a} °C/W	Derate above 25°C W/°C
2N 3055	115·5	15·0	1·1	100	60	70	90	7	200	20	50	70	15	50	120	1·8	1·5	0·7
ECN 055	50·0	5·0	1·0	60	50	55	60	5	200	25	50	100	25	75	125	1·5	3·5	0·4
ECN 149	30·0	4·0	1·0	50	40	—	—	8	150	30	50	110	33	60	115	1·2	4·0	0·3
ECN 100	5·0	0·7	0·6	70	60	65	—	6	200	50	90	280	50	90	280	0·9	35	0·05
BC147A	0·25	0·1	0·25	50	45	50	—	6	125	115	180	220	125	220	260	0·9	—	—
2N 525(PNP)	0·225	0·5	0·25	85	30	—	—	—	100	35	—	65	—	45	—	—	—	—
BC147B	0·25	0·1	0·25	50	45	50	—	6	125	200	290	450	240	330	500	0·9	—	—

Transistor type	h_{ie}	h_{oe}	h_{re}	θ_{j-a}
BC 147A	2·7 K Ω	18µ ℧	1·5 × 10⁻⁴	0·4°C/mw
2N 525 (PNP)	1·4 K Ω	25µ ℧	3·2 × 10⁻⁴	—
BC 147B	4·5 K Ω	30µ ℧	2 × 10⁻⁴	0·4°C/mw
ECN 100	500 Ω	—	—	—
ECN 149	250 Ω	—	—	—
ECN 055	100 Ω	—	—	—
2N 3055	25 Ω	—	—	—

BFW 11—JFET MUTUAL CHARACTERISTICS

−Vgs volts	0·0	0·2	0·4	0·6	0·8	1·0	1·2	1·6	2·0	2·4	2·5	3·0	3·5	4·0
Ids max. mA	10	9·0	8·3	7·6	6·8	6·1	5·4	4·2	3·1	2·2	2·0	1·1	0·5	0·0
Ids typ. mA	7·0	6·0	5·4	4·6	4·0	3·3	2·7	1·7	0·8	0·2	0·0	0·0	0·0	0·0
Ids min. mA	4·0	3·0	2·2	1·6	1·0	0·5	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0

N-Channel JFET

Type	V_{gs} max. Volts	V_{gg} max. Volts	V_{gs} max. Volts	P_d max. @25°C	T_j max.	I_{dss}	g_{fs} (typical)	$-V_p$ Volts	r_d	Derate above 25°C	θ_{j-a}
2N3822	50	50	50	300 mW	175°C	2 mA	3000 µ ℧	6	50 KΩ	2 mW/°C	0·59°C/mW
BFW 11 (typical)	30	30	30	300 mW	200°C	7 mA	5600 µ ℧	2·5	50 KΩ	—	0·59° C/mW

17/5/2019

SE (Extc) / Sem-IV / Choice based

(Time: 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:

(a) Give ideal characteristics of op-amp and give their practical values. [05]

(b) Compare linear and switching voltage regulator. [05]

(c) Design a circuit for $V_O = V_1 + V_2$ using single op-amp and few resistors. [05]

(d) What are the advantages of switch capacitor filters? [05]

(e) Explain op-amp as window detector. [05]

Q.2 (a) With the help of a neat diagram and voltage transfer characteristics explain the working of an inverting Schmitt trigger. Derive the expressions for its threshold levels. [10]

(b) Draw a neat circuit diagram of a Wien bridge oscillator using op-amp. Derive its frequency of oscillation. What are the values of R and C for frequency of oscillation to be 965 Hz? [10]

Q.3 (a) Draw the circuit diagram of a square and triangular waveform generator using op-amp and explain its working with the help of waveforms. [10]

(b) The circuit given in Fig. 3(b) is similar to that of internal diagram of IC555 with slight modifications in the internal resistances to value 2R. Analyse this circuit and draw the waveforms at output terminal v_{out} and across the capacitor C. Comment on the duty cycle of output waveform when i) R_A is less than R_B, ii) R_A is equal to R_B, and iii) R_A is greater than R_B. [10]

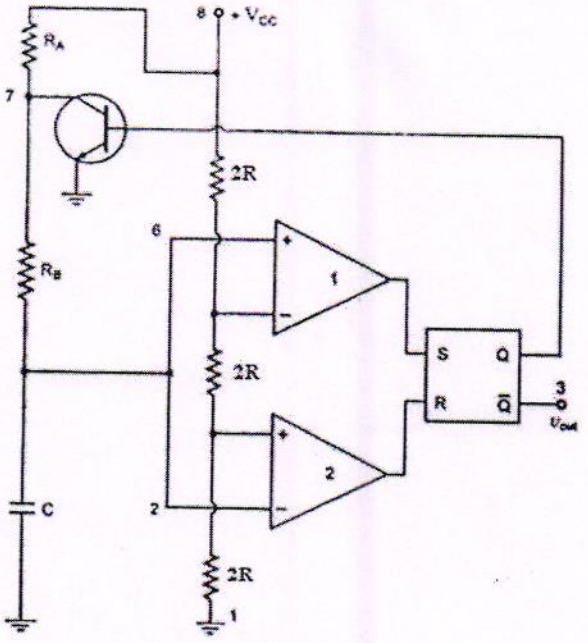

Fig. 3(b)

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]

(b) With a neat circuit derive an expression for the output of an instrumentation amplifier. [10]

Q.5 (a) With neat circuit explain R/2R ladder digital to analog converter. [10]

(b) With the help of a functional block diagram explain the working of voltage regulator LM317 to give an output voltage variable from 6 V to 12 V to handle maximum load current of 500 mA. [10]

Q.6 Short notes on: (Attempt any four)

(a) Effect of swamping resistor. [05]

(b) Current fold-back protection circuit in voltage regulator. [05]

(c) Voltage to Current converter. [05]

(d) Peak detector circuit. [05]

(e) Working of PLL IC 565. [05]

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SE- EXTC - Sem IV - Choice Based

23/05/19

(3 Hours) [Total marks: 80]

- Question no. 1 is compulsory.
- Attempt any Three questions from remaining.

Q. 1 Answer ***any 4*** questions from the given questions. 20

a. Determine energy and power of given signal.

$$x(t) = 3 \cos 5\,\Omega ot$$

b. Test the given system for linearity, causality, stability and time invariance.

$$y(t) = x(t^2)$$

c. Find the initial value x (0) and final value x(∞) of given Z-domain signals.

$$X(Z) = \frac{2z^{-1}}{1-1.8z^{-1}+0.8z^{-2}}$$

d. Realize following FIR system with minimum no of multipliers.

$$h(n) = \{-0.5, 0.8, -0.5\}$$

e. Explain applications of signals and systems in communication.

f. Give advantage of state space analysis for system analysis.

Q.2 a. Perform convolution of $x_1(t)$ and $x_2(t)$ using convolution theorem and sketch resultant waveform. Where 10

$$x_1(t) = u(t) - u(t-1)$$

$$x_2(t) = u(t) - u(t-2)$$

b. Find response of LTI system if impulse response of system is 10

$h(t) = 2e^{-3t}u(t)$ for input $x(t) = 2e^{-5t}u(t)$ using Fourier Transform.

Q.3 a. Determine inverse Z-transform of the function by using Residue method. 10

$$X(Z) = \frac{3+2z^{-1}+z^{-2}}{1-3z^{-1}+2z^{-2}}$$

b. List any 4 properties of Z-transform. 04

c. Find response of time invariant system with impulse response 06

$h(n) = \{1, 2, 1, -1\}$ to an input signal $x(n) = \{1, 2, 3, 1\}$

Q.4 a. The state space representation of a discrete time system is given by 10

$$A = \begin{pmatrix} 2 & -1 \\ 3 & 1 \end{pmatrix} \quad B = \begin{pmatrix} 1 \\ 2 \end{pmatrix} \quad C = [1 \quad 3] \quad D = [3]$$

Derive the transfer function of the system.

b. Find the digital network in direct form I and II for the system described by the difference equation 10

$y(n) = x(n)+0.5\, x(n-1)+0.4\, x(n-2)-0.6\, y(n-1)-0.7y(n-2)$

Q. 5 a. Determine Fourier series representation of the half wave rectifier output given by equation, 10

$$x(t) = A \sin \Omega ot \quad ; \text{for } t=0 \text{ to } \frac{T}{2}$$

$$= 0 \quad ; \text{for } t= \frac{T}{2} \text{ to } T$$

b. Determine Fourier transform of 10

$$x(t) = 1-t^2 \quad ; \text{for } |t| < 1$$

$$= 0 \quad ; \text{for } |t| > 1$$

Q.6 Write short note on ***any two***. 20

a. ROC in Z-transform and Laplace transform.

b. Gibbs Phenomenon.

c. Relation of ESD, PSD with Auto-correlation.

SE(E/T) sem-IV Choice Based 29/5/19

Duration :3hrs Max.Marks:80

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

1. Solve **any four** 20
   (a) Why AGC is required in radio receiver?
   (b) Explain Noise figure and noise factor.
   (c) Why IF is selected as 455 KHz in AM?
   (d) Explain natural top and flat top sampling
   (e) Compare narrow band FM and wideband FM.

2. (a)List the methods used for SSB generation. Explain the third method of SSB generation with suitable diagram. 10
   (b) The unmodulated carrier power of AM transmitter is 10 Kw and carrier frequency is 2 MHz. The carrier is modulated to a depth of 50% by an audio signal of 5KHz.Assume R=1Ω. 10
   i) Determine the total transmitted power.
   ii) Determine the SSB power.
   iii) Percentage of power saving if SSB is transmitted.
   iv) Draw the frequency spectrum and find the bandwidth.

3. (a) Explain FM demodulator using PLL with suitable diagram. 10
   (b) Explain amplitude limiting and thresholding in detail with its significance. 10

4. (a)) Explain Varactor diode modulator ? 10
   (b) With the help of suitable waveforms explain generation and detection of PPM. 10

5. (a) Explain independent side band receiver in detail with block diagram. 10
   (b) Compare Amplitude, Frequency and phase modulation. 10

6. Write short note on **(any four)** 20
   (a) Aliasing error and aperture effect
   (b) Applications of Pulse communication
   (c) VSB transmission with its application
   (d) Time division Multiplexing (TDM)
   (e) Low level and high level modulation

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TE (IT) (Choice Based) (CE/IT)

9th May 2019

(3 Hours)

Total Marks = 80

N.B.

1. Question No: 1 is compulsory.
2. Solve any three questions out of remaining questions.
3. Assume suitable data where necessary.

Q. 1 (a) Explain need of assembly language and compare with high level languages 05M

Q. 1(b) What is memory segmentation of 8086? Explain in brief. 05M

Q. 1 (c) Write an 8086 based program to read a character from keyboard of IBM PC and display it on the screen. Use INT 21H, function AH=07 that reads character input without echo in reg. AL and function AH= 02 to display a character stored in register DL. Explain logic of the program in brief. 05M

Q.1 (d) If (CS) = 5000H, (DS) = 6000H, (SS)= 7000H and (ES) = 8000H, draw the memory map of 8086 cpu with starting and end physical address of each segment. 05M

Q.2 (a) Explain Minimum mode of 8086 µp. Draw timing diagram for Read operation in minimum mode. 10 M

Q.2 (b) Ten, 8 bit numbers are stored in data segment. Write an 8086 based program to check whether at least one number out of these numbers matches with 20H or not. If match is found make AH =00H otherwise AH= FFH 10 M

Q.3 (a) Describe the features of Programmable Interrupt Controller 8259. What is master slave configuration of 8259 ? . 10 M

Q.3 (b) Write a program to find strength of positive and negative numbers among the series of 10 signed numbers. 10M

Q.4 (a) Explain the communication of Math co-processor with 8086. 10 M

Q.4 (b) Draw and Explain the interfacing of DAC 08 with 8086 Microprocessor. 10 M

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Q.5 (a) If analog voltage of 3.2V is connected to the IN3 channel of ADC 0809. Suggest hardware and write a program to convert analog voltage to its digital equivalent and store the value in AL register. Comment on the digital equivalent expected. 12 M

Q.5 (b) What are different types of buses in microprocessor based system? Discuss their role in the system in brief. 08M

Q.6 (a) Design an 8086 based system with 32K RAM (2 chips of 16K). Draw the memory map of the system designed. 10 M

Q.6 (b).Explain salient features of Programmable Interval Timer 8255. What are different modes of operations ? Explain in brief. 10 M

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4 hrs
15/05/19.

T.E (EXTC) CBCGS Sem V

Time: 3 Hours **Marks: 80**

NB. 1. Question No. **1** is **compulsory**.
2. Attempt **any three** out of remaining five questions.
2. Figures to right indicate full marks.
3. Assume data wherever required and state it clearly.

Q1 20

a) Stating the relationship between PDF and CDF, give the properties of PDF.
b) Define Entropy of an information source? When is the entropy maximum?
c) Over a long transmission line draw the following data format for the binary sequence 10011101011.
i) Unipolar NRZ ii) Polar RZ iii) Manchester
Select the best and justify the answer.
d) Explain the role of Hamming distance in error detection & correction?
e) For impulse responses $g^1=\{1,1,0\}$, $g^2=\{0,1,0\}$, $g^3=\{1,1,1\}$ design the state diagram.

Q2

a) A discrete memoryless source has an alphabet of six symbol with their probabilities as shown: 10

Symbol	M_1	M_2	M_3	M_4	M_5	M_6
Probability	0.3	0.25	0.15	0.12	0.08	0.10

i) Determine the Minimum Variance Huffman code-words and average code-word length and hence find Entropy of the system.
ii) Verify the average code-word length using Shannon Fano.
iii) Compare and comment on the results of both

b) A convolution encoder has a constraint length of 3 and code rate of 1/3. The impulses for each are $g^1=100$ $g^2=101$ $g^3=111$. Draw 10

i) encoder
ii) state diagram
iii) code transfer function

Q3

a) State and prove the Conditional Probability. 10
b) Draw the signal space diagram for 16-PSK and 16-QAM and find their error probability. Also draw their PSD and determine bandwidth. 10

Q4

a) A parity check matrix of a (7,4) Hamming code is given as follows: 10

$$H = \begin{bmatrix} 1 & 1 & 1 & 0 & 1 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 & 1 & 0 \\ 1 & 1 & 0 & 1 & 0 & 0 & 1 \end{bmatrix}$$

i) Find Generator matrix, using which find out the code-words of 1100 and 0101 ,
ii) Determine the error detecting and correcting capability of system,
iii) Draw the encoder for the above block code.

b) Sketch the encoder and syndrome calculator for the generator polynomial 10

$g(x)=1+x^2+x^3$ and obtain the syndrome for the received code-word 1101011.

Q5

a) Discuss the problem of inter symbol interference (ISI). Explain the measures to be taken to reduce ISI. How to study ISI using eye pattern? 10

b) Consider a convolution encoder with the constraint length K=3 and $g^1= \{1,0,1\}$ and $g^2=\{0,1,1\}$. Find the code vector for the message stream 11010 using time domain approach. Verify the code vector using transform approach. 10

Q6

Explain with the required diagrams **(Any Three):** 20

a) Modified duo-binary encoder

b) Shannon Hartley Theorem for Channel Capacity

c) Need for error control codes.

d) Define the following terms and give their significance

(i) Mean (ii) Central moment (iii) Variance (iv)Standard deviation

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TE (EXTC) / sem - V / choice Based

21/05/19

Duration: 3 Hours

Marks : 80

1] Question no. 1 is Compulsory
2] Attempt any three questions out of remaining questions
3] Assume suitable data if require

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

a) Explain Wave equation for free space.
b) Calculate Divergence and Curl of $\bar{F} = r\cos\varphi\,\overline{a_r} + rz^2\overline{a_\varphi}$ Units
c) Derive Faraday's Law with suitable applications.
d) Derive Laplacian's Equation for charge free dielectric region.
e) Explain Reflection Coefficient of Transmission lines.
f) Explain Gauss's Law in detail with applications.
g) Derive relationship between Electric field and Voltage.

Q. 2

a) Derive magnetic field provided by infinite thin filament caring current I suspended on 'z' axis. Also, provide significance over short filament. 10

b) Calculate input impedance of the lossless transmission line terminated by load impedance of $Z_L = 100 + 100j\ \Omega$ in $Z_0 = 50\ \Omega$ system with length of $l = 0.35\lambda$ with $f = 3GHz$, air as dielectric for transmission (Either by theoretical method or by Smith chart). 10

Q. 3

a) Find out total Electric field at Origin because of following charge distributions: 10

- Point charge of $20nC$ placed at $(-1, -2, -3)$
- Point charge of $50nC$ placed at $(-2, -3, -4)$
- Uniform infinite line charge of $2nC/m$ placed at $x = -5, z = -6$
- Uniform infinite surface charge of $0.5nC/m^2$ placed at $z = -5$

b) Explain Point and Integral format of Time Varying field Maxwell's Equation with appropriate examples. 10

Q. 4

a) If plane interface between two perfect dielectric mediums is located at $z = 0$. A 4GHz uniform planar wave travelling along z axis is incident from region 1, $z \leq 0$ onto region 2, $z \geq 0$. The wavelength in dielectrics are $\lambda_1 = 6cm$ and $\lambda_2 = 4cm$. Both the materials are non-magnetic. What are the percentage of energy on boundary is:

- Reflected
- Transmitted
- Standing wave ratio in region 1 10

b) Aircraft antenna radiates Electric field in air ($\sigma = 0, \mu = \mu_0, \varepsilon = \varepsilon_0$) which is $\bar{E} = 25\cos(10^9 t + 0.33x)\overline{a_y}\ KV/m$ find out following terms related with this EM System:

- Propagation constant (k)
- Phase Velocity
- Intrinsic Impedance (η)
- Average Poyting Power
- Magnetic Field ($\bar{H}$) 10

Q. 5

a) Two plates of cylindrical capacitor describe by their radius $\rho_1 = 1mm$ & $\rho_2 = 1mm$ holding voltage of $V_1 = 1V$ *and* $V_2 = 100V$ find out $\bar{E}$ in capacitor, also prove that dielectric of capacitor dose not carries any charge. 10

b) Derive Poynting Vector and explain effects of medium parameters on EM power with suitable diagram 10

Q. 6 **Write short note on** **20**

a) Super Conductivity
b) Helmholtz's Equation
c) Wave equation for transmission line
d) Electrical Discharge

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TE EXTC SEM-V CHOICE BASED Date : 27/05/2019

(3 Hours) [Total Marks: 80

N.B.: (1) **Questions No.1** is **compulsory**.
(2) Attempt **any three** questions out of remaining **five** questions.
(3) Assume suitable **data** if **required**.
(4) **Figures** to the **right** indicate **full marks**.

Q 1.Solve **any four** **20**

a) Compare Impulse invariant method and BLT method.
b) If x[n]={1,2,1,2} , determine X[K] using DIF FFT.
c) State and prove frequency shifting property of DFT.
d) Write a short note on replication.
e) State advantages of digital filters.

Q 2 a) Develop composite radix DITFFT flow graph for N=6=2*3. **10**

b) Design a digital Butterworth filter that satisfies following constraints using bilinear transformation method. Assume Ts=0.1s. **10**

$0.8 \leq |H(e^{jw})| \leq 1 \quad 0 \leq w \leq 0.2\pi$

$|H(e^{jw})| \leq 0.2 \quad 0.6\pi \leq w \leq \pi$

Q 3 a) Explain Dual Tone Multifrequency Detection using Goertzel's algorithm. **10**

b) Design a linear phase FIR low Pass filter of length 7 and cut off frequency 1 rad/sec using Hamming window. **10**

Q 4 a) Compute DFT of x[n]={1,2,3,4,5,6,7,8} using DITFFT algorithm. **10**

b) Explain Finite word length effects in digital filters. **10**

Q.5 a) Explain Architecture of TMS320C67XX DSP processor with the help of neat block Diagram **10**

b) Find DFT of x(n)={1,2,3,4}. Using these results and not otherwise find DFT **10**

i) $x_1(n)=\{4,1,2,3\}$
ii) $x_2(n)=\{2,3,4,1\}$
iii) $x_3(n)=\{6,4,6,4\}$

Q 6. Solve following

a) Obtain digital filter transfer function by applying impulse invariance transfer function. **08**

$H(s)=\frac{s}{(s+5)(s+2)}$ if Ts=0.1s.

b) Explain application of DSP processor to radar signal processing. **06**

c) Write short note on limit cycle oscillations **06**

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T.E (EXTC) sem-V choice base 31/05/2019 Evening

(3 Hours) [Total Marks: 80]

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

1. Solve any four **20**
   (a) Why we use DCT in JPEG?
   (b) What is biometric authentication?
   (c) Why we need data compression?
   (d) What are the various models used for data compression?
   (e) Explain Chinese Reminder theorem (CRT) with example

2. (a) A Source emits letters from alphabet M=[m1,m2,m3,m4,m5] with probabilities P(m1)=0.15, P(m2)=0.05,P(m3)=0.25, P(m4)=0.05 and P(m5)=0.50. **10**
   i) Calculate entropy of this source. **10**
   ii) Find Huffman code for this source.
   iii) Find Average length of this code.
   iv) Find its redundancy.
   (b) What is the significance of prime numbers in public key cryptography? Explain RSA algorithm with suitable example.

3. (a) Explain : **10**
   i) Fermat's little theorem with example.
   ii)Euler's phi function with example
   (b) Take an alphabet string and show encoding procedure for LZ78 and LZW. Compare LZ78 and LZW **10**

4. (a) Explain the working of standard. DES with suitable diagram. **10**

   (b) Explain Ceaser Cipher and multiplicative ciphers with suitable examples and diagrams. **10**

5. (a) Explain Hashed MAC with suitable diagram. **10**

   (b) Explain Intrusion detection system. **10**

6. Write short note on **(any four)** **20**

   (a) μ-law and A- law Companding with digital audio

   (b) S/MIME

   (c) JPEG 2000

   (d) Diffie-Hellman key exchange

   (e) MPEG-2

TE (E/T) (CVI) (Choice based) 16th May 2019

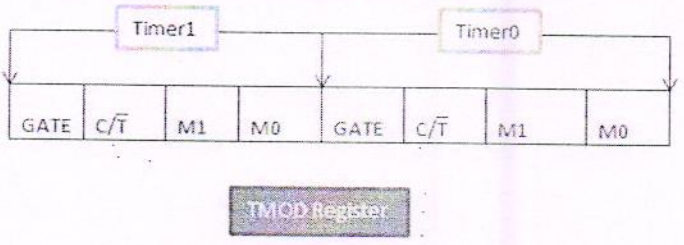
Time: 3 Hours **Marks: 80**

- Question no. 1 is compulsory
- Attempt any Three questions from remaining
- Assume suitable data wherever necessary

Q1 a) Explain Program Status word Register of 8051 Microcontroller [5]
b) Explain any five Addressing modes of 8051 with one example in each [5]
c) Write short notes on CPSR of ARM7 [5]
d) Differentiate between ARM and THUMB state. [5]

Q2 a) Explain Internal RAM Organization of 8051 Microcontroller [10]

b) Write a program for 8051 microcontroller to generate square waveform of 2kHz & 50% duty cycle at pin P2.1. Assume 8051 is operating at frequency 11.059MHz. Use hardware timer 0 in mode 1 to generate delay. [10]



Q3 a) Explain Interrupts in 8051 along with Interrupt vector table. [10]
b) Explain LCD interfacing with 8051 and write assembly language program to display message "HI" on it. Draw the connection diagram of 8051 with LCD. [10]

Q 4 a) Explain in detail 8051 Timer operating modes [10]
b) Draw & Explain dataflow model of ARM7 [10]

Q 5 a) Explain Operating modes of ARM7 Processor [10]
b) Explain Addressing modes of ARM7 Processor with examples [10]

Q 6 a) Explain following instructions of ARM7 processor with example [10]
1. ADD r0, r1, r1, LSL #1
2. STR r0, [r1]
3. LSR r0,#2
4. LDR r0,[r1,#2]
5. CMP r0,r1,LSR #3

b) Write embedded C language program to blink LED at P0.16 with certain delay. Use Software approach to generate delay. [10]

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TE (Extc) | Sem-VI | Choice based Date:- 16/5/2016

(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) Compare circuit switching and packet switching.
b) Illustrate byte count framing method in Data link Layer.
c) Explain the tools to achieve Error control in TCP.
d) How the medium access with Collision avoidance (MACA) protocol works in wireless LAN?
e) Describe Border Gateway protocol (BGP) as a inter-domain Routing protocol?

Q.2 a) Explain Link state Routing protocol with the help of building of Link state packets and distribution of link state packets. [10]
b) Explain HDLC frame format. Describe configuration and response modes supported by HDLC protocol. [10]

Q.3 a) Draw TCP header and explain the meaning of various fields associated with it. [10]
b) What are the different types of CSMA protocols? Explain 1-persistant CSMA protocol. [10]

Q.4 a) The following is a dump of a UDP header in hexadecimal format. [10]
CB84000D001C001C
(i) What is the source port number?
(ii) What is the destination port number?
(iii) What is the total length of the user datagram?
(iv) What is the length of the data?
(v) Is the packet directed from a client to a server or vice versa?
b) Explain Go back N protocol with suitable diagram. [10]

Q.5 a) Explain the function of Repeater, hub, bridge, routers and switches in details and mention in which layer they work. [10]
b) A company is granted the site address 181.56.0.0 (class B). The company needs 1000 subnets. Design the subnets. [05]
c) A bit stream **10011001 11100010 00100100 10000100** is transmitted to the receiver. Apply checksum error detection scheme and check whether data will be accepted at receiver or not? [05]

Q.6 Short notes on: (Attempt any four) [20]
a) IPv4 datagram
b) Point to Point Protocol (PPP)
c) Digital Subscriber Line (DSL)
d) OSI Model
e) Adaptive tree walk Protocol

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65628

Paper / Subject Code: 88943 / Antenna & Radio Wave Propagation

TE – EXTC – sem VI – Choice Based 22/05/19

(3 Hours) (Maximum Marks 80)

NB 1. Question No. 1 is Compulsory.
2. Attempt any 3 questions out of remaining 5.
3. Assume suitable data if necessary.
4. Figures to the right indicate the maximum marks.

Q.1 a) A lossless resonant half-wavelength dipole antenna, with input impedance of 73 ohms, is connected to a transmission line whose characteristic impedance is 50 ohms. Assuming that the pattern of the antenna is given approximately by $U=B_o Sin^3\theta$, find the maximum absolute gain of this antenna. 05

b) List salient features of Microstrip antenna. 05

c) Draw current distribution and radiation pattern of 0.1λ, 0.5 λ, λ and 3 λ simple dipole antenna. 05

d) What is grating lobe in broadside and end-fire array antenna, how it can be minimized in both. 05

Q2 a) What is the significance of beamwidth of antenna? If HPBW of directional antenna in E-plane and H-plane is 30^0 and 45^0 respectively, calculate directivity and gain of the same antenna. (Assume radiation efficiency =55%) 10

b) With neat sketch explain parabolic reflector antenna. List feed mechanism used. 10

Q.3 a) Derive expressions of radiation resistance of half wavelength dipole antenna. Why, actual length of half wavelength dipole antenna is lies between 0.47λ to 0.48 λ instead of 0.5 λ. 10

b) With neat diagram derive important parameters of helical antenna in axial mode. What is the effect of change in length and circumference of the same on the radiation pattern? 10

Q.4 a) What is pattern multiplication of array antenna, if two isotropic point sources of array are λ/4 distance apart and if they fed with equal amplitude and π/2 phase, draw radiation pattern of the same. 10

b) Design 10-element binomial array with a spacing of λ/2 between the elements. Determine amplitude distribution of all elements; also calculate the half-power beamwidth (in degrees) and the maximum directivity (in dB). 10

Q.5 a) Design rectangular microstrip antenna for 2.4 GHz frequency application using Rogers RT/Duroid 5880 substrate with thickness of 1.6 mm. 10

b) Describe formation of ionized layer in the ionosphere and describe their importance in radio communication. Define critical frequency. 10

Q.6 Write short notes on (any four)

a) Polarization measurements. 05

b) Ground wave propagation. 05

c) Phased (Scanning) Array. 05

d) Log-periodic antenna. 05

e) Horn antenna. 05

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T.E (E/T) sem-VI choice based 28/05/2019.

Time: 3 Hrs **Total marks: 80**

Instructions

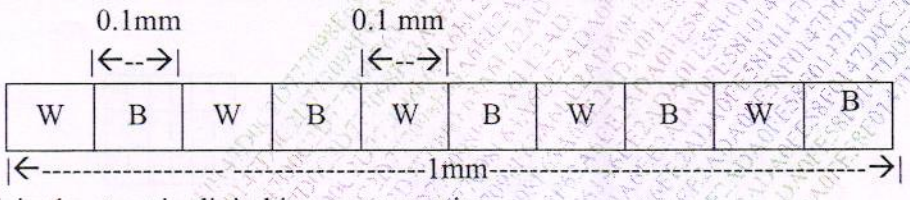
1. Q1 is compulsory
2. Solve any 3 from remaining
3. Assume suitable data if necessary

Q1 Answer the following

1. Identify the noise in following image and remove it by filtering 4M

19	0	20	21
21	150	25	26
22	23	24	27

2. For given figure, Improve and reduce the spatial resolution, consider W= White line, B = Black line, Size of each white and black line is 0.1 mm, total length is 1 mm. 4M



3. Explain the steps in digital image processing 4M
4. Write Hadamard transform matrix for N=4 and its application 4M
5. Explain the effect of illumination in thresholding 4M

Q2

1. Find Haar basis for N=4 10M
2. Explain image enhancement using frequency domain filtering 10M

Q3

1. For given image find and equalize histogram 07M

10	12	8	9
10	12	12	14
12	13	10	9
14	12	10	12

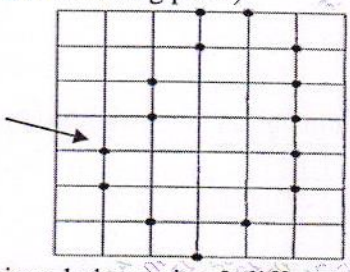
1. Apply Averaging filter on given image Use pixel replication for padding. 05M

4	8	9
12	15	18
30	32	46

2. Explain 1) Sharpening using 2nd order derivative 2) Unsharp masking and high boost filtering 8M

Q4

1. Draw PDF and write equation for following noise models 04M
   a) Gaussian Noise b) Rayleigh noise
2. Find the chain code, shape number for given image using 8-connectivity. Use anti-clockwise direction. (Arrow shows starting point) 6M



3. Find the border for image F given below using 2 different structural elements A and B respectively 10M

F=

0	0	1	1	1	1	0	1	1	1	0	
0	1	1	1	1	1	1	1	1	1	0	
0	1	1	1	1	1	1	1	1	1	0	
1	1	1	1	0	1	1	1	1	1	1	
0	1	1	1	1	1	1	1	1	1	1	
0	1	1	1	1	1	1	1	1	1	0	
0	1	1	1	1	1	1	1	1	1	0	
0	0	0	0	0	1	1	1	0	0	0	

A=

0	1	0
1	1	1
0	1	0

B=

1	1	1
1	1	1
1	1	1

Q5

1. Explain SVM in detail? 10M
2. Explain canny edge detection algorithm with proper steps 10M

Q6 Write Short Notes on any 2 of the following 20M

1. Geometric border representation
2. B-spline algorithm
3. Statistical texture description methods

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T.E. Sem-VI ExTC choice based 03/05/2019

Time: 3 Hrs **Total Marks: 80**

N.B. : (1) Question no 1 is compulsory
(2) Attempt any 3 question out of remaining.
(2) Figures to the right indicate full marks.
(3) Assume suitable data wherever necessary and indicate the same.

Q1		
a.	Compare CW Radar with Frequency Modulated Radar.	[5]
b.	Explain Frequency Agility and Diversity Technique.	[5]
c.	Explain factors which governs pulse repetition frequency.	[5]
d.	Explain radar range equation.	[5]
Q2		
a	Explain Doppler Filter banks along with its merits and demerits	[10]
b	What do you mean by Radar Cross Section? Explain RCS of Sphere.	[10]
Q3		
a	Draw and explain 'Delay Line Canceller 'along with its frequency response.	[10]
b	Give importance of Match filter of Radar and discuss them in detail.	[10]
Q4		
a	Discuss in brief Radar Resolution Cell, land and Sea Clutter	[10]
b	With the help of detailed block diagram explain Conical Scanning used in Radar Systems	[10]
Q5		
a	Draw and explain Travelling Wave Tube Amplifier used in Radar Transmitter	[10]
b	Compare low power and High Power Radar Transmitter along with their applications	[10]
Q6		
a	Explain methods of Integration of Radar Pulses to improve its detection. Define Integration Improvement Factor. How does it affect Radar Equation	[10]
b	Draw block diagram of MTI Radar and explain each block in detail.	[10]

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B. E. (VII) (CBSGS) (E/T) 7th May 2019

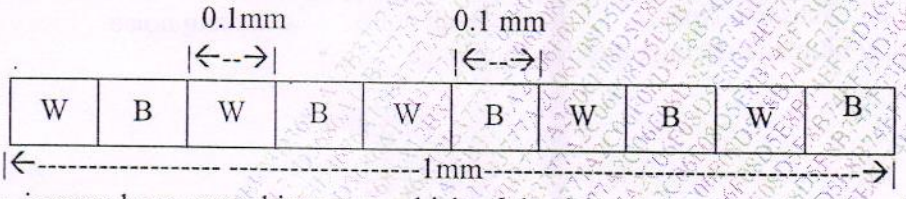
Time: 3 Hrs **Total marks: 80**

Instructions

1. Q1 is compulsory
2. Solve **any three** from remaining
3. Assume suitable data if necessary

Q1 Answer the following

1. Image resulting from poor illumination could be difficult to segment, State true or false, Justify your answer 4M
2. For given figure, Improve and reduce the spatial resolution, consider W= White line, B = Black line, Size of each white and black line is 0.1 mm, total length is 1 mm. 4M



3. Two images have same histogram which of the following properties must they have in common 1) same total power 2)same entropy 3) same inter pixel covariance function Justify your answer 4M
4. Compare 2-D motion and optical flow 4M
5. Draw and explain the model of image degradation/restoration process 4M

Q2

1. For given image find and equalize histogram 8M

1	2	3	4
5	5	6	6
6	7	6	6
6	7	2	3

2. Explain 1) Contrast stretching 2) Log Transformation with neat diagrams 6M
3. Prove Periodicity and symmetry properties of DFT 6M

Q3

1. Apply 1) Averaging filter 2) Median filter on following image. Use pixel replication for padding. No marks if procedure not followed 8M

4	8	9
12	15	18
30	32	46

2. Explain 1) Sharpening using 2nd order derivative 2) Unsharp masking and high boost filtering 8M
3. Let V = {0,1} . Compute 1) Euclidean distance 2) City block distance 3) Chess board distance between pixels p and q 4M

0	1	1	1
1	0	0	1 (q)
1	1	1	1
1 (p)	1	1	1

Q4

1. Draw PDF and write equation for following noise models 6M
   a. Gaussian Noise b. Rayleigh noise c. Erlang noise
2. Apply bit plane slicing on following image

5	7	5
4	6	3
1	3	2

3. Find the border for image F given below using two different structural elements A and B respectively 10M

F=

0 0 1 1 1 1 0 1 1 1 0
0 1 1 1 1 1 1 1 1 1 0
0 1 1 1 1 1 1 1 1 1 0
1 1 1 1 0 1 1 1 1 1 1
0 1 1 1 1 1 1 1 1 1 1
0 1 1 1 1 1 1 1 1 1 0
0 1 1 1 1 1 1 1 1 1 0
0 0 0 0 0 1 1 1 0 0 0

A=

0	1	0
1	1	1
0	1	0

B=

1	1	1
1	1	1
1	1	1

Q5

1. Classify video frames? What is GOP? 6M
2. Which are the digital quality measures? Explain any 2 6M
3. Find DCT of given image by finding kernel function 8M

4	2	2	1
2	5	8	9
2	4	5	2
2	3	2	2

Q6

1. Explain motion estimation criterion based on optical flow equation 10M
2. Write Short Notes on **any two** 10M
   1. Exhaustive block matching algorithms
   2. Binary Feature Matching
   3. Motion Representation

B.E EXTC (CBSGS) VII Sem

Date: 13/05/19.

(3 Hours) [Total Marks: 80]

N.B.: (1) Question no 1 is compulsory
(2) Solve any three from remaining five
(3) Assume suitable data if required.
(4) Figures to the right indicate full marks.
(5) Draw neat diagrams wherever required.

1	(a)	What is timing advance in GSM?	05
	(b)	Explain Foliage loss in propagation.	05
	(c)	What is cell dragging and dwell time?	05
	(d)	How handoffs are prioritized	05
2.	(a)	If bw=1.25MHz, R=9600 bps and minimum acceptable E_b/N_0 is found to be 10 dB determine the maximum no of users that can be supported in a single-cell CDMA system using a) omnidirectional base station antennas and no voice activity detection and b) 3 sectors at base station and activity detection with α=3/8 assume the system is interference limited.	10
	(b)	Draw and explain 3GPP architecture	10
3	(a)	Draw and explain Signaling architecture of GSM.	10
	(b)	What is the concept of software Defined Radio	10
4	(a)	Classify small scale fading based on Multipath Time Delay Spread and Doppler spread and explain in brief each type.	10
	(b)	Explain Block Call delayed and Block Call cleared System	10
5	(a)	Draw reference architecture of GPRS and explain role of SGSN and GGSN	10
	(b)	Draw and explain IMT 2000 architecture	10

6. Write short note on

a) MIMO technique in LTE

b) Rake Receiver

c) Power control in CDMA 2000 and WCDMA

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BE (Extc) / Sem – VII / CBSGS 17/5/2019

(3 Hours) [Total Marks: 80]

N.B.

(1) **Question No.1** is compulsory
(2) **Attempt** any **three** questions from remaining questions.
(3) **Figures** to right indicate **full** marks

1. a) Explain the advantages and disadvantages of SONET/SDH **05**
   b) Compare Linear and Nonlinear Scattering **05**
   c) What is the Numerical Aperture of Fiber? Give its significance **05**
   d) What is Optical Circulator? Give its applications. **05**

2. a) Explain in brief intermodal and intramodal dispersion in fiber **10**

   b) A 6Km optical link consist of multimode step index fiber with a core refractive index of 1.5 and relative refractive index difference of 1%. Estimate **10**
   (i) Delay difference between slowest and fastest modes at the fiber output
   (ii) RMS pulse spreading due to intermodal dispersion on the link
   (iii) Maximum bit rate that may be obtained without substantial errors on the link assuming only intermodal dispersion
   (iv) Bandwidth Length product corresponding to (iii)

3. a) What are the different fiber fabrication methods? Explain double crucible method of fiber fabrication. **10**

   b) What is optical amplifier? Compare different types of optical amplifiers **10**

4. a) Explain in detail working principle of PIN photodetector. Explain its merits and demerits **10**

   b) What is OTN? Draw and explain its frame structure **10**

5. a) What are the advantages of OTDM? Explain its working principle **10**

   b) Discuss the term power penalty with suitable system model **10**

6. Write short notes on any two **20**
   a) Passive optical Network
   b) Dispersion compensation
   c) Performance and fault management in optical network
   d) Optical safety

BE EXTC / SEM. VII CBSGS / 23/05/2019

(3 Hours) **Max Marks: 80**

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) What factors limit transistor use at microwave frequencies? [5]
(b) Explain Doppler shift and its role in CW radar. [5]
(c) Explain the working of Phase shifter. [5]
(d) Explain the principle of working of quarter wave transformer. [5]

Q.2

(a) Explain how avalanche devices operate. Name three devices that use the avalanche mode for their operation. [10]
(b) Design single-stub (short circuit) shunt tuning networks to match a load impedance $Z_L = 60 - j80\ \Omega$, to a 50 Ω line. Assuming that the load is matched at 2 GHz [10]

Q.3

(a) Explain the working of a negative resistance parametric amplifier. [10]
(b) Explain the concept of velocity modulation. Also explain the working of cylindrical magnetron. [10]

Q.4

(a) Derive equation for phase velocity, cutoff frequency, cutoff wavelength and field equations for rectangular waveguide. [10]
(b) Explain how avalanche devices operate. Name three devices that use the avalanche mode for their operation. [10]

Q.5

(a) Derive the Radar range equation as governed by minimum detectable signal to noise ratio. [10]
(b) Draw the functional block diagram of an MTI Radar system and explain its operation. Define the terms blind speed and MTI improvement factor. [10]

Q.6

(a) Instrument landing system. [5]
(b) Ferrite device Isolator [5]
(c) Hybrid ring [5]
(d) Modes in Gunn diode [5]

B.E. (EXTC) sem-VII CBSGS. 25/5/19 morning

Duration: 3 Hours **Marks: 80**

Note:

1) Q.1 is **compulsory**.
2) Attempt any **three** questions from the remaining **five** questions.
3) Assume Suitable data wherever necessary

Q.1 (a) In JPEG compression why DCT is the preferred transform? (20)
(b) State Fermat's theorem and describe its application in cryptography.
(c) Compare image and video compression concepts.
(d) What are 'active 'and 'passive' attacks on security system? List two attacks for each type.

Q.2 (a) Draw and explain the block diagram of JPEG2000 image compression standard. (10)

(b) Explain why RSA works? In a public-key system using RSA, you intercept the cipher text C = 10 sent to a user whose public key is e = 5, n = 35. What is the plaintext M? (10)

Q.3 (a) What is 'frequency' and 'temporal' masking? Explain how it is used and implemented in MP3 audio compression. (10)

(b) Explain Hash function. What characteristics are needed in a secure hash function? (10)

Q.4 (a) Encode and decode the sequence 'abababababaab' using LZW. Initial dictionary (a,b).Compare LZ77 and LZ78. (10)

(b)Describe Diffie-Hellman key exchange protocol and also a man-in-the-middle attack on the protocol. (10)

Q.5 (a) Consider a source with symbols = {m, n, o, p, q} with corresponding probabilities {0.1, 0.1, 0.2, 0.3, 0.3}. Using arithmetic coding, determine the output tag for the message "nqpo". Also, reconstruct the message using this tag. (10)

(b) Draw and explain the working of AES encryption algorithm. (10)

Q.6 (a) Explain μ Law and A Law Companding. How it is used in audio compression? (10)
(b) Write short notes(Any two)
(i) Chinese remainder theorem in cryptography (10)
(ii)Triple DES
(iii) Intruders and viruses

BE (VIII) (~~Old~~ CBS(RS)) (E/T) 8th May 2019

(3 Hours) [Total Marks - 80]

N. B.(1) Question 1 is compulsory

(2) Solve any three from remaining five.

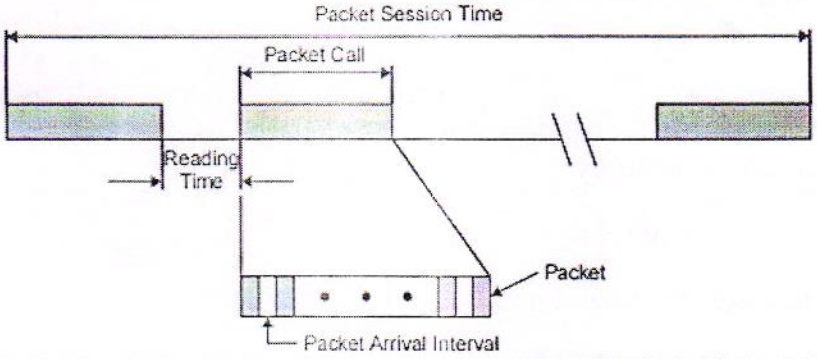
(3) Draw neat sketches wherever require.

(4) Assume suitable data if required.

1. **Solve any four**
   (a) Give the features of LTE 5
   (b) Explain various states in Bluetooth system 5
   (c) What are the three phases of wireless network design? Explain 5
   (d) What are the basic middleware functions for WSN? Explain. 5
   (e) What is RFID? Discuss different components of RFID and explain how the communication takes place among the components? 5

2. (a) Using the following data for a GSM network, estimate the voice and data traffic per subscriber. If there are 40 BTS sites, calculate voice and data traffic per cell. 10
   - Subscriber usage per month: 150 minutes
   - Days per month: 24
   - Busy hours per day: 6
   - Allocated spectrum: 4.8MHz
   - Frequency reuse plan: 4/12
   - RF channel width: 200 kHz(full rate)
   - Present no. of subscriber in the zone: 50,000
   - Subscriber growth per year: 5%
   - Network roll out period: 4 years
   - Number of packet calls per session (NPCS): 5
   - Number of packets within a packet call (NPP): 25
   - Reading time between packet calls (T_r): 120s
   - Packet size (NBP): 480 bytes
   - Time interval between two packets inside a packet call (T_{int}): 0.01s
   - Total packet service holding time during one hour (T_{tot}): 3000s
   - Busy hour packet sessions per subscriber: 0.15
   - Penetration of data subscribers: 25%
   - Data rate of each subscriber: 48 kbps

   Packet transmission time: 10 s



(b) Explain link budget analysis requirement of wireless network. 10

3. (a) Give detailed radio access network overview. Explain in detail functions of Node B and RNC also draw UTRAN logical architecture. 10

(b) Explain HSDPA emphasizing its primary objectives and how it achieves performance improvement? 10

4. (a) Explain the ZigBee technology. Discuss different network topologies that are supported in ZigBee. 10

(b) Explain Bluetooth security features and security levels with proper diagram. 10

5. (a) Why TCP and UDP protocols are unsuitable for implementation in WSN? List out transport protocols designed for WSN. Explain any one in detail. 10

(b) Describe the model of Wireless Sensor Network. What are the factors influencing design of wireless sensor network 10

6. Write short note on **(any two)** 20

(a) IEEE 802.16

(b) Middleware architecture of WSN

(c) UWB technology

Library

Paper / Subject Code: 52903 / 2) Telecom Network Management

B.E. (EXTC) Sem VIII CBSGS Date:- 14/05/19

(3 Hours) Max 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.**

1. (A) Explain the TMN Conceptual model. (05)
   (B) Write a short note on: Semi Formal and Formal notations. (05)
   (C) What encoding mechanisms are used by ASN.1 ? (05)
   (D) What is LAN emulation? (05)

2. (A) State the additional capabilities of RMON2 over RMON1 and explain how these capabilities can be used for an enterprise network management. (10)
   (B) Describe two tier and three tier network management organization model. (10)

3. (A) What is the difference between accounting management and performance management? (10)
   (B) List and describe SNMP commands with Syntax. (10)

4. (A) What are the functional requirements of NMS design? (10)
   (B) What is ATM remote monitoring? (10)

5. (A) Describe the services offered by CMISE. (10)
   (B) What is policy based security management in SNMP v3. (10)

6. (A) Describe three scenario that require event correlation techniques and explain clearly why each one need it. (10)
   (B) Describe different Network management models and standards. (10)

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BE (Extc) | Sem-VIII | CBSGS

20/5/2019

Duration: 3 Hours **Marks: 80**

Note:
1) Q.1 is **compulsory**.
2) Attempt any **three** questions from the remaining **five** questions.
3) Assume Suitable data wherever necessary

Q1. Attempt any four **20**

a) Why LAN is placed close to outdoor unit?
b) What are the space particles? What is the impact on satellite? The TWT has limited life and less reliable to other subsystems justify
c) Explain different orbital parameters
d) Explain design considerations of Earth station
e) Differentiate window and frame organization

Q2. a) What is EIRP, Discuss importance of [G/T] ratio. Calculate Overall [C/N] for a satellite link, if [C/N] up link =25dB and [C/N] downlink=20dB and intermodulation noise =13dB **10**

b) Explain
1) Input Back off and output back off
2) AM/PM Conversion

Q3 a) Define 'Satellite perturbation', their causes and effects **10**

b) What are different types of lasers used for satellite communication? Explain acquisition link model for optical communication **10**

Q4 a) What is meant by sub-system reliability & its Characteristics? Hence explain the terms:- initial failure, random failure & wear-out failure **10**

b) With the help of block diagram explain transmit receive type of earth station **10**

Q5 a) Explain SPADE system and SCPC of FDMA **10**

b) Explain earth Eclipse of satellite with neat sketches. State & Derive the period & duration of eclipse before & after equinox. Also explain the Sun Transit **10**

Q6. Write short note on any TWO **20**

a) Onboard connectivity with transparent processing
b) VSAT and GPS
c) TTC

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BE (EXTC) Sem - VIII CBSGS 24/05/2019.

Duration: 3 hours **Max marks: 80**

Note the following instructions.

1) **Question No.1** is **compulsory.**
2) Total **four** questions need to be solved.
3) Attempt **any three** questions from remaining five questions.
4) Assume suitable data wherever necessary, justify the same.

1.a With an example define the physical address, the internetwork address (IP address), the port address and application specific address. **5**

1.b Explain how H.323 uses G.71/ G.723.1, H.225, Q.931 and H.245 to establish and maintain voice (or video) communication. **5**

1.c Differentiate between subnetting and supernetting. **5**

1.d The following is a dump of a UDP header in hexadecimal format. **5**

CB840035001C001C

i) What is the source port number? ii) What is the destination port number?
iii) What is the total length of the user datagram? iv) What is the length of the data? v) Is the packet directed from a client to a server or vice versa?

2.a Explain the process of sending Email using message transfer agent. **10**

2.b Discuss the DHCP operation when the client and server are on the same network or on different networks. **10**

3.a Explain how TCP controls the congestion in the network using different strategies. **10**

3.b An ISP is granted a block of addresses starting with 150.80.0.0/16. The ISP wants to distribute these blocks to 2600 customers as follows: **10**

i) The first group has 200 medium-size businesses; each needs approximately 128 addresses.
ii) The second group has 400 small businesses; each needs approximately 16 addresses.
iii) The third group has 2000 households; each needs 4 addresses.

Design the subblocks and give the slash notation for each subblock. Find out how many addresses are still available after these allocations.

4.a Draw the general format of ICMP messages. Discuss the purpose of error-reporting and query messages. **10**

4.b Explain quality of service (QoS) and how it can be improved using scheduling techniques and traffic shaping techniques. **10**

5.a Discuss some characteristics of real-time audio/video communication. **10**

5.b Draw the IP header format and explain all fields in brief. **10**

6 Write short note on: **20**

a) FTP b) Control field or flags of TCP c) Messages used in RTCP
d) TCP Timers

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