MODEL QUESTION PAPER
II/IV B.E. Electronics and Communication Engineering
ECE 2101 Mathematics IV

Subject Code: ECE 2101　　　　　　　　　　　　　　　　　　　**Max Marks: 70**

Question 1 is Compulsory
Answer any FOUR from 2 to 8

Part A

1. (a) Find a unit normal to the surface $x^2 yz + 4xz^2 = 5$ at the point (1,-2,1).

   (b) State Green's theorem in the plane.

   (c) If $\overline{A}$ and $\overline{B}$ are irrotational, then prove that $\overline{A} \times \overline{B}$ is solenoidal.

   (d) Find the partial differential equation of all spheres whose centers lie on the Z-axis.

   (e) Solve $\dfrac{\partial^3 z}{\partial x^3} - 4\dfrac{\partial^3 z}{\partial x^2 \partial y} + 4\dfrac{\partial^3 z}{\partial x \partial y^2} = 0$

   (f) State change of scale and shifting properties of Fourier transform

   (g) Find the finite Fourier sine transform of $f(x) = 2$, $0 < x < 4$..

2. (a) Prove that $\nabla^2 f(r) = f''(r) + \dfrac{2}{r} f'(r)$

   (b) show that $\overline{A} = 3x^2 yI + (x^3 - 2yz^2)J + (3x^2 - 2y^2 z)K$ is irrotational, but not solenoidal. Also, find ϕ such that $\overline{A} = \text{grad}\,\phi$.

3. (a) Compute the line integral $\displaystyle\int_c (y^2 dx - x^2 dy)$ about the triangle whose vertices are (1,0), (0,1) and (-1,0).

   (b) Verify Stoke's theorem for $\overline{F} = (y - z + 2)I + (yz + 4)J - xzK$, where S is the surface of the cube x = 0, y = 0, z = 0, x=2, y=2, z=2 above the xy plane.

4. (a) Using divergence theorem, evaluate $\displaystyle\int_S \overline{R}.\overline{N}\, ds$, where S iitectures the surface of the sphere

   $x^2 + y^2 + z^2 = 9$, $\overline{R} = xi + yj + zk$.

   (b) Solve $(z - y)\, p + (x - z)\, q = y - z$.

5. (a) Solve $\dfrac{\partial^2 z}{\partial x \partial y} - \dfrac{\partial^2 z}{\partial x \partial y} = \cos x . \cos 2y$.

   (b) Solve $(D - D' - 1)(D - D' - 2)z = e^{2x-y}$.

6. (a) Solve $\dfrac{\partial u}{\partial x} = \dfrac{\partial u}{\partial y}, u(0, y) = 8e^{-3y}$ by using the method of separation of variables.

   (b) Solve completely the equation $\dfrac{\partial^2 y}{\partial t^2} = c^2 \dfrac{\partial^2 y}{\partial x^2}$, representing the vibrations of a string of length l, fixed at both ends, given that y(0,t) = 0; y(l,t) = 0; y(x,0) = f(x) and $\partial y (x,0) / \partial t = 0$, $0 < x < l$.

7. (a) Express the function $f(x) = \begin{cases} 1 & for\ |x| \le 1, \\ 0 & for\ |x| > 1, \end{cases}$ as a Fourier integral. Hence evaluate $\displaystyle\int_0^\infty \dfrac{\sin \lambda \cos \lambda x}{\lambda} d\lambda$.

   (b) Find the Fourier cosine transform of e^{-x^2}.

8. (a) Solve the integral equation $\displaystyle\int_0^\infty f(x)\cos \alpha x\, dx = e^{-\alpha}$.

   (b) Using Parseval's identity, show that $\displaystyle\int_0^\infty \dfrac{dx}{(x^2 + 1)^2} = \dfrac{\pi}{4}$.

MODEL QUESTION PAPER
II/IV B.E. Electronics and Communication Engineering
ECE 2102Network Theory Analysis
<u>**Subject Code: ECE 2102**</u>   <u>**Max Marks: 70**</u>

Question 1 is Compulsory

Answer any FOUR from 2 to 8

1. (a) What are active elements?

   (b) State kirchoff's laws.

   (c) What the value of current in source free RL circuit?

   (d) Define complex power.

   (e) What do you understand by RMS value?

   (f) Obtain transform impedance for a series RLC circuit.

   (g) What are odd and even functions?

2. (a) Explain the growth and decay of current in RL series circuits.

(b).explain clearly how voltage source can be converted into an equivalent current source and vice versa.

3. (a) explain the significance of duality property.

(b) using star-delta and delta-star transformation find the input resistance for the below network.
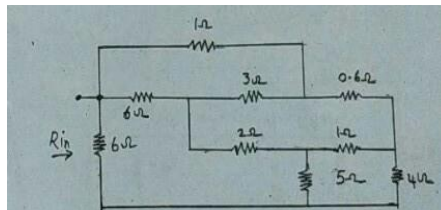
4 (a) obtain the Y parameter of the network shown in below.
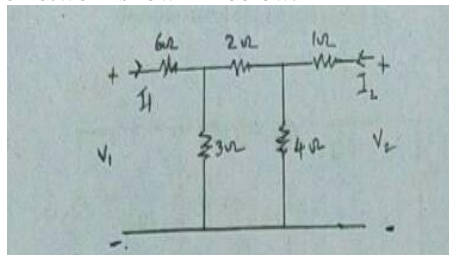
(b). State Norton's theorem. Explain Norton's theorem with an example.

5. For the given below network, the steady state conditions are achieved with the switch closed. At t=0 the switch is opened. Find

(a) $i_1(t)$ at $t=0^+$ and $t=20^-$

(b) $i_2(t)$ at $t=0^+$ and $t=20^-$
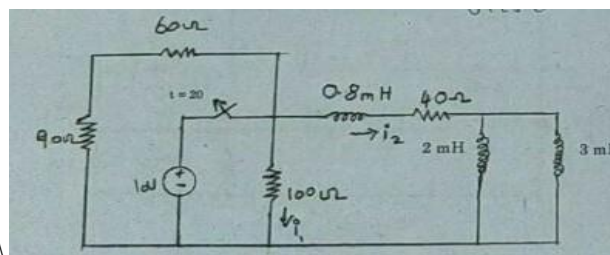
6. (a) A coil joined in series with a pure resistor of R=800ohms across100V,50Hz supply. The reading at voltmeter across the coil is 45V and across pure resistor is 80V.Find resistance and inductance of the coil.

   (b).derive resonant frequency for a RLC series circuits. A circuit has R=10ohms, L=0.14, C=8uF. Find:

   (i).resonant frequency

   (ii).quality factor

   (iii).band width

   (iv). Half power frequencies

7. (a)Explain the relationship between z and h parameters?

   (b) write the necessary conditions for driving point impedance and for transfer functions.

8. (a) write the properties of Hurwitz polynomials with examples.

(b). check wheather the given function positive real or not

$F(s) = \{s^2+4\}/\{s^3+3s^2+3s+1\}$

MODEL QUESTION PAPER
II/IV B.E. Electronics and Communication Engineering
ECE 2103Electrical Machines

<u>**Subject Code: ECE 2103**</u>   **Max Marks: 70**

Question 1 is Compulsory
Answer any FOUR from 2 to 8

1 .

  (a).List out the non-conventional energy sources for the generation of electric power.

  (b).Draw the characteristics of DC series motor.

  (c).List out the various losses of transformer.

  (d).Draw the torque slip characteristics of three phase induction motor.

  (e). Write the equations of emf generated and voltage regulation of an alternator.

  (f). Define synchronous condenser.

   (g). Write the applications of shaded pole and stepped motors.

2. (a) Draw the structure of electrical power system and explain different stages.

(b). Describe briefly electrical power distribution.

3. (a) Explain briefly methods of speed control of DC motors with neat schematic diagrams.

  (b) An 8 pole d.c generator has 500 armature conductors and a useful flux of 0.05 wb.per pole. What will
    be theemf generated if it is lap connected and run at 1200 rpm? What must be the speed at which it is to
    be driven to produce the same emf if it is wave wound?

4. (a) Derive the expression for emf of single phase transformer.

(b) A 40 KVA, single phase , 50Hz , transformer has a copper loss of 800 W and iron loss of 500W at full
    load . Determine the efficiency at half full load and 0.8 p.f. lagging

5. (a) Explain power stages of 3-phase induction motor and prove.P2:Pm:(1-s):s, where s is slip.

(b) The input power of a 3-phase , 4-pole , 50Hz 1440 rpm induction motor is 50kW and state copper loss is
    2kW. Determine the rotor copper loss and efficiency of the motor, if total iron and friction losses are
    2kW.

6. (a)Explain the constructional features of 3-phase alternator.

  (b) A 550 V, 55KVA, single phase alternator has an effective armature resistance of 0.2ohm and a
    synchronous reactance of 2.25ohm. Calculate the voltage regulation at full load 0.8 p.f. leading.

7. (a) Explain the methods of starting of synchronous motors.

(b). Explain v-curves and ^-curves of a 3-phase synchronous motor.

8 (a)Explain briefly the double field revolving theory in single phase induction motor.

  (b). Draw and explain the principle and operation of capacitor start and capacitor run single phase induction
  motor.

<u>**Subject Code : ECE 2104**</u>   <u>**Maximum: 70 marks**</u>

All questions carry equal marks
Answer any FIVE questions and Question No.1 is compulsory

1.   Answer the following with brief description   [14]

(a) Write down diode specifications

(b) Write down salient features of tunnel diode

(c) Relation between α and β.

(d) Thermal runaway

(e) Emitter follower

(f) Application of JFET

(g) Effect of bypass and coupling capacitors

2.   (a) Discuss about intrinsic and extrinsic semiconductors   [7]

(b) Discuss about Zener breakdown and mention its applications.   [7]

3.   (a) Discuss the operation bridge rectifier with capacitive filter and derive equation for ripple factor.
                                                                           [7]

(b) A sinusoidal voltage which has a peak voltage of 12 V is applied to full-wave rectifier. A load resistance of R_L = 1.5 KΩ is added to the circuit. Find out I_m, I_{rms}, I_{dc} and ripple factor. Assuming R_f = 0.   [7]

4.   (a) Compare CE, CB and CC configurations.   [7]

(b) Discuss about the currents components of CB transistors.   [7]

5.   (a) Discuss about the drain saturation current characteristics of JFET   [7]

(b) For a fixed bias circuit shown in fig.
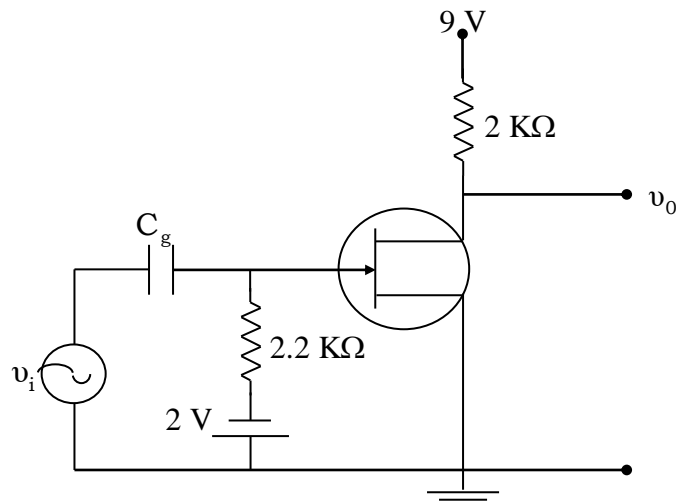
I_{DSS} = 6 mA, pinch-off voltage, V_p = -6 V, find out drain current and V_{DS}.   [7]

6.   (a) Discuss about the self-bias circuit.   [7]

(b) In a self bias circuit containing R_1 = 80 KΩ, R_2 = 25 KΩ, R_e = 2 KΩ, R_c = 2 KΩ, β = 100, V_{CC} = 12 V, V_{BE} = 0.7 . Find the operating point, S and $S^{'}$. [7]

7. (a) Discuss about RC coupled amplifier. [7]

(b) In a CE transistor amplifier circuit, R_c = 5 KΩ, R_s = 1.2 KΩ. h_{fe} = 1, h_{ie} = 1.1 KΩ, h_{fe} = 100, h_{oe} = 25 μ mho. Find R_i , A_i , A_υ and R_o . [7]

8. Write short notes on
    (a) Bias stability [5]
    (b) high frequency modal of a transistor [5]
    (c) Cascode amplifier [4]

MODEL QUESTION PAPER
II/IV B.E. Electronics and Communication Engineering
ECE 2105   SWITCHING THEORY AND LOGIC DESIGN
<u>Subject Code : ECE 2105</u>   <u>Maximum: 70 marks</u>
Question 1 is Compulsory
Answer any FOUR from 2 to 8

1. (a) Determine which bit, if any, is in error in the Hamming-coded character 1100111.
    (b) Mention the main stops of reducing a multiple-output prime implicant table.
    (c) Express the XOR function with minimum number of basic gates.
    (d) Implement the following function using on 74154
        $$f(A,B,C,D) = \sum m(0,1,3,4,7,10,12,14)$$
    (e) Compare the cross-coupled. NAND gate cell and the cross-coupled NOR gate cell.
    (f) Draw the circuit of a shift left-shift right register and give a fours statement explanation.
    (g) How are asynchronous sequential machines characterized?
2. (a) Write in its simplest possible form the Boolean Function realized by the logic
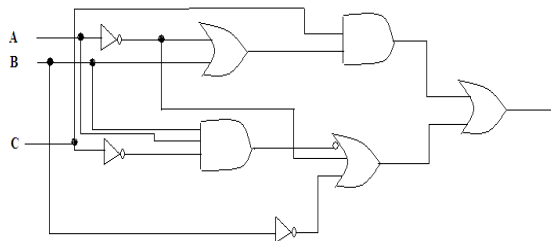   network of Fig.1.

Fig. 1

    (b) Design and realize the following function using a 4-input multiplexer
        $$f(x_1, x_2, x_3, x_4) = \sum m(0, 5, 6, 7, 11, 13, 14, 15)$$
3. (a) Determine minimal sum-of-products realizations for the following incompletelyspecified function.

        $$f(a,b,c,d) = \sum m(7,8,9,12,13,14,19,23,24,27,29,30) + \sum d(1,10,17,26,28,31)$$

    (b) Minimize the following function by quine- Mcqluskey method.

        $$f(A,B,C,D,E) = \sum m(0,1,2,3,4,6,9,10,15,16,17,18,19,20,22,24,26,31)$$

4. (a)A System has four inputs and is to produce an output which is true if and only if an odd number of the inputs are true. Design a two level logic circuit that will meet the specification.

    (b) Given the logic package A shown in big Fig.2., which operates as follows:

        Output y1=1 if and only if ' i ' inputs out of which x_0, x_1, x_2, x_3 are equal to 1.

        Design unit B so that the overall logic of unit c will be to produce an output $z_1=1$

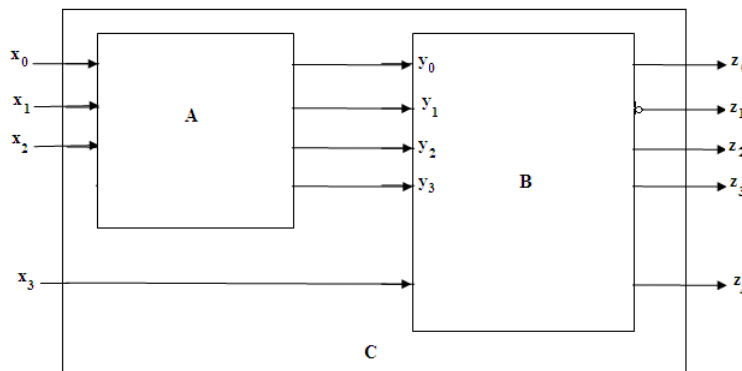   if and only if ' i ' inputs out of x_0, x_1, x_2, x_3 are equal to 1.

Fig. 2

5. (a) Design a full adder and implement it using only NAND gates.

(b) Use the 1-bit binary full adder to demonstrate how the generic PLA (8 AND gates and 2 OR gates) can be programmed directly from a truth table.

6. Design a synchronous finite state machine which will sequence from state a=00 to state b=11 to state c=10 to state d=01, then reverse itself at state a andstate d if the input COSQ (H) is ASSERTED. Any time the cos Q input is NOT-ASSERTED, the circuit is to revert to state a and hold. Carry out all stops for the design. Make your choice of Flip-Flops based on the minimum cost next state decoder implementation (use edge-trigged devices)

7. Review the operational characteristics of the AM 2841 FIFO memory unit for the purpose of gaining an insight into the general operation of   FIFO memory.

   Exercise: Design a small four-bit four-level FIFO memory using 4 four bit   PIPO registers, some tri-state buffers and a sequential controller circuit which   controls the operation of your FIFO memory (Hint : Design your unit to work on   a dual tri-state bus arrangement (Input bus and an out bus)

8. The state diagram shown in figure 3 defines the handshake control sequence for a high speed direct memory access interface control unit. Use the cell-centered asynchronous approach to design the logic for this MDS diagram
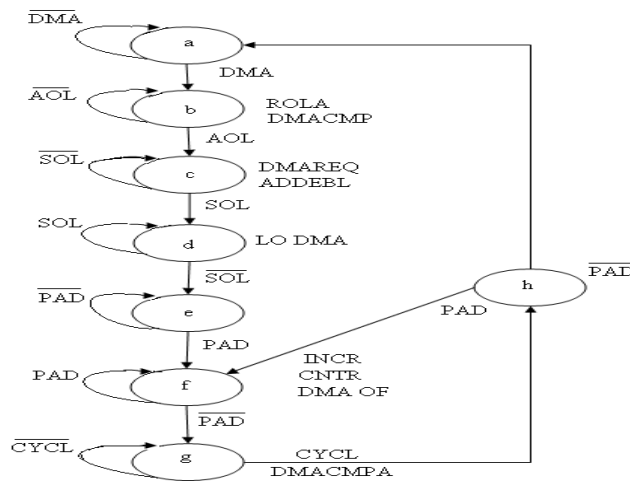

Fig. 3

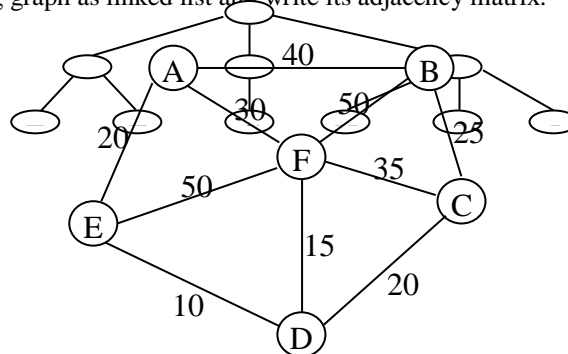<u>**Subject Code : ECE 2106**</u>   <u>**Max Marks : 70**</u>

Question 1 is Compulsory
Answer any FOUR from 2 to 8

1. (a) Give the address of an element in a z-dimensional array given the row number
   (i) Column number (ii) the size of the array (m × n).   [2]

   (b) Represent the following polynomial using linked list $10x^3 - 2x^2 + 3x^2y = y^3$.   [2]

   (c) Define the term hash function and give example.   [2]

   (d) Define a Circular Queue. Calculate the number of elements 'n' the Circular Queue in terms of Front, Rear, Pointers and the size of the Queue 'N'.   [2]

   (e) Convert the following infix expression to prefix form (a*b-c)/(d+e).   [2]

   (f) Write the different tree-traversals techniques.   [2]

   (g) When the input is already stored, what is the running time of insertion sort?   [2]

2. (a) Write recursive as well as non-recursive versions of routines for towers of Hanoi problem and compare their efficiencies.   [7]

   (b) How do you implement a non-homogeneous list in C?   [7]

3. (a) Implement the ADT stack using templates in C++.   [7]
   (b) Use the above template to evaluate a given postfix expression.   [7]

4. (a) Implement the ADT circular list in C.   [7]
   (b) Write a C program to solve Josephus problem using circular lists.   [7]

5. (a) construct the binary tree whose preorder sequence is ACBIHEDGF and Inorder sequence is CIHBEADFG.   [7]

   (b) Discuss alternatives on approaches of representation of binary trees and their suitability to given application.   [7]

6. (a) Discuss various approaches to collision handling in Hash tables.   [7]
   (b) What are multi-way search trees and discuss the alternatives of inserting nodes into them?
                                                                        [7]

7. (a) Write Prim's algorithm to find the minimal spanning tree and estimates its time complexity. [7]
   (b) Write Kruskal's algorithm and explain.   [7]

8. (a) Convert the following tree into its equivalent binary tree.   [7]

   (b)Represent the following graph as linked list and write its adjacency matrix.   [7]

<u>Subject Code: ECE 2201</u>   Max. Marks : 70

Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks
PART A

1. a) Find the harmonic conjugate of $x3 - 3xy2$.

     b) Define removable singularity and give an example.

     c) What are the objectives of sampling .

     d) Define type 1 and type 2 errors.

     e) Form the difference equation from $y = Ax+Bx^2$.

     f) Find$Z\left[n_{C_p}\right]$, $0 \le p \le n$.

     g) State Damping rule.

PART B

2. a) Show that the function $f(z) = \sqrt{|xy|}$ is not analytic at the origin even though Cauchy-Riemann equations are satisfied there at.

   b) Find the analytic function $f(z) = u(r, \theta) + iv(r, \theta)$ such that $v(r, \theta) = r^2\cos2\theta - r\cos\theta + 2$.

3. a) Find the bilinear transformation which maps the points z=1, i, -1 onto the points
     W=2, i, -2 respectively. Also find the fixed and critical points of the transformation.

b) Use the Cauchy's integral formula to evaluate $\oint_c \frac{\log z}{(z-1)3} dz$, where C:$|z\text{-}1|=\frac{1}{2}$.

4. a) Expand $f(z)=\frac{1}{(z-1)(z-2)}$ in the region (i) $|z| < 1$,(ii) $1 < |z| < 2$,(iii) $0 < |z| < 1$.

     b) Apply the calculus of residues to prove that $\int_0^\pi \frac{d\theta}{17-8\cos\theta}=\frac{\pi}{15}$.

5. a) Solve the difference equation y_{n+2} -5y_{n+1}+6y_n=4^n(n^2-n+5).

     b) Solve $y_{n+2}+y_n= \cos \alpha n$.

6. a) Find (i)$z[\frac{1}{(n+1)!}]$, (ii)$Z^{-1}[\frac{z^2}{(z-a)(z-b)}]$.

     b) State initial value theorem and final value theorem. Given that

$Z[u_n] = \frac{2z^2+3z+4}{(z-3)^3}$, $|z| > 3$, show that u_1=2, u_2=21, u_3=139.

7. a) Solve: u_{n+2}-4u_{n+1}+4u_n =2^n, u_0=0, u_1=1, using Z-transforms.

b) The means of simple samples of sizes 1000 and 2000 are 67.5 and 68.0 cm respectively. Can the samples be regarded as drawn from the sample population of S.D. 2.5 cm.

8. a) A machinist is making engine parts with axel diameter of 0.7 inch. A random sample of10 parts shows mean diameter 0.742 inch with a standard deviation of 0.04 inch. On the Basis of sample, would you say that the work is inferior?

b) A die was thrown 60 times and the fallowing frequency distribution was observed:

Faces:	1	2	3	4	5	6
f_0	15	6	4	7	11	17

Test whether the die is unbiased?

MODEL QUESTION PAPER

II/IV B.Tech. Electronics and Communication Engineering

E.M.F. THEORY AND TRANSMISSION LINES (ECE 2202)

<u>Subject Code: ECE 2202.</u>   <u>Max. Marks : 70</u>

Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks

1. (a) State Coulomb's law.
    (b) What is magnetic susceptibility and magnetic dipole?
    (c) State Lenz's law.
    (d) What is meant by a uniform plane wave?
    (e) Draw an equivalent circuit of a two-wire transmission line and explain in brief.
    (f) What is the propagation constant of the transmission line?
    (g) A vector field is given by $\vec{A} = ya_x + (x-1)^2 a_y + zxa_z$. Determine a unit vector in the direction of A
         at a point P (2, 0, 3)?

2. (a) State and prove Gauss's law. Express Gauss's law in both integral and differential forms?
    (b) Find the capacitance of a parallel –plate capacitor with a dielectric mica filled between plates ε_r =6.
         The plates of the capacitor are square in shape with 0.254cm side. Separation between the two plates
         is 0.254cm.

3. (a) Write the equation for Biot-Savart's law in terms of distributed current sources?
    (b) Derive the expressions for magnetic field intensity due to finite and infinite lines?

4. (a) Derive the differential forms from the integral forms using the divergence theorem and Stokes
         theorem?
    (b) If H=10 sin(2_*10^8 t+8x) a_y A/m in a medium where relative permeability is 2, relative permittivity is 1

         and conductivity is zero, determine $\vec{B}$ and $\vec{E}$?

5. (a) State and explain different kinds of polarizations?
    (b) A travelling wave has two linearly polarized components E_x =4 cosωt and E_y=3cos (ωt+π/2).
         Calculate   1) The axial ratio and
                      2) The tilt angle of major axis of polarization ellipse?

6. (a) Explain the different types of transmission lines. What are the limitations to use maximum power that
         they can handle?
    (b) A 100m long lossless transmission line has a total inductance and capacitance of 100μH and 10μF
         respectively. Determine the velocity of propagation, phase constant and characteristic impedance of
         the transmission line at the operating frequency of 100KHz ?

7   (a) A rectangular waveguide with a width of 4cm and height of 2cm is used to propagate an
         electromagnetic wave in the TE_{10} mode. Determine the wave impedance, phase velocity, group
         velocity of the waveguide for the wavelength of 6 cm?
    (b) Why TEM mode is not possible for rectangular waveguide?

8.   Write short notes on
         a) Poynting theorem
         b) Reflection coefficient
         c) Phase velocity and Group velocity

MODEL QUESTION PAPER
II/IV B.Tech. Electronics and Communication Engineering
ANALOG ELECTRONIC CIRCUITS (ECE 2203)

Subject Code: ECE 2203   **Max. Marks: 70**

Question 1 is compulsory

Answer any other FOUR questions

All questions carry equal marks

1. Write about the following

    a) List advantages of JFET over BJT.

    b) What is the need for cascoding.

    c) Discuss the advantages of negative feedback.

    d) List the advantages of push pull class B amplifier.

    e) Compare LC oscillators and crystal oscillators.

    f) What is the need of emitter bypass capacitor?

    g) What is crossover distortion

2. a) Obtain the expression for higher cut-off frequencies of BJT Amplifier

    b) Derive the components of the Hybrid - π model in terms of h parameters in CE
    Configuration.

3. a) Derive the voltage gain and current gain of CE amplifier with emitter resistance

    b) Find A_v, R_i, A_i, R_o of CE amplifier of voltage divider biasing having h_{fe} =100 ,
    h_{ie}=1.71kΩ h_{oe}=17$\mu\upsilon$&Rs=500Ω , R_1=80kΩ , R_2=20kΩ , Rc=5kΩ R_L=4kΩ .

4. a) Derive the expression the bandwidth of the multistage amplifier

    b) Draw the circuit diagram for cascode amplifier and derive expressions for voltage gain and input
    impedance

5. a) An amplifier has voltage gain of 200, input resistance 10kΩ and output resistance of
    50kΩ. If 2% of input voltage is feedback to the input in series opposition than
    calculate modified values of gain, input and output resistances.

    b) Derive expressions for voltage gain, input impedance and output impedance in case of voltage
    series feedback.

6. a) Derive expressions for efficiency of class A power amplifier with

    (i) Resistive load (series fed)

    (ii) Transformer coupled load.

    b) Explain how harmonic distortion in push-pull amplifier is reduced.

7. a) Derive an expression for the frequency of oscillation of a RC phase shift oscillator.
    Determine the min h_{fe} for the transistor.

    b) In a Colpitts oscillator C_1 = 0.001 µF and C_2 = 0.01 µF and L = 5 µH. Calculate

    (i)   Frequency of oscillations.

(ii)   If **'L'** is doubled, find the new frequency.

8.   Write short notes on

i) Stagger tuned amplifier.

ii) Crystal oscillator.

iii) Miller theorem.

MODEL QUESTION PAPER

II/IV B.Tech. Electronics and Communication Engineering

ECE 2204 PROBABILITY THEORY & RANDOM PROCESS

<u>Subject Code: ECE 2204.</u>   <u>Max. Marks: 70</u>

Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks

1. (a) State Baye's probability theorem?
   (b) Define a Random Variable.
   (c) Distinguish between Mean square and Square of mean.
   (d) Define first order and second order central moments.
   (e) Define the characteristic function.
   (f) State Central limit theorem?
   (g) Distinguish the terms Ergodicity and Stationarity.
2. (a) State axioms of probability. Define exclusiveness and independence.
   (b) In a class room, 70% are above average, 20% are average and 10% are below average. Suppose that 20% of
above average, 10% of average and 20% of below average students fail in a subject. What is the probability
that a randomly selected student is an averagestudent who failed?
3. (a) Define the distribution and density functions. List the properties of them. Prove any oneproperty of
each.
   (b) A random variable X has a probability density function
$f(X) = \frac{c}{X^2+1}$, $-\infty < X < \infty$.
   Find the constant 'c' and also find the probability distribution function of the randomvariable X.
4. (a) The random variables X and Y have joint probability density function
$$f(x,y) = \frac{1}{\pi} , \quad (x^2 + y^2) \le 1$$
$$= 0 , \quad otherwise.$$
   Determine $f(x)$ and$f(y)$. Are they independent?
   (b) A random variable X has a Gaussian density function with mean '0' and variance'1'. Find the
probability
density function of the random variable Y defined as Y= X^2.
5. (a) A random variable has a probability density function
$f(x) = \frac{5}{4}(1 - x^4)$ $for\ 0 < x \le 1$
   = 0   elsewhere
        Find   (i) E(X),   (ii) E(4X+2),   (iii) E(X^2).
    (b)State and prove Chebyshev inequality
6. (a) Compute the characteristic function for a random variable X with
$$f(x) = \frac{1}{2}e^{-|x|} , \quad -\infty < x < \infty$$
   (b) Prove that the random process X(t) = A cos(ω$_o$t + Θ) is wide sense stationary where A, ω$_o$are constant
and Θ is uniformly distributed random variable on the interval (0,2π).
7. (a) Define Autocorrelation and power spectral density for a random process. List their Properties.
   (b) State and prove Wiener-Kinchine theorem. Give its significance
8. (a) Show that the Narrow band noise process can be expressed as in phase and quadrature component of it.
   (b) Find the input autocorrelation function, output autocorrelation function and output spectral density of
RC low pass filter, when the filter is subjected to a white noise of spectral density N$_o$/2.

MODEL QUESTION PAPER

II/IV B.Tech. Electronics and Communication Engineering

SIGNALS AND SYSTEMS (ECE 2205)

<u>**Subject Code: ECE 2205**</u>   <u>**Max. Marks : 70**</u>

Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks

1.   (a) Find and sketch the first derivatives of the following signals
$$x(t) = u(t) - u(t - a), a > 0.$$

    (b) Determine whether or not the following signals is periodic. If periodic, determine its

fundamental period. $x(t) = \cos t + \sin \sqrt{2} \ t.$

    (c) Determine whether the following signal is energy signal or power signal or neither
$$x(t) = A \cos (W_o t + \theta)$$

    (d) The input x(t) and the impulse response h(t) of a continuous LTI system are given

by $x(t) = u(t); \ h(t) = e^{-at} u(t), \ \alpha > 0$. Compute the output y(t).

     (e) List any two properties of z-transform.

    (f) Define DFT and IDFT.

    (g) Determine the discrete Fourier series representation for $x[n] = \cos \pi / 4n$.

2.   (a) Check whether the following systems are

        i)   Static or dynamic
        ii)   Linear or non linear
        iii)   Causal or noncausal
        iv)   Time invariance or time variant.

$$(1) \quad y(t) \frac{d^2 y(t)}{dt^2} + 3t \frac{dy(t)}{dt} + y(t) = x(t)$$

$$(2) \quad y(n) = x(n).u(n) \ .$$

    (b) Find the natural response of the system described by the difference equation
$$y(n) - 1.5 \ y(n - 1) + 0.5 \ y(n - 2) = x(n)$$
$$y(-1) = 1; \ y(-2) = 0$$

3.   (a) Find the convolution of the following sequence
$$x(n) = 2\delta(n + 1) - \delta(n) + \delta(n - 1) + 3\delta(n - 2)$$
$$h(n) = 3\delta(n - 1) + 4\delta(n - 2) + 2\delta(n - 3)$$

    (b) Determine the stability of the system described by difference equations
        i) $y(n) = 0.6 \ y(n - 1) - 0.08 \ y(n - 2) + x(n)$

        ii) $y(n) = \frac{5}{2} \ y(n - 1) + y(n - 2) = x(n) - x(n - 1).$

4.   (a) Find the trigonometric Fourier series for the periodic signal x(t) as shown
            in figure below
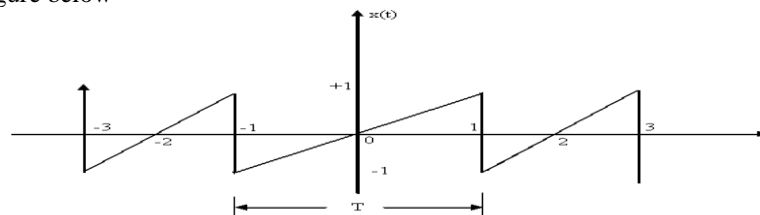
        (b) Find the average power of the signal
$$x(t) = 2 \sin^2 (2500\pi \ t)\cos(20,000\pi \ t).$$

5. (a) Find the Fourier transform of the following:

   (i) $e^{at}u(-t)$

   (ii) $t\,e^{-at}u(t)$

   (b) Find the inverse Fourier transform of $X(j\Omega)$ for the spectra shown in figure below.
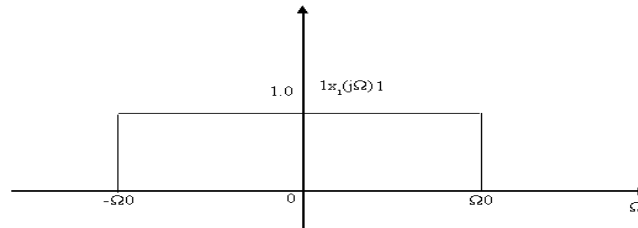
6. (a) Find the convolution of the signals given below using Fourier transform

   $$x_1(n) = \left(\frac{1}{2}\right)^n u(n); \quad x_2(n) = \left(\frac{1}{3}\right)^n u(n).$$

   (b) Find the discrete time Fourier transform of the following signals

   (i) $x(n) = z^{-n}$ for all n

   (ii) $x(n) = a^n \sin W_o n\, u(n)$.

7. (a) A signal $x(t) = \sin c(150\pi t)$ is sampled at a rate of   (i) 100Hz   (ii) 200 Hz
      (iii) 300Hz. For each of these cases, explain if you can recover the signal $x(t)$ from the sampled signal.

   (b) Find the z-transform and RUC for the following:

   (i) $x(n) = a^n u(n)$

   (ii) $x(n) = -b^n u(-n-1).$

8. (a) Find the inverse z-transform of the following:

   (i) $X(z) = 1/1 + 3z^{-1} + 2z^{-2}$ $ROC : |z| > 2.$

   (ii) $X(z) = (z+1)/z^2 + 5z + 4$ $ROC : |z| < 2$

   (b) Solve the following difference equation for $y(n)$ using z-transform and the specified initial condition

   $$y(n) - y(n-1) + \frac{1}{4} y(n-2) = x(n); \; n \geq 0$$

   $$\text{where } x(n) = 2\left(\frac{1}{8}\right)^n ; y(-1) = 2 \text{ and } y(-2) = 4.$$

MODEL QUESTION PAPER

II/IV B.Tech. Electronics and Communication Engineering

ECE 2206 ENVIRONMENTAL STUDIES

Subject Code: ECE 2206   **Max. Marks : 70**

Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks

1. (a) Define Ecology.
    (b) What is meant by food chains?
    (c) What are major consequences of deforestation?
    (d) What do you understand by term "Conservation of biodiversity"?
    (e) What is thermal pollution? State its positive environmental impacts.
    (f) What are the principal acids present in acid rain?
    (g) What is meant by "Sustainable development"?

2. (a) Briefly discuss the need of public awareness about environment.
    (b) Explain the biotic and abiotic components of a ecosystem with examples.

3. (a) What are decomposers? Explain their role in the ecosystem.
    (b) Explain the adverse environmental impacts of modern agriculture.

4. (a) What is dam? Explain the environmental impacts of large dams.
    (b) Explain briefly the present day major threats to the biodiversity of India.

5. (a) What are sources and impacts of indoor air pollution?
    (b) Explain the environmental impacts of surface water pollution.

6. (a) What are environmental pollution control acts? State the salient features of water (prevention and control of pollution) Act 1974.
    (b) What are the major implications of enhanced global warming?

7. (a) Give some unsustainable development activities and their effects.
    (b) What is meant by environmental impact assessment? State its advantages and disadvantages.

8.   Write short notes on :
    (a) Environmental education
    (b) Ozone depletion
    (c) Silent valley project

III/IV B.Tech. Electronics and Communication Engineering

LINEAR ICS AND APPLICATIONS

Subject Code : ECE 3101   **Max Marks : 70**

Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks

1. (a)   Define and explain the bias current in an operational amplifier.
   (b)   What is CMRR?   (How it can be increased)
   (c)   What is a regenerative Comparator.
   (d)   Explain the differences between active filters and passive filters.
   (e)   Draw a second order low pass filter using an operational amplifier.
   (f)   List important features of the 555 timer.
   (g)   What is a phase lock loop (PLL)

2. Calculate the output voltage, input impedance, and output impedance for a non-inverting amplifier with $R1=1K\Omega$, $R2=10K\Omega$ for an input voltage of Vs=2sin 3t volts. The operational amplifier has the following parameters:

   Open loop voltage gain $A_{ov}=2x10^5$

   Input impedance $R_1=2M\Omega$

   Output impedance $R_0=75\Omega$

   Derive the formula used in your calculations.

3. (a) Design a monostablemultivibrator using an op-amp to get an output pulse of 15V amplitude and of 1 msec duration. Show the circuit diagram and explain its operation with wave forms.

   (b) Explain the operation of a precision rectifier.

4. (a) Draw the block schematic diagram of a 555 IC timer and explain the function of each block.

   (b) Design an astablemultivibrator using 555 timer to get the output waveform at 10KHz with 30% duty cycle. Show the circuit diagram with all the component values and explain its operation with waveforms.

5. Design a second order low pass filter with Butterworth response so as to have cutoff frequency at 1KHz. Show the circuit diagram with all the component values.

6. (a) What is a sample – and - hold circuit? Why is it needed?
   (b) Draw the block schematic diagram of a PLL system and explain it operation bringing
out clearly the importance of 'Lock Range' and 'Capture Range'.

7. (a) Draw the circuit diagram and explain the operation of the wein bridge oscillator.
   (b) Design a Wein bridge oscillator that will oscillate at a frequency of 2KHz.

8. (a) Explain the operation of a 3 terminal voltage regulator.
   (b) Sketch an analog multiplexer system and explain its operation.

MODEL QUESTION PAPER

III/IV B.Tech. Electronics and Communication Engineering

ANALOG COMMUNICATIONS

Subject Code : ECE 3102   **Max Marks : 70**

Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks

7 x 2 = 14 marks

1. a) Explain need for modulation
   b) Calculate the percentage saving in power if only one side band transmission is used over the DSB-FC system at i) 100% modulation ii) 50% modulation
   c) Define phase deviation and frequency deviation.
   d) Give the classification of Radio Transmitters.
   e) Give the block diagram of an AM transmitter.
   f) Explain the need of amplitude Limiter.
   g) If a FM wave is represented by the equation

$$FM(t) = 10 \sin(8 \times 10^8 t + 4 \sin 1500 t)$$

   Calculate: i) Carrier frequency, modulating signal frequency and ii) modulation index β.

2. a) Describe one method of generating the amplitude modulation wave. Also sketch the spectrum of an AM signal.   6marks
   b) Explain the advantages of SSB system. Describe a method of generating an SSB signal. 8marks

3. a) Give the block diagram of an Indirect method of FM generation and explain.   6marks
   b) An angle modulated wave is generated and is given by the equations   8marks

$$V(t) = 10 \cos(2 \times 10^6 \pi^t + 10 \cos 2000 \pi t)$$

   Find i) the power of the modulated signal if FM wave dissipate is a 10Ω resistor.
         ii) the maximum frequency deviation.
         iii) the bandwidth of the modulated signal.

4. a) Explain the effect of the modulation index (μ) on Bandwidth of an FM signal.   6marks
   b) In an FM system, when the audio frequency is 500HZ and the AF voltage is 2.4V, the deviation is 4.8KHz. If the AF voltage is now increased to 7.2V, what is the new deviation? If the AF voltage is raised to 10V, while AF is dropped to 200HZ. What is the deviation ? Find the modulation index in each case.   8marks

5. a) Explain the Special devices of Radio telephone Transmitter clearly.   10marks
   b) Enumerate the operation of Radio telegraph transmitter.   4marks

6. a) Explain the operation of an AM receiver with a neat schematic block diagram.   7marks
   b) Give the circuit diagram of a Radio detector and explain.   7marks

7. a) What is the purpose of AGC in a radio receiver? Explain.   4marks
   b) Explain the terms: (i) Pre-emphasis and De-emphasis.   10marks
                (ii) Squelch circuit.

8. Explain the following: 4 + 4 + 6marks
   a)   Resistor Noise
   b)   Shot Noise
   c)   Method for calculation of Noise in an Linear system.

III/IV B.Tech. Electronics and Communication Engineering

Core Elective-I (COMPUTER ARCHITECTURE & ORGANIZATION)

Subject Code : ECE 3103   **Max Marks : 70**

Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks

1) Answer All Questions   7x2=14 marks
   a)   Draw the symbol for tri state buffer, explain
   b)   List out the registers & their basic function for a digital computer
   c)   Draw the 20 bit micro instruction format
   d)   Write four characteristers of RISC processors
   e)   What is USART
   f)   What is content addressable memory
   g)   Two inter connection schemes for multi processor systems

2)   a) Explain the function of an ALU with the help of a block diagram and function table   (7 marks)
     b) Design a common BUS system to inter connect 4 four bit registers A, B, C, D using suitable
        multiplexers   (7 marks)

3)   a) Explain in detail about the three basic computer instruction formats with examples   (7 marks)
     b) With the help of a flowchart explain the operation of a basic computer during
        i) Instruction cycle,   ii) Interrupt cycle   (7 marks)

4)   a) Explain the concept of microprogramming in detail with the help of an example (7 marks)
     b) Write the merits and demerits of micro programmed control unit compared to a hardwired control unit
                                                                                    (7 marks)

5)   a) With relevant examples discuss different addressing modes through which storage operands can be
        pecified in an instruction   (7 marks)
     b) Explain about Data transfer, Data manipulation & program control instructions with relevant examples
                                                                                    (7 marks)

6)   a) What is the role played by cache memory in a digital computer and what are its constraints in
        implementation   (7 marks)
     b) Design a memory system of 512 byte RAM and 512 byte ROM using 128 byte RAMchip and 512 byte
        ROM chips   (7 marks)

7)   a) With the help of a block diagram and function table explain the operation of an I/O interface unit
                                                                                    (7 marks)
     b) With the help of an example, explain DAM operation   (7 marks)

8)   Answer any **Two** from the following
     a)   Daisy chain mechanism
     b)   A synchronous communication interface
     c)   Memory hierarchy
     d)   Stack organization   (2x7=14 marks)

III/IV B.E. Electronics and Communication Engineering
ECE 3103-(2) NETWORK & PROTOCOLS

Subject Code: ECE 3103-(2)   **Max Marks : 70**

Time: 3 Hours

Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks

1. Answer All Questions   7x2=14 marks
   a. What is super netting?
   b. Why do you use RARP?
   c. What is Gateway?
   d. What is MBONE?
   e. Write the format of UDP.
   f. Define data encryption.
   g. List the advantages of WAN.

2.a. Explain briefly the design of ARQ.
b. Write about different types of messages & general message formats of ICMP.

3.a. Explain the concept of sub-netting.
b. Explain briefly TCP design.

4.a. Explain briefly UDP operation.
b. Explain TCP header option.
c. Explain IGMP operation is single network.

5.a. Write about communication in FTP.
b. Explain connection management in TCP.

6.a. Write about DNS in the internet.
b. Explain BOOTP protocol.

7.a. Explain HTTP.
b. Explain client-server model.

8.a. Explain the concept of sockets.
b. Explain different socket system calls.
c. Explain briefly connection -oriented concurrent server.

MODEL QUESTION PAPER
III/IV B.E. Electronics and Communication Engineering
ECE 3103-(3) INTERNET AND WEB TECHNOLOGIES

Subject Code : ECE 3103-(3)   **Max Marks : 70**

Time: 3 Hours

Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks

1. Answer All Questions   7x2=14 marks
    (a) How to use line break and horizontal line tags in HTML? Give an example.
    (b) How to add java script onto a webpage?
    (c) Define bean resistance?
    (d) What is the use of XSL?
    (e) What is generic servlet?
    (f)What is meant by session tracking?
    (g) What is scriptlets? Give its advantages.

2.Describe different types of CSS with syntax and also explain the following terms related to CSS.
    (a) Font size
    (b) Font weight
    (c) Font stretch
    (d) Text decoration
    (e) Text transformation
    (f) Text alignment
    (g)Padding

3.(a) Describe elements in XML and also different types of content of elements.
 (b) Consider XML document with the following schema:
[Sl.no, name (first name, last name), address].
Write DTD for the above schema

4. Write a java script to validate a form consisting of a hall ticket number as username and mobile number as
    password. Also navigate to another web page after validation.

5. (a) Discuss the methods defined by servlet request interface.
(b) How is session tracking achieved by URL rewriting? Explain with suitable example.

6. (a) Write about the components of JSP.
(b) Write a JSP to demonstrate the usage of page and include directives.

7. (a) Write about different types of JDBC drivers with syntax.
(b) Write JDBC program to fetch student data from the student database using JDBC-ODBC driver.

8. Write short notes on the following:
        (a) Bean properties
        (b) Session bean
(c) Struts framework.

Subject Code: ECE 3103-(4)   **Max Marks : 70**

Time: 3 Hours

Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks

1. Answer All Questions   7x2=14 marks

    (a). Software architecture

    (b) Use case diagram

    (c) Difference between error and failure

    (d) Rationale management concepts

    (e) Generalization

    (f) Boundary testing

    (g) Client sign-off.

2. What is use case diagram? Draw a use case diagram for distributor of a train system.

3. What are project organization concepts? Explain each of them with suitable examples.

4. Explain various activities involved in object design.

5. Draw a UML diagram to model the requirements of a system

6. Create class diagram for school information system.

7. What do you mean by test case design? Design a test case using template for check payment process.

8. Discuss the configuration management activities. Illustrate mycarparts system for the activities

Subject Code : ECE 3103-(5)   **Max Marks : 70**

Time: 3 Hours

Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks

1. Answer All Questions   7x2=14 marks
    (a) Data abstraction
    (b) Virtual base class
    (c) Type conversion
    (d) This pointer
    (e) Setprecision()
    (f) Command line arguments
    (g) Synchronisation

2. (a) Write the difference between object oriented programming and procedural programming.

    (b) Explain about different UML diagrams.

3. (a) Write about the scope of variables.

    (b) Explain the different types of pre-processor directives in C++.

4. (a) What is operator overloading? Write a C++ program to overload +, - operators for addition, subtraction of complex numbers.

    (b) What is Polymorphism? Describe compile time polymorphism.

5. (a) What are the types of inheritance? Explain each with examples.

    (b) Explain dynamic binding through virtual functions.

6. (a) Define Class template and Function template.

    (b) Write a program in C++ for file copying using file streams.

7. (a) Write about exception handling in Java.

    (b) Write Java program to sort a list of numbers.

8. Explain the following in Java:
    (a) Priority in threads.
    (b) Runnable interface.

Subject Code: ECE 3104   **Max Marks: 70**

Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks

1. a) Define effective area of an antenna and effective length?
   b) Differentiate broadside and end-fire arrays?
   c) What is the expression for amplitude distribution for a linear array using Fourier transform method?
   d) What is Cassegrain feed, and mention its applications?
   e) Differentiate slot antenna and dipole?
   f) What is Faraday's rotation and explain briefly?
   g) Differentiate radio and optical horizons?

2. a) Define the following.
      Directivity, Power Gain, Antenna Efficiency, Front-to-Back Ratio of an Antenna.
   b) Derive an expression for radiated power of an quarter wave monopole?

3. a) Derive expression for null-to-null beam width of broadside and end-fire arrays?
   b) A uniform linear array is required to produce an end-fire beam when it is operated at a frequency of 10 GHz. It contains 50 radiators and are spaced at 0.5 λ. Find the progressive phase shift required to produce the end-fire beam. Find the array length?

4. a) Describe Woodward Lawson method to find out amplitude distribution for a specified radiation pattern?
   b) Compare the pattern characteristics for uniform, circular, triangular and raised cosine type of amplitude distributions?

5. a) Design log periodic antenna to operate over a frequency range of 125 MHz to 500 MHz to obtain a gain of 9 dB.
   b) Derive an expression for the radiation resistance of a loop antenna.

6. a) Draw schematic diagram of parabolic reflector with Cassegrain feed and explain different feed systems.
   b) For a parabolic reflector of diameter 6m, illumination efficiency, b = 0.65. The frequency of operation is 10 GHz. Find its beam width, directivity and capture area.

7. a) Describe a method of measurement of radiation pattern with a neat measurement setup.
   b) What is polarization and describe polarization measurement by power measurement approach.

8. Write short notes on

   a) Feeding and Diversity
   b) Ground wave propagation and its limitations
   c) Factors involved in the propagation of radio waves.

Subject Code: ECE 3105   **Max. Marks: 70**

Question No.1 is Compulsory
Answer any other FOUR questions
All Questions carry equal Marks

1. a) Define linear wave shaping.
    b) What is an attenuator? Write its application.
    c) State Clamping circuit theorem.
    d) Define Stable state and quasi stable state.
    e) Write the expression for Pulse width of Monostable Multivibrator.
    f) Define slope error and displacement error.
    g) Construct an OR gate using diodes.

2. a) A 10 Hz symmetrical square waveform with $4V_{P-P}$ amplitude is applied to a RC high pass circuit whose lower 3 dB frequency is 5 Hz. Determine the output waveform.
    b) Draw the RC low pass circuit and derive the response of the circuit for ramp input.

3. a) Draw the two level clipper and explain its working with the help of neat wave forms.
    b) Derive the steady state response of a clamping circuit for the square wave input.

4. a) Discuss about unsymmetrical triggering of a BistableMultivibrator with neat diagram.
    b) Explain the working of Schmitt Trigger with neat sketches.

5. a) Explain the working of MonostableMultivibrator with help of neat circuit and waveforms.
    b) Design an AstableMultivibrator for following specifications V_{CC}=12 V, I_C(sat) = 3 mA, h_{FE}=30   f=1 KHz.

6. a) Explain the operation of Bootstrap sweep circuit with help of neat diagram and waveforms.
    b) Draw the simple current sweep circuit and explain its working with neat sketches.

7. a) Describe the Pulse synchronization of an Astable relaxation circuit with neat sketches and waveforms.
    b) Briefly describe about DTL logic with help of neat sketches.

8. Write short notes on the following.
    a) Ringing Circuit
    b) Switching Times of Transistor
    c) Exponential Sweep circuit

MODEL QUESTION PAPER
III/IV B.E. Electronics and Communication Engineering
DIGITAL SIGNAL PROCESSING

Subject Code:ECE 3106　　　　　　　　　　　　　　　　　**Max. Marks: 70**

Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks

1. (a) Define "stability" and "causality" of a System? [2]

   (b) Write the expression for convolution of two sequences. [2]

   (c) Mention any four properties of DFT. [2]

   (d) What is meant by Radix-2 decimation-in-time (DIT). [2]

   (e) Give the second order transfer function of analogchebyshev filter. [2]

   (f) Give two advantages of bilinear transformation IIR digital filter. [2]

   (g) Why FIR filter has linear phase characteristic? [2]

2. (a) Explain the properties of linear time invariant systems. [7]
   (b) Consider a system with input x(t) and output y(t) given by

   $$y(t) = \sum_{h=-\infty}^{\infty} x(t)\delta(t-nT)$$

   (i) Is the system linear?

   (ii) Is the system invariant? Justify your answer. [7]

3. (a) Find whether the following system is stable or not.

   $$y(n-2)-y(n-1)+y(n) = x(n-2)+x(n)$$

   (b) Explain "Finite Word Length Effects" in digital filters. [7]

4. (a) Obtain DFT of the following sequence using 8-point, FFT algorithm. Give all intermediate results.

   $$x(n) = \{0,1,-1,0,0,-1,1,0\}$$ [8]

   (b) Give the properties of DFT. [6]

5. (a) Draw a radix-2, 8-point FFT (DIT) flow graph from the necessary equation. [7]
   (b) Explain the computation efficiency of FFT over DFT. [7]

6. (a) Explain IIR filter design using bilinear transformation and impulse invariance method. [7]
   (b) Using bilinear transformation method. Design a low-pass filter derived from a second-order Butterworth analog filter with a 3-dB cut-off frequency at 100 Hz. [7]
7. (a) Explain windowing technique to design FIR filter. [7]
   (b) The desired amplitude response of a certain band-pass FIR filter can be stated as
   $$A_d(f) = 1 \quad \text{for} \quad 250 \leq f \leq 750\,\text{Hz}$$

   $$= 0 \quad \text{elsewhere in the range } 0 \leq f \leq f_o$$

   the sampling rate is 2 KHz and impulse response is to limited to 20 delays using Hamming window function, determine the transfer function. [7]

8. (a) Explain how DFT is used in spectral estimation. [7]
   (b) Explain the role of DSP in speech processing. [7]

Subject Code: ECE 3201   **Max Marks: 70**

Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks

1. (a) What are the advantages of networking.   [2]
   (b) What is the difference between a bridge and repeater?   [2]
   (c) Explain the terms 'html' and 'http'.   [2]
   (d) Identify the protocol, domain name, type of organization, path and file in the following URL. *http://www.aucevizag.ac.in/ECEdept/GSRao.html*[2]
   (e) Explain the functions of a router   [2]
   (f) Explain the terms simplex and full duplex communication.   [2]
   (g) What type of multiple access used in the following LAN technologies.   [2]
        (i) BUS Topology   (ii) Ring Topology

2. (a) List advantages of having International standards for network protocols.   [6]
   (b) Explain the OSI model architecture with a neat diagram.   [8]

3. (a) What are the various internetworking devices and explain where these devices are used in OSI reference model.   [7]
   (b) Define Bandwidth, throughput, band rate and bit rates. If bit rate = 3000 and each signal element carries 6 bits. Find the band rate.   [7]

4. (a) What is Integrated Series Digital Network. Explain the ISDN series and number of channels it offers with a neat diagram.   [7]
   (b) What is a packet radio system?   [7]

5. What are design issues of data link layer? Explain the following framing methods

   (a) Character oriented protocol   [7]
   (b) Bit oriented protocol.   [7]

6. (a) What are the various LAN standards/technologies.
   (b) Explain the IEEE 802.3 Ethernet LAN technology and how the CSMAICD is implemented.
   (c) Draw the Ethernet Frame structure and explain the various fields in it.

7. (a) Classify the various IP addressing schemes and Discuss the various IP addressing scheme with examples.
   (b) What is the difference between MAC address and IP address?
   (c) List the design issues of network layer.

8. Write short notes on any two of the following.

   (a) Physical layer characteristics
   (b) Pure ALOHA and slotted Aloha protocol
   (c) TCP/IP protocol
   (d) Token passing
   (e) Transport port layer functions

MODEL QUESTION PAPER
III/IV B.E. Electronics and Communication Engineering
MICRO PROCESSORS AND MICRO CONTROLLERS

Subject Code: ECE 3202   **Max Marks: 70**

Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks

1. (a) What is the function of READY signal of 8086 microprocessor?   [2]
   (b) What are the main differences between 8086 and 8088 microprocessors?   [2]
   (c) What is the status of Flag register after the execution of the following?   [2]
       MOV BL, #55 H
       MOV CL, #AAH
       MOV AL, BL
       OR AL, CL
       ADD AL, C
   (d) What are the different modes of operation of 8253 timer?   [2]
   (e) Give the register set of 80386 microprocessor.   [2]
   (f) What do you mean by Read modify instructions of 8051?   [2]
   (g) Explain the different modes of operations of ARM   [2]

2. (a) Explain the effect of execution of the following instructions of 8085 microprocessor   .[7]
       (i)   POP B
       (ii)   RST 7
       (iii)   STAX B
       (iv)   CALL 2000 H
   (b) Draw and explain the timing diagrams of the following instructions: [7]
       (i)   JMP Addr and
       (ii)   OUT port

3. (a) Write an ALP for 8085 to multiply two 8-bit numbers by shift left and add method.   [7]
   (b) Ten 8-bit numbers are stored in memory location starting from 4000 H. Write an ALP for 8085 to store
       all the even numbers from 4500 H location onwards and odd numbers from 4600 H onwards. [7]

4. (a) Explain interrupt driven data transfer scheme with an example.   [7]
   (b) A microprocessor has 8 K × 8 memory divided into 4 K × 8 ROM and 4 K × 8 RAM. The addresses
       starts from 0000 H onwards. The following chips are available.   [7]
       (i) 2 K × 8 bit EPROM
       (ii) 1 K × 8 bit SRAM
       (iii) 1 out of 8 decoder
       Draw the memory map and explain.

5. (a) Show the block schematic diagram of 8255 PPI and explain its operation in MODE 1.   [7]
   (b) Design an I/O interface to interface an 8-bit ADC to 8085 using 8255 PPI. Write an ALP for 8085 to
       initialize ADC and get data from ADC. Assume any data required.   [7]
6. (a) Explain the architecture of 8051 with neat block diagram.   [7]
   (b) Define addressing modes and explain different addressing modes of 8051.   [7]

7. (a) Explain Data transfer instructions of ARM controller.   [7]
   (b) Explain the Timer operation in PIC 16c61 with examples   [7]

8. (a) Draw the architecture of 80386 microprocessor and explain the memory management unit of it.   [5]
   (b) Explain the memory organization in 80386.   [5]

   (c) What is meant by Cache memory? How does it increase the speed of operation of the processor
       system?   [4]

MODEL QUESTION PAPER
III/IV B.E. Electronics and Communication Engineering
DIGITAL COMMUNICATIONS

Subject Code : ECE 3203   **Max Marks : 70**

Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks

1. (a) Differentiate digital signal and discrete signal.   [2]
    (b) Distinguish between coherent and non-coherent detection.   [2]
    (c) Differentiate between bit rate and band rate.   [2]
    (d) State sampling theorem.   [2]
    (e) Differentiate between ISI and ICI.   [2]
    (f) What is the necessasity of expanding in PCM.   [2]
    (g) Relate bandwidth and rise time in digital communications.   [2]

2. (a) What is meant by aliasing and what are the measures to be taken in practice to reduce this effect?   [6]
    (b) Discuss band-pass sampling and what are important points to be considered in sampling band-pass
         signal.   [4]

3. (a) Explain "due-binary sigdling" scheme in detail with example.   [7]
    (b) Explain with neat sketches base band data transmission systems and also discuss it demerits?

4. (a) Explain both PCM and delta modulation system in detail.   [6]
    (b) Derive the expressions for bandwidth for PCM and Delta modulation.   [4]
    (c) Discuss the BER (Bit error rate) in PCM and Delta modulation with an example. [4]

5. (a) Explain different types of noises in digital communication systems.   [6]
    (b) Explain representation of noise using orthonormal co-ordinates.   [8]

6. (a) Explain in detail QAM transmitter.   [4]
    (b) Bandwidth requirements of QAM.   [3]
    (c) QAM receiver   [4]
    (d) Error probability of QAM system.   [3]

7. (a) What is the need for spread spectrum techniques?   [4]
    (b) Explain in detail CDMA transmitter and receiver with neat sketches. [6]
    (c) Explain about different types orthogonal codes generator.   [4]

8.   Write short notes on the following.

    (a) Eye diagrams   [5]
    (b) Matched filter   [4]
    (c) Define processing gain and anti-jamming margin.   [5]

Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks

1.   (a) Write Advantages of sensor Networks

          (b)Define Gateway

          (c)OLSR Routing protocol

          (d) About Topology Control in WSN?

          (e) List the classification of routing protocols in ad hoc networks

          (f) Write Routing Protocol for Ad Hoc Wireless Networks?

          (g) What are the different kinds of multiplexing techniques?

2. a) What are the major challenges wireless sensor networks are facing? Explain in detail.

b) Discuss in brief the difference between Ad hoc networks and wireless sensor networks.

3 a) Explain in detail choice of modulation schemes in WSN.

b) Write about the topologies of PAN.

4 a) What are the different Contention based protocols, write about CSMA Protocol.

b) Write about the MAC protocol that uses Directional Antennas.

5 a) Explain the different issues in designing a routing protocol.

b) Discuss in detail about STAR protocol.

6 a) Give the comparison of TCP solutions for Ad-hoc wireless networks.

b) Write about tradition TCP and explain its inefficiency in Ad-hoc wireless networks.

7 a) Explain the network security requirements in wireless sensor network.

b) Write about security aware AODV protocol.

8 Write short notes on

a) Berkeley motes

b) Wireless fidelity systems

MODEL QUESTION PAPER
III/IV B.E. Electronics and Communication Engineering
Core Elective – II (2) MICRO ELECTRONICS
Subject Code: ECE 3204-2   **Max Marks: 70**

Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks

1. (a) Define oxidation.   [2]
   (b) Define ion implantation   [2]
   (c) Compare NMOS and CMOS technologies   [2]
   (d) Draw CMOS inverter and explain its voltage transfer characteristics.   [2]
   (e) Write about PLA   [2]
   (f) What are the applications of shift registers.   [2]
   (g) Distinguish synchronous and asynchronous counters.   [2]

2. (a) Explain about bipolar transistor fabrication with relevant cross-sectional diagram.
                                                                                            [7]
   (b) Discuss about the characteristics of IC components.   [7]

3. (a) Explain the operation of MOSFET as a switch.   [7]
   (b) Explain the structure of CMOS circuit and draw the CMOS NAND and CMOS NOR gates.
                                                                                            [7]

4. (a) How do you synthesize a logic function using multiplexers. Give one example.
                                                                                            [7]
   (b) Realize a n-bit parity generators with n no. one bit cells.   [7]

5. (a) Write notes on PLA   [7]
   (b) Write notes on PAL and PLD's   [7]

6. (a) Discuss the operation of 4-bit synchronous counter with D-flip-flop with relevant diagram.
                                                                                            [7]
   (b) Write short notes on ring counter and Johnson counter.   [7]

7. (a) Discuss about carry look ahead adder with relevant example.   [7]
   (b) Distinguish between ripple carry adder and carry select adder.   [7]

8.   Write short notes on
   (a) Applications of shift register   [4]
   (b) Current mirrors   [5]
   (c) Microelectronic circuit layout   [5]

MODEL QUESTION PAPER
III/IV B.E. Electronics and Communication Engineering
Core ECE 3204-(3) EMI / EMC

Subject Code: ECE 3204 (3)   **Max Marks: 70**

Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks

1. (a) Define EMI, EMC and EMS.   [2]
   (b) Write at least two differences between man-made and natural sources of EMI.   [2]
   (c) What are the EMC standards of USA and Germany?   [2]
   (d) Define bonding effectiveness.   [2]
   (e) What is the insertion loss of a filter and define.   [2]
   (f) Give 2 examples of ESD occurrences.   [2]
   (g) What is a magnetic dipole and draw its schematic diagram.   [2]

2. (a) List out different man-made and natural sources and point out the emitters and susceptors.   [7]
   (b) Explain how E field coupling and H field coupling takes place.   [7]

3. (a) Describe the methods of tackling of EMI systematically.   [7]
   (b) List out the methods of elimination of EMI and briefly explain them.   [7]

4. (a) What are the various grounding techniques and bring out differences between them.   [7]
   (b) Define shielding effectiveness and point out the best shielding materials. Also point out its limitations.   [7]

5. (a) How is conducted EMI produced and differentiate common and normal mode noise.   [7]
   (b) How do you design passive components R, L, C for meeting EMC conditions?   [7]
6. (a) What are the different EMI measurement ranges and list out EMI measuring instruments.   [7]
   (b) Explain EMI immunity test system.   [7]

7. (a) Point out different softwares available for EMI/EMC measurement and explain different trends in susceptibility measurement.   [7]
   (b) Explain the meaning of ESD and EMP and describe the methods of ESD control.   [7]

8. Write short notes on
   (a) Bounding   [4]
   (b) Compliance and engineering tests   [5]
   (c) EMI filters for mains noise.   [5]

MODEL QUESTION PAPER
III/IV B.E. Electronics and Communication Engineering
ECE 3204-4 DSP PROCESSORS AND ARCHITECTURES

Subject Code: ECE 3204 (4)   **Max Marks: 70**

Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks

1. (a) What is the range of signed fractional number that can be represented in a fixed point format using 16bits?
    (b) What is the function of barrel shifter?
    (c) What are different features that can increase the execution speed of the DSP architecture?
    (d) What is the need of overflow & scaling in fft implementation?
    (e) What is the function of MP/ MC CPU status register?
    (f) What are the advantages of interrupts over programmed I/O
    (g) What is the use of interpolation and decimation filters in dsp?

2. a. Explain about the different sources of error in DSP implementations?   [7]

    b. Explain the functionality of MAC unit? Explain how overflow/ underflow conditions can be avoided in MAC operations.   [7]

3. What are the various DSP computational building blocks? Explain each in detail.   [14]

4. Explain the various data addressing modes of TMS320C54XX processor with suitable examples.   [14]

5. a. Represent each of the following as 16 bit number in the desired Q nota   [8]

            i.0.3125 as Q15 number
           ii.-0.3125 as Q15 number
         iii.3.125 as Q7 number
         iv.-352 as Q0 number

    b. Write a program to implement FIR filter.   [6]

6. a. Write a program to multiply a Q15 number with Q15 number to obtain the result in Q15 notation.   [6]

    b. Write a programme to implement an 8 point DITFFT algorithm.   [8]

7. a. Explain how MCBSP provides an interface to serial port and DSP.   [7]

    b. Interface the TMS320C54XX to a 10 bit ADC and an 8 bit DAC. The sampled signal read from the ADC is to be written to the DAC after adjusting its size. The start of the conversion is to be initiated by the Tout signal of the timer.   [7]

8 a.   What are the various classifications of interrupts for the TMS320C54XX processor?   [7]

   b.   Short notes on DMA.   [7]

Subject Code: ECE 3204 (5)   **Max Marks: 70**

Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks

1. (a) Explain the difference between accuracy and precision.
    (b) Define the terms standard deviation and variance.
    (c) What is the difference between DC voltmeter and AC voltmeter?
    (d) Write the applications of cathode ray Oscilloscope.
    (e) What is Piezo-electric effect?
    (f) Write the different types of transducers.
    (g) Write the Advantages and disadvantages of thermocouples.

2. (a) Discuss about DC ammeters.

    (b) Explain the different types of bridge measurements.

3. (a) Draw and explain series type ohm meter.
    (b) Write the Comparisons of analog and digital techniques.

4. (a) With suitable diagram explain digital voltmeter.

    (b) Write a short note on Continuous balance and Successive approximation.

5. (a) Discuss about frequency counters.
    (b) Draw and explain Cathode ray oscilloscope.

6. (a) Describe the operation sampling oscilloscope.
    (b) Briefly explain about Spectrum analyzer.

7. (a) Explain different types of strain gauges.
    (b) Discuss about different types of photoelectric transducers.

8. Write notes on the following:
    (a) Variable inductance type transducer.
    (b) Digital transducers.
    (c) Thermo meters

MODEL QUESTION PAPER
III/IV B.E. Electronics and Communication Engineering
DIGITAL IMAGE PROCESSING

Subject Code: ECE 3205   **Max Marks: 70**

Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks

1. A) Define the following a) Image b) Brightness.
    B) Find the number of bits required to store a 256 X 256 image with 32 gray levels?
    C) What is the need for data transform?
    D) What is meant by masking?
    E) Explain additive property in linear operator?
    F) What is pseudo color image processing?
    G) What is Run length coding?

2. A) Explain various functional blocks of digital image processing?
    B) Write a short note on sampling and quantization.

3. A) Explain the properties of 2D Fourier Transform?
    B) Discuss the applications of Hadamard and Hotelling transform.

4. A) Explain spatial filtering in image enhancement.
    B) Discuss image smoothing using frequency domain filters.

5. A) What is the use of wiener filter in image restoration? Explain.
    B) Explain image degradation model /restoration process in detail.

6. A) Explain image segmentation based on color.
    B) Discuss the image compression process for a color image.

7. A) What are the applications of digital image watermarking?
    B) Explain the operation of Wavelet transforms.

8. A) How is line detected? Explain through the operators?
   B) Discuss about various boundary descriptors.

**Subject Code: ECE 3206**   **Max Marks: 70**

Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks

1. (a) List the effects of negative feedback on the performance of a system
   (b) Define the "System Sensitivity". For a good system, should it be high or low? Explain.
   (c) What is the break-away point on the root locus? How do you determine the breaking point.
   (d) Explain Routh's Hurwitz stability criterion.
   (e) Define the gain margin and phase margin of a closed loop control system.
   (f) Distinguish between absolute stability and conditional stability.
   (g) What is the purpose of Nichol's chart?
2. (a) For the given block diagram shown below, determine its transfer function. Use block diagram reduction technique.
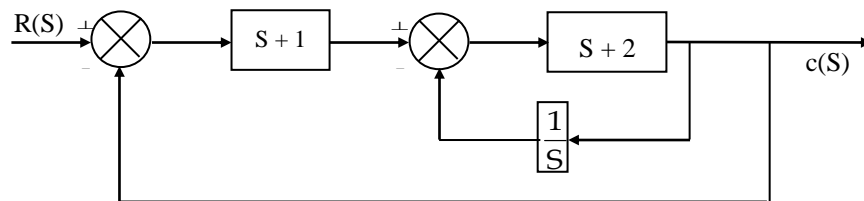
(b) What are the rules for the construction of signal flow graph?

   (c) Find for the following system shown below, $\dfrac{C}{R}$ by using Mason's gain formula.
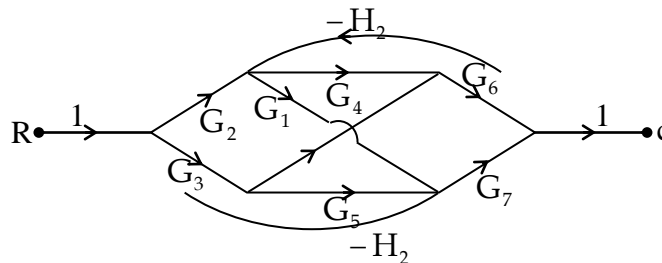
3. (a) What is steady state error? Derive the expressions for static error coefficients K_p, K_υ and K_α.

(b) A unity feedback control system is characterized by an open loop transfer function

$$G(S) = \frac{K}{S(S+10)}$$

   Determine the gain K so that the system will have a damping ratio of 0.5. For this value of 'K', determine settling time, peak overshoot and time to peak overshoot for a step input.

4. (a) Determine the stability of the system that has the following characteristic equation whose transfer function is

$$G(S).H(S) = \frac{K(S+3)}{S(S+2)(S+4)(S+5)}$$

   (b) What are the uses of tachometers in control systems?

   (c) Determine the stability of the system that has the following characteristic equation using R-H criterion :

$$S^6 + 2S^5 + 8S^4 + 17S^3 + 20S^2 + 16S + 16 = 0$$

5. (a) Discuss the rules of construction of Root locus.

(b) Sketch the root locus of a system whose open loop transfer function with unity feedback is given by

$$G(S) = \frac{K(1+S)}{S(2+S)(5+S)}$$

Determine the maximum value of K for which the system is stable from root locus diagram.

6. (a) Explain time domain specifications of a control system.

(b) The open loop transfer function of a unity feedback control system is

$$G(S) = \frac{100}{S(1+0.02S)}$$

Draw the bode plots and from them calculate the phase margin and gain margin of the system.

7. (a) Apply Nyquist criterion to determine the stability of the system with

$$G(S).H(S) = \frac{7(S-1)}{(S-2)(S-4)}$$

(b) Draw the polar plots of the system whose

(i) $G(S).H(S) = \dfrac{1}{S(1+\tau S)}$

(ii) $G(S).H(S) = S$

8. Write short notes on the following.

(a) Merits and demerits of ac and dc servomotors
(b) M and N circles
(c) Frequency domain specifications of control system.

Subject Code: ECE 4101   Maximum Marks: 70

First question is compulsory
Any four questions from the remaining
All questions carry equal marks

1.Write short notes on the following.   (7x2 =14)
 (a) Scarcity definition of Economics
 (b) Micro and Macro Economics
 (c Determinants of Demand
 (d) Monopolistic competition
 (e) Pricing by Retailers
 (g) Inflation

2.Describe the nature and scope of Managerial Economics. What is its relation with
  other disciplines.

3.What is Elasticity of demand? Illustrate with diagrams the measurement of elasticity of
  demand.

4.Explain the Law of Variable Proportions.

5.Discuss the economies and diseconomies of large scale production.

6.How do you classify markets? State the features of Perfect competition.

7.Outline the significance of Pricing and explain any four methods of pricing.

8.What is a Business Cycle? Explain the phases, causes and consequences of a Business
cycle .

Subject Code: ECE 4102   Maximum Marks: 70

First question is compulsory and any four questions from the remaining
All questions carry equal marks

1. (a) Define Channel Capacity

    (b) Distinguish between discrete and continuous channel.

    (c) Define Binary Symmetric channel

    (d) State source coding theorem.

    (e) What is constraint length of a convolutional code?

    (f) What is Hamming distance? Find the hamming distance between codes 110011 and 011100.

    (g) Give characteristics of BCM code.

2. (a) Consider a discrete memoryless source with source alphabet $P = \{s_0, s_1, s_2\}$ and source statistics

    $\{0.7, 0.15, 0.15\}$.

     (i) Calculate the entropy of the source.

     (ii) Calculate the entropy of the second order extension of the source.

    (b) Explain Digital communication with subcarriers and data formatting.

3. (a) A Discrete memory less source has an alphabet of 5 symbols with their probabilities of its output

    as given here :

    Symbol S_0 S_1 S_2 S_3 S_4

    Probability   0.45   0.05   0.15   0.10   0.15

    Compare two different Huffman codes for this source. Hence, for each of the two codes, find

    (i)   The average code-word length

    (ii)   The variance of the average code-word length over the ensemble of the source symbols.

    (b) Derive the channel capacity for binary symmetric channel.

4. (a) The parity check matrix of a particular (7,4) linear block code is given by

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

    (i)   Find generator matrix

    (ii)   List all possible code vectors.

    (b) Write short notes on ARQ

5. Discuss Convolutional codes in detail, Using both time domain and transform domain approaches

    with an example

6. (a) Find out the generator matrix corresponding to $G(D) = 1 + D + D^3$ and find out the code vectors

    for (7,4) cyclic code.

    (b) Give the comparison of error rates in coded and uncoded transmission.

7. (a) Write short notes on Fame algorithm with reference to sequential decoding of convolutional

    codes.

(b) Discuss any three applications of error control coding technique.

8. Write short notes on :

(a) Trellis codes

(b) Predictive coding

(c) Coding gain

MODEL QUESTION PAPER
IV/IV B.E. Electronics and Communication Engineering
ECE 4103 VLSI DESIGN

Subject Code: ECE 4103   Maximum Marks : 70

Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks

1. (a) State Moor's Law.
   (b) What are the advantage of n-well CMOS circuits over p-well CMOS circuits?
   (c) Give an example of component declaration?
   (d) Draw the circuit of NAND gate using CMOS logic.
   (e) Draw the stick diagram for CMOS inverter.
   (f) What is meant by scaling?
   (g) What are contact cuts?

2. (a) Explain how MOS transistors is used as a switch?
   (b) Find the figure of merit of CMOS transistor in terms of geographical parameters.

3. (a) Explain the sheet resistance and layer capacitance for MOS transistor and inverter.
   (b) Explain about wiring capacitance.

4. (a) What are the different scaling models and explain the scaling factors for device parameters.
   (b) Give the scaling models for NMOS transistor for constant electric field.

5. (a) Explain the CMOS dynamic memory cell read and write operations.
   (b) Explain different forms of CMOS logic
       (i) Pseudo NMOS logic
       (ii) Dynamic CMOS logic
       (iii) CMOS domino logic

6. (a) Explain about some switch logic arrangements with respect to sub-system design.
   (b) Discuss general function block.

7. (a) Explain the processing steps of an NMOS process
   (b) What is cross talk? What are the measure taken to reduce cross talk.

8.   Write a short notes
       a. BIST
       b. DRC
       c. Contact cuts

Subject Code :ECE – 4104   Maximum Marks : 70
Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks

1. (a) Define directivity and coupling factor of a 4-port directional coupler.
   (b) Draw the schematic diagram and explain how a circulator used as a duplexer to connect the radar transmitter, receiver and antenna.
   (c) Draw the schematic diagram and explain how the isolator is used to prevent the re-radiation from the local oscillator.
   (d) Convert the radar transmitted power of 10,000 W in to dBW, dBm.
   (e) Find the resonant frequency of an air-filled cavity resonator with dimensions a = 5 cm, b = 3 cm, d = 8 cm.
   (f) Input power to a 20 dB waveguide attenuator is 75 mW. Find the output power and power absorbed by the attenuator.
   (g) Explain the operation of an 'E' plane 'Tee' junction.

2. (a) What are the various applications of microwave frequencies.
   (b) What are the limitations of conventional electronic devices and microwave tubes to work at microwave frequencies.
   (c) What is a reentrant cavity and describe the principle of operating of a rectangular cavity resonator.

3. (a) What is a scattering matrix? Write the properties of a scattering matrix for reciprocal device.
   (b) Show that the 'S' matrix of a perfectly matched 2-port network is $\begin{bmatrix} 0 & 0 \\ 1 & 0 \end{bmatrix}$.

4. (a) the operating frequency of a reflex klystron is 10GHz, it has a DC beam voltage of 200V, a repeller spacing of 0.1cm for 1¾ mode. Determine the maximum value of power and the corresponding repeller voltage for a beam current of 60mA.
   (b) Explain with a neat sketch, the principle of operation of a 2 cavity klystron amplifier and write the equations for the maximum voltage gain and efficiency of the klystron tube.

5. (a) A rectangular waveguide has cross sectional area of 3 cm × 2 cm and the operating frequency is 9 GHz. Calculate the (i) free space wavelength, (ii) cut-off wavelength (iii) guided wavelength (iv) phase velocity (v) angle of incidence.
   (b) Explain the principle of operation of circulator.
   (c) What is the Faraday rotation effect and with a neat diagram explain the operation of a Ferrite isolator.

6. (a) What is an MMIC, write the differences between conventional IC and an MMIC.
   (b) What are the basic materials used for MMICs.
   (c) Describe the ideal characteristics of substrate, conductor, dielectric and resistive film materials and that are used in MMICs.

7. (a) Explain the procedure with a neat diagram to measure the coupling factor and directivity of a given directional coupler.
   (b) Explain the procedure with a neat diagram showing the experimental setup to find the guided length.

8.   Write short notes on any three of the following.
   (a) Applegate diagram of reflex klystron
   (b) TWT
   (c) Gunn diode oscillator
   (d) IMPATT diode
   (e) Magnetron

Subject Code : ECE 4105-1   Max Marks : 70
Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks

1. (a)   Define acceptance angle of a fiber.   [2]
    (b)   List basic attenuation mechanisms in an optical fiber.   [2]
    (c)   Calculate the number of modes propagating in a graded index fiber at 880 nm with 20 μm core radius
          and $\eta_1 = 1.40$ and $\eta_2 = 1.46$.   [2]
    (d)   Draw the radiation pattern of an edge emitting LED.   [2]
    (e)   What are the three conditions necessary to attain lasing action?   [2]
    (f)   What is the system rise time and what is its significance in an optical communication link.
                                                                                     [2]
    (g)   What are the types of stations used in FDDI network.   [2]

2. (a)   Describe briefly the fabrication of various types of optical fibers with neat sketches. [10]
    (b)   For a multimode step index optical fiber of glass core of refractive index 1.5 and quartz cladding of
          refractive index 1.46, determine the critical angle, acceptance angle and numerical aperture. Define all
          the parameters involve.   [4]

3. (a)   What is dispersion in an optical fiber? How does it affect the communication link? Compare single and
          multimode fibers in this regard in detail?   [8]

    (b)   Explain the different types of signal distortions in optical fibers?   [6]

4. (a)   What are splices? Explain different types of splicing with neat sketches.   [7]
    (b)   Explain the following characteristics of a LASER diode.   [7]
          (i) Threshold and operating current
          (ii) Radiating wavelength
          (iii) spectral width

5. (a)   Explain the detection process in a PN photo diode. Compare this device with PIN photodiode.   [7]
    (b)   What are the various noise sources in an optical receiver? Explain with neat diagram   [7]

6. (a)   Derive an expression for the signal-to-noise ratio at the output of an optical receiver using Avalanche
          Photodiode (APD) and deduce the expression for optimum avalanche gain.   [6]
    (b)   Draw the block diagram of an optical receiver and explain the function of each block   [5]
    (c)   What is surface dark current? How does this affect the optical receiver performance?   [3]

7. (a)   Explain the design of power link budget with neat block diagram, and give a numerical example.
                                                                                     [8]

    (b)   Describe briefly the topologies used for optically linked network for data communication techniques.
          [6]

8.   Write a short notes on

    (a)   Modulation formats   [5]
    (b)   Synchronous optical network (SONET)   [5]
    (c)   Wavelength division multiplexing (WDM)   [4

Data Communications

Subject Code : ECE 4105-2   **Max Marks : 70**

Question 1 is compulsory
Answer any other FOUR questions

All questions carry equal marks

1. (a) Give the necessity and importance of Signal Encoding in data transmission.
(b) Explain about Cross talk
(c) Explain about Differential PSK
(d) What is Channel capacity?
(e) List out the advantages of broadband cable over base-band cable in transmission media.
(f) What is meant by Diffraction
(g) Explain about Line Drivers.

2. (a) Explain in detail about the TCP/IP protocol suite.

(b) Explain Digital Modulation with the help of a simplified block diagram
3. (a) Draw and explain the optical fiber communication system.

(b) List out the advantages and disadvantages of optical fiber transmission.
4. (a) Explain the circuit and packet switching processes.

(b) Give the LAN topologies with detail explanation.
5. (a) Explain about RJET

(b) Explain about Concentrators
6. (a) Describe Time-Division Multiple Accessing.

(b) Explain about AMPS identification codes.
7. (a) Depicting the organization of layers, Explain the open system interconnection model.

(b) Explain ASK and PSK with neat sketches.
8. (a) Write a detailed note on Retransmission and Forward Error Correction.
(b) What is the significance of Modem Equalizer in Modem Synchronization?

MODEL QUESTION PAPER
IV/IV B.E. Electronics and Communication Engineering
ECE – ECE 4105 Bio-Medical Signal Processing
<u>**Subject Code : ECE 4105-2**</u>   <u>**Maximum Marks : 70**</u>
Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks

1.   Answer all questions.

  (a) What is bioelectric potential?
  (b) Define ECG and EEG.
  (c) List objectives if Biomedical signal analysis.
  (d) What are the techniques to record EEG?
  (e) What is Conduction velocity in EMG?
  (f) Define Heart rhythm.
  (g) Define Power line Interference.

2. (a) Explain about acquisition and analysis of biomedical signals
   (b) Discuss difficulties in biomedical signal analysis.

3. (a) Discuss about EEG recording from scalp.
   (b) Describe applications of EEG.

4. Explain about modelling, artifacts and spectral analysis of EEG processing.

5. (a) Describe amplitude estimation in surface EMG
   (b) Explain Intramuscular decomposition of EMG signal

6. Describe generation, recording and QRS detection of Electrocardiogram signal in brief.

7. Explain various noise effects in ECG signal processing

8. Write a short note on following
   (a) Heart rate variability
   (b) Clinical Applications of ECG
   (c) Joint time-frequency analysis of EEG

Subject Code : ECE 4105-3   Maximum Marks : 70
Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks

1.   Answer all questions.

   (a)   What is Scanning?
   (b)   What is importance of synchronizing pulses?
   (c)   What is color burst?
   (d)   Write on the choice of IF in TV receiver?
   (e)   Give the reasons for using VSB and not SSB for TV.
   (f)   Explain the terms : Contrast, Tonal, Gradation.
   (g)   Draw the circuit of video detector?

2. (a)   Draw the block diagram of monochromes TV receiver and explain the function of each and every block. What is meant by active scan area of a TV image. Explain.

3. (a)   Derive the formula for the bandwidth of a TV signal as per Indian standards.

   (b)   Explain the purpose of interlaced scanning. Discuss the advantage over sequential scanning.

4. (a)   Compare the construction and characteristics of the image orthicon and vidicon camera tubes.

   (b)   Discuss the advantage of keyed AGC over the other forms.

5. (a)   What are the features of color TV system. Draw the block diagram of color TV and explain.

   (b)   Explain how is it possible that chrominance and luminance signals could be accommodated in the same bandwidth.

6. (a)   Why is the uplink frequency different from down link frequency in a satellite communication system and explain.

   (b)   Derive the general link design equations. Find out the expression for C/N and G/T relation.

7. (a)   Draw the layout of a typical earth station. What are the essential characteristics of an earth station.

   (b)   Draw the simplified functional block diagram of a single channel transponder.

8.   Write a short notes on

   (a)   Evolution of satellite communications
   (b)   CDMA
   (c)   Antennas used in space craft

MODEL QUESTION PAPER
IV/IV B.E. Electronics and Communication Engineering
ECE 4201 Industrial Management and Entrepreneurship

Subject Code : ECE 4201   **Maximum Marks: 70**
Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks
1) Write short notes for the following: (7x2 = 14)
    a. Explain the importance of Management.
    b. What is business?
    c. Types of partnership.
    d. Plant location factors.
    e. Importance of break-even analysis.
    f. Types of Entrepreneurs.
    g. Steps in starting a small project.

2. Explain principle of Management.

3. Elucidate the importance of public sector and explain the salient features of different public
    sector organizations.

4. Explain the importance and functions of production planning and control .

5. Describe the significance human resource management and explain the functions of human
    resource manager.

6. a. Explain the functions of marketing.
    b. What are the different methods of raising finance?

7. a. Define entrepreneurship . And explain characteristics and skills of entrepreneurs.
    b. Explain the importance of women entrepreneurs.

8. a. Describe the importance idea generation and its sources and techniques.
    b. Explain the different stages in project formulation.

Subject Code : ECE 4202   **Maximum Marks: 70**

Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks

1. (a) Define a cell and a cluster in a cellular system.
    (b) Why does the mobile phone cell have a hexagonal shape?
    (c) Define diversity.
    (d) Discuss the mobile signal propagation over water.
    (e) What is cell splitting?
    (f) What is the difference between TDMA and CDMA.
    (g) Name the various handoff initiation techniques.

2. (a) Describe the principle of operation and explain the various components of a cellular mobile system with a neat diagram.

   (b) A cellular system has 125 channels in the uplink and 125 reverse channels in the downlink. Each channel has a bandwidth of 200 kHz. Determine the total bandwidth occupied in both uplink and downlink.

3. (a) Describe the frequency reuse concept in cellular communication system and derive the expression for the frequency reuse ratio.

   (b) Determine the distance from the nearest co-channel cell for a cell having a radius of 0.6 km and a co-channel reuse factor of 12.

4. (a) Explain the types of interferences in cellular communication system.

   (b) Discuss the diversity schemes for interference reduction at both mobile unit and cell site.

5. (a) Explain the point-to-point prediction model and its features.

   (b) What is meant by foliage? Define foliage loss.

6. (a) Explain in detail about link budget.

   (b) Explain about mobile fading characteristics

7. (a) what is SDMA system and how it is used as a multiple access system in cellular mobile communications?

   (b) Compare the spectrum efficiencies of CDMA and TDMA.

8. (a) What is mean by handoff? Explain the process of handoff in cellular systems.

   (b) What are the types of handoff? Explain in detail.

MODEL QUESTION PAPER
IV/IV B.E. Electronics and Communication Engineering
RADAR ENGINEERING

Subject Code : ECE 4203   **Max Marks : 70**

Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks

1. (a) Write the limitations of basic radar   [2]
   (b) If a radar operates at a peak power of 50 kW, pulse-width of 0.8 ms and PRF of 1000 Hz, then find duty cycle and average power.   [2]
   (c) What is Doppler effect and give the Doppler frequency equation.   [2]
   (d) What is noise bandwidth and give its equation.   [2]
   (e) Write notes on integration of radar pulses.   [2]
   (f) Explain limitations of canonical scan   [2]
   (g) What is frequency modulated continuous wave radar? What are its applications.   [2]
2. (a) Derive the transmission equation for monostatic radar.   [10]
   (b) Define blind speed and give its expression. Explain the methods of reduction of effect of blind speed. [4]
3. (a) Explain briefly about coherent and non-coherent MTI radar with neat block diagram. [8]
   (b) Two MTI radar operates at different frequencies but at the same PRF. If the blind speed of the first MTI radar is equal to the third blind speed of second MTI radar, determine ratio of the operating frequencies of two radars. [6]
4. (a) Distinguish between CW radar and pulse radar.   [7]
   (b) Determine the beat frequency and the quantization error if range is 100m and the frequency excursion is 80Hz and modulating frequency is 2kHz [7]
5. (a) Derive the expression for frequency response function of matched filter [7]
   (b) Explain detection criteria in radar signals.   [7]
6. (a) Write characteristics and applications of pulse Doppler radar.   [7]
   (b) Explain delay line canceller and double delay line canceller.   [7]
7. (a) Describe the various methods of monopulse tracking techniques.   [7]
   (b) With a neat diagram explain the operation of sequential lobbing and a conical scan. [7]
8. write short notes on
   (a) Moving target Detector.   [4]
   (b) Radar Displays   [6]
   (c) CFAR receiver   [4]

Subject Code : ECE 4204-1   **Maximum Marks : 70**

Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks

1. a) What are the sailent features of Block IIR-M GPS   satellites   (2)
    b) How did the NAVSTAR GPS originate?   (2)
    c) Write the equation for GPS satellite transmitted signal.   (2)
    d) What is GNSS? What are constituents of the GNSS system?   (2)
    e) If the satellite signal travel time observed by the receiver from a particular is 70   msec. what is the pseudorange observed on this satellite?   (2)
    f) What are the future constelltion of GPS system?   (2)
    g) Differentiate between Geocentric and Geodetic coordinate system.   (2)

2. a) What is Trilateration? How is user position computed in 2 D and 3D?   (7)
    b) Explain how the satellite positions and distance to each satellite are determined
                                                                                   (7)

3.   a) Which PRN code characteristics are important for the GPS systems and why? Explain with neat diagram how the P-code is generated?   (7)
    b) Explain with a neat diagram how the L1 and L2 signals are generated? Find the free space loss factor on a GPS satellite L1 C/A code signal at a distance of 2×10^7.
                                                                                   (7)

4. What are the other Global Navigation Satellite systems and how does they different from the GPS system in terms of constellations and services provide by them?
                                                                                  (14)

5. a) Describe the various GPS system segments.   (9)
    b) Write the basic equations for finding the user position.   (5)

6.   a) Explain Galileo signal components.   (9)
    b) What are the advantages of Galileo signal structure over GPS?   (5)

7. a) What is Geodetic coordinate system and how does it different from the Geocentric coordinate system?   (7)
    b) Write the equation for conversions of Cartesian or ECEF coordinate to geodetic coordinate frame.
                                                                                   (7)

8.   Answer any three of the following   (14)
    a) WGS Coordinate System   b) C/A code and P code of GPS system
    c) Navigation Message System   d) Signal structure of GPS

MODEL QUESTION PAPER
IV/IV B.E. Electronics and Communication Engineering
ECE 4204-(2)Tele Communication Switching Systems

Subject Code : ECE 4204-2   **Max Marks : 70**

Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks

1. a. What is meant by combination switching?
   b. Give the most common 3-stage configurations used.
   c. What are the factors that limit the length of the subscriber loop system?
   d. Define Grade of Service.
   e. Name the three fundamental transmission channels in ISDN.
   f. Give the classification of Data Networks based on the geographical coverage.
   g. Differentiate Pure ALOHA and Slotted ALOHA.

2. a. Derive an expression for calculating the minimum number of switching elements for a 3- stage network.
                                                                                7 M
   b. Explain the modes of operation of Centralised SPC   7 M

3. a Explain about the Basic Switching System   6 M
   b. With neat diagrams explain about Three stage Networks   8 M

4. a. Write short notes on Subscriber Loop Systems.   8 M
   b. Explain about the Numbering Plans   6 M

5. a. Write short notes on Block Models & Loss Estimates.   8 M
   b. Explain about the Delay Systems   6 M

6. a Explain about the Network & Protocol Architecture of ISDN   9 M
   b. Write short notes on Broadband ISDN   6 M

7. a. Write short notes on Circuit and Store& Forward Switching Techniques.   8 M
   b. Explain about the Local Area Networks   6 M

8. a Explain about the Link to Link Layers using a neat diagram   8 M
   b. Write short notes on Internetworking   6 M

Subject Code : ECE 4204-3   **Maximum Marks : 70**

Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks

1. a) Define Switched-Beam

    b) Define Space Division Multiple Accesses

    c) Define DOA

    d) Define Space – Time Beamforming

    e) Define SINR

    f) Define LMS Algorithm

    g) Define Maximum Ration Combining

2. a) Explain about Smart Antenna Configurations

    b) Draw and explain the Architecture of Smart Antenna System

3. a) What are the Conventional DOA estimation methods explain each of them

    b) Explain the ESPRIT Algorithm

4. a) Explain the RLS (Recursive Least-Squares) Algorithm

    b) Explain the Maximum SNR Beam former

5. a) Explain about Discrete Space –Time Channel and Signal Models

   b) Explain the CCI and ISI suppression

6. a) Explain the MIMO in Wireless Local Area Networks

   b) Differentiate single user data rate limits and multiple user data rate limits

7. a) Explain the Combining Techniques

   b) Explain the selection (Switched) Diversity

8. a) Explain the Mutual cooling Effects

   b) Explain Maximum Ratio Combing in detail

Subject Code : ECE 4204-4   Max Marks : 70

Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks

1. (a) Define Doppler shift
    (b) Explain radar jamming
    (c) Define quantization
    (d) Write the differences between FM and LFM pulse compression
    (e) Write the advantages of Ambiguity function
    (f) What is pulse chancellor?
    (g) Write the limitations of MTI

2. (a) Derive simple point target radar range equation.

    (b) Discuss about various functions and applications of Radar.

3. (a) What is Radar cross section? Explain radar cross section for meteorological targets.
 (b) Discuss about simplified approach to Doppler shift.

4. Write a short note on

    (a) Time and Frequency sample.

    (b) Nyquist rate in Doppler.

    (c) Phased array element spacing and Antenna beam spacing.
5. (a) Discus the relationship between matched filter characteristics and correlation function.
    (b) What is Ambiguity function? Explain the properties of Ambiguity function.

6. (a) Discuss about Doppler response of the pulse burst waveform.
    (b) Ambiguity function of the LFM waveform.

7. (a) Describe the operation of simple MTI Radar.
     (b) Explain, how the clutters will be suppressed by matched filters?
8. (a) With suitable expressions explain the discrete time Fourier transform of a moving target.
    (b) Explain about filter-bank interpretations of pulsed Doppler processing with the DFT.

<u>Subject Code : ECE 4204 (5)</u>   <u>Max Marks : 70</u>

Question 1 is compulsory
Answer any other FOUR questions
All questions carry equal marks

1   (a) Define Roots and Scope of AI

(b) Write about Reinforcement Learning

(c) What are neuronal dynamical systems?

(d) What are the four unsupervised learning laws?

(e) Write back propagation algorithm

(f) Write BAM Connection matrices

(g) What is meant by competitive learning?

2. (a) What are Artificial neural networks? What are their characteristics?

(b) Explain the historical development of Artificial neural networks?

3. a) What are the basic learning laws? Explain the weight updation rules in each learning law.

b) explain about general neuronal activations Cohen-grossberg and multiplicative models

4. (a) What are activation functions? Give three examples with necessary graphical representation.

(b) Explain Hebbian learning and delta Rule

5. (a) Draw the architecture of a counter propagation network and explain its normal mode of operation

(b) Explain the training process in the Kohonen layer and Grossberg layer of a CPN.

6. (a) Explain what you mean by statistical methods. Give an example.

(b) Discuss the application of statistical methods to general non-linear optimization problems.

7. (a) Compare and contrast Boltzman Training and Cauchy Training. Give their graphs.

(b) Explain what you mean by

(i)   Simulated annealing

(ii) Artificial specific heat methods

8. (a) Draw the architecture of BAM, properly labelled. Give a problem that can be solved

With the help of the Network.

(b) Explain how weights are computed in Bidirectional Associative memory. Also show how

Associations are stored and retrieved