[B16 ENG 2101]

II/IV B.Tech. DEGREE EXAMINATION

First Semester.

MATHEMATICS-IV

MODEL QUESTION PAPER

(Common to CIV, ECE, EEE & ME)

Time: 3 Hrs. **Max. Marks: 70**

Question No. 1 compulsory.
Answer any FOUR questions from the remaining.
All Questions Carry equal marks
All parts of a question must be answered at one place only

1 (a) Find a unit vector normal to the surface $x^3 + y^3 + 3xyz = 3$ at the point $(1,2,-1)$.

(b) Show that $Curl\,(grad\,\phi) = 0$.

(c) Show that $\iint_S \nabla r^2 \cdot d\bar{s} = 6V$.

(d) State two-dimensional Laplace equation in Cartesian coordinates. Define harmonic function.

(e) Find the analytic function whose real part is $x^3 - 3xy^2$.

(f) Evaluate $\oint_C \frac{z^2 - z + 1}{(z-2)} dz$ where C is the circle $|z| = 1$.

(g) Find the nature and location of the singularities of the function $\frac{1}{(z-1)^3}$.

2 (a) Find the directional derivative of $f = x^2 - y^2 + 2z^2$ at the point $P(1,2,3)$ in the direction of the line PQ where Q is the point $(5,0,4)$. Also calculate the magnitude of the maximum directional derivative.

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

3(a) Show that $\bar{F} = (2xy + z^3)\bar{i} + x^2\bar{j} + 3xz^2\bar{k}$ is a conservative field. Find the potential function and hence the work done in moving a particle in this field from $(1,-2,1)$ to $(3,1,4)$.

(b) Use Green's theorem to evaluate $\oint_C [(3x - 8y^2)dx + (4y - 6xy)dy]$ where C is the boundary of the region described by $x = 0,\ y = 0\ and\ x + y = 1$

4 (a) Evaluate $\iiint_v div\ \bar{F}\, dv$ where $\bar{F} = y\bar{i} + x\bar{j} + z^2\bar{k}$ over the cylindrical region bounded by $x^2 + y^2 = 9,\ z = 0$ and $z = 2$.

(b) Find components of the vector field $z\bar{i} - z\bar{j} + y\bar{k}$ in cylindrical polar coordinates.

5 (a) Solve the equation $p\,y^3 + q\,x^2 = 0$ by the method of separation of variables.

(b) A tightly stretched string with fixed end points $x = 0$ and $x = l$ is initially at rest in its equilibrium position. If it is set vibrating by giving to each of its points a velocity $\lambda x(l - x)$, find the displacement of the string at any distance x from one end at any time t.

6 (a) If $f(z)$ is a regular function of z, prove that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} \right) |f(z)|^2 = 4|f'(z)|^2$.

(b) Find the bi-linear transformation which maps the points $z = 1, -1, \infty$ of the z-plane onto the points $w = 1+i, 1-i, 1$ of the w-plane. Hence find the critical points and the invariant points of this transformation.

7(a) Evaluate $\oint_C \frac{z^3 + z + 1}{z^2 - 7z + 2} dz$, where C is the ellipse $4x^2 + 9y^2 = 1$.

(b) Find the Laurent's expansion of the function $f(z) = \frac{1}{(1-z)(2-z)}$ valid for

(i) $0 < |z-2| < 1$ (ii) $|z-1| > 1$.

8 (a) Evaluate $\int_c \tan z \, dz$ where C is the circle $|z| = 2$.

(b) Use calculus of residues to evaluate $\int_0^{2\pi} \frac{Cos\,3\theta}{5 - 4\,Cos\,\theta} d\theta$.

[B16 ENG 2101]

[B16 EE 2104]
II/IV B.Tech Degree Examination
Second Semester
CIRCUIT ANALYSIS& SYNTHESIS
MODEL QUESTION PAPER
Electronics and Communication Engineering

Time : 3 Hrs. **Max. Marks : 70**

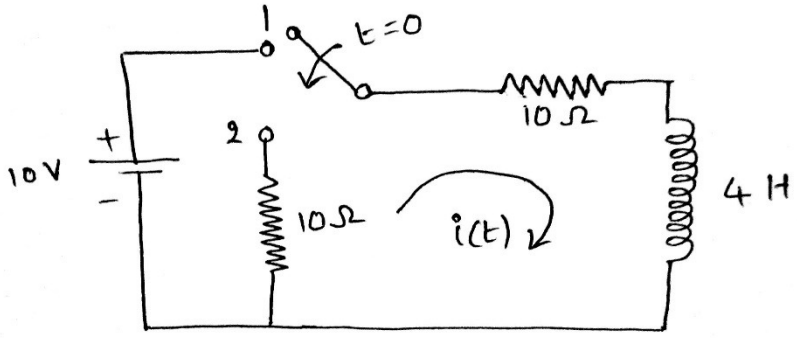
Question No. 1 is compulsory
Answer any FOUR questions from remaining
All questions carry equal marks
All parts of a question must be answered at one place only

(7*2=14M)

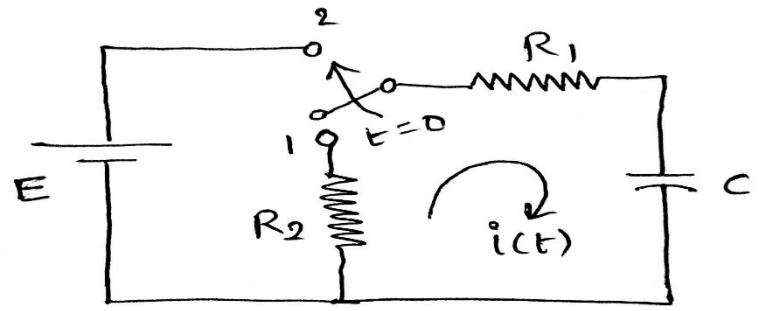
1.a) Distinguish between natural response and forced response.
b) Write two properties of driving point functions.
c) State final value theorem in Laplace domain.
d)Define H-Parameter.
e) Explain Dot convention for mutually coupled circuits.
f) Write down the Hurwitz conditions for stability
g) Write the Foster form of R-L network

2.a) In the circuit shown below the switch K is moved from position 1 to 2 at t=0, the steady state condition being reached in position 1, Find the expression for i(t) for t>0.

(7M)



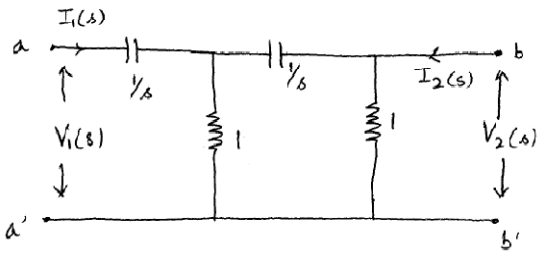
b) Derive the expression for i(t) when the switch is moved from position1 to position 2 at t=0 in the circuit shown. The switch as in position 1 for a long time. (7M)



3.a) Draw the pole zero diagram for the given network function and obtain the time domain response i (t) .

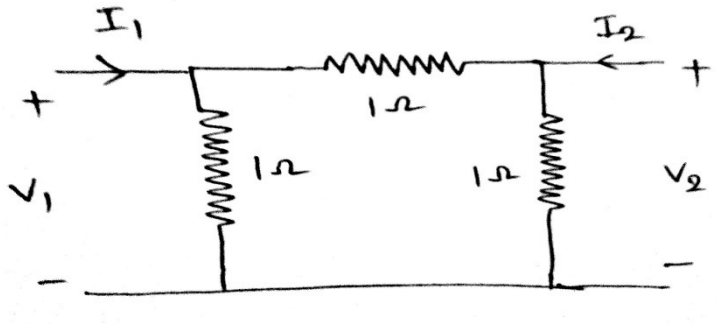
$$I(S) = \frac{5s}{(1+s)(s^2+4s+8)}$$ (7M)

b)Find the Z–parameters of the RC–ladder network shown in Figure.

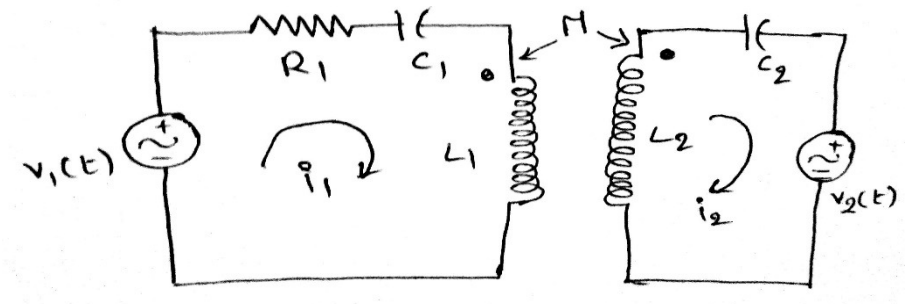


(7M)

4.a) Express ABCD-parameters in terms of Z-Parameters. Obtain the Z-Parameters of the network shown in figure. (7M)



b) Write the loop equations for the network shown.
(7M)



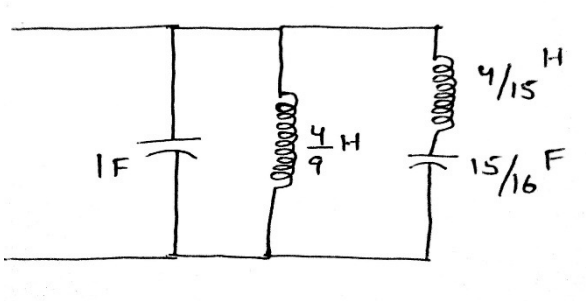
5. a) Determine whether the function F(s)= $\frac{(s^2+6s+5)}{(s^2+9s+14)}$ is positive real function?(7M)

b) Test if the polynomial s^4+8s^2+32 is Hurwitz? (7M)

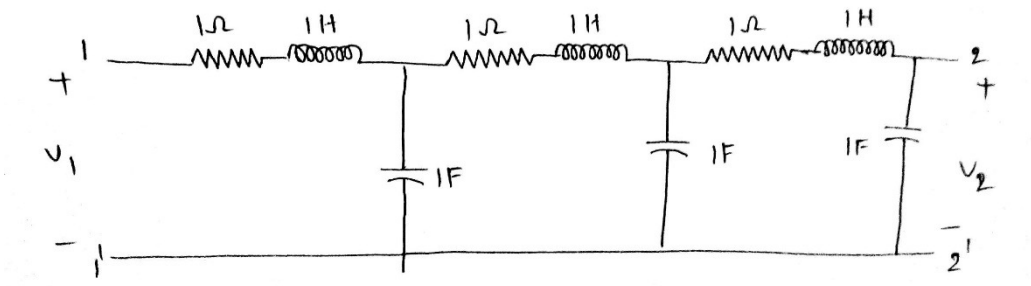
6.a)Find the Forster form 1 of the RL impedance function $Z(s)=\frac{(s+1)(s+4)}{(s+5)(s+3)}$ (7M)b) Draw the pole zero diagram of the impedance transformed function. (7M)

$Z(s)=\frac{s(s^2+3)(s^2+7)}{(s^2+1)(s^2+5)}$

7.a) Find the driving point impedance Z(s) of the given network. (7M)



b) For the ladder network find the driving point impedance at 1-1' with 2-2' open.(7M)



8.a) Explain the concept of duality. (4M)

b) Explain the properties of driving point immitance functions. (6M)

c) Explain the following terms with respect to transients: (4M)

(i) Time constant
(ii) Transient response and
(iii) Steady state response.

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[B16 EE 2104]

[B16 EE 2105]

II/IV B.Tech Degree Examination

Second Semester

ELECTRICAL TECHNOLOGY

MODEL QUESTION PAPER

Electronics and Communication Engineering

Time : 3 Hrs. **Max. Marks : 70**

Question No. 1 is compulsory

Answer any FOUR questions from remaining

All questions carry equal marks

All parts of a question must be answered at one place only

(7*2=14M)

1.

a) What is the purpose of core in a transformer?
b) Write short note on potential transformer?
c) Why series motor not operated on no-load condition?
d) Draw the speed torque characteristics of cage induction motor?
e) Briefly explain 'V' curve of a synchronous motor?
f) Why 1-phase induction motor is not self-starting?
g) Write the applications of 1-phase induction motors.

2. **a)** Explain function of commutator in D.C Machines. (7M)

b) The armature of a 4-pole, lap wound d.c machine has a core length of 30cm, diameter is 40cm, total conductors are 500 and speed of the machine is 1200rpm with a current of 20A. For an average flux density of 0.5 Tesla, find the electromagnetic power developed and the internal torque. (7M)

3. **a)** Explain Working principle and operation of a 1-phase transformer with neat diagram. (7M)

b) A 250V Compound generator has armature, series, and shunt field resistances of 0.4Ω, 0.2Ω, and 125Ω respectively. If this generator supplies 10KW at rated voltage, find the E.M.F Generated in the armature when the machine is connected, a) Long shunt b) Short shunt. Ignore armature reaction and allow 1V per brush for contact. (7M)

4. **a)** Explain OC & SC Test on a 1-Phase Transformer. (7M)

b) A 400/200V 1-phase transformer is supplying a load of 50A at a p.f of 0.866 lagging. The no load currentis 2A at p.f of 0.208 lag. Calculate the primary current and power factor . (7M)

5 **a)** Derive the condition for maximum torque in a three phase induction motor . (7M)

b) If a motor has a slip of 2 percent at normal voltage ,deduce the approximate slip when developing sametorque at 10% above normal speed. (7M)

6.**a)** Explain voltage regulation with help of synchronous impedance method. (7M)

b) In a 50KVA , star connected ,440v ,3 phase ,50Hz alternator ,the effective armature resistance is 0.25 ohm per phase. The synchronous reactance is 3.2 ohm per phase and leakage reactance is 0.5 ohm per phase .Determine at rated load and unity power factor

(7M)

7. a) Draw and explain all the characteristics of D.C Shunt Generator and D.C series motor with its applications. (7M)

b) Derive the EMF Equation of a transformer. (7M)

8. **a)** Explain constructional details of stepper motor (7M)

b) Explain the principle of operation of universal motor (7M)

[B16 EC 2101]

II/IV B.Tech Degree Examination

First Semester

Analog Electronic Circuits

MODEL QUESTION PAPER

Electronics and Communication Engineering

Time : 3 Hrs. **Max. Marks : 70**

Question No. 1 is compulsory

Answer any FOUR questions from remaining

All questions carry equal marks

All parts of a question must be answered at one place only

1. [7x2=14 M]
   (a) List any two reasons for the need of cascading amplifiers.
   (b) Draw the hybrid –π model for a transistor in the CE configuration.
   (c) Mention any four advantages of negative feedback.
   (d) List the advantages of push pull class B amplifier.
   (e) Classify Oscillators.
   (f) Define slew-rate and input offset current for OP-AMP
   (g) List the ideal characteristics of an OP-AMP.

2. (a) Derive expression for voltage gain (A_V) and current gain (A_I) for two stage RC coupled amplifier using low frequency model. State the assumptions clearly.

   (b) A transistor is connected as a CE amplifier with load resistance of 10KΩ. The parameters are h_{ie}=5KΩ and h_{fe}=330. Calculate the overall gain for mid frequency range when four such stages are connected in cascaded RC coupling. Assume R_s=0.

3. (a) An amplifier gain changes by ±10% using negative feedback amplifier is to be modified to yield gain of 100 with 0.1% variation. Find required loop gain and amount of negative feedback.

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

4. (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 is reduced in a push-pull amplifier.

5. (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.

6. (a) A three stage double tuned amplifier system is to have a half power B.W. of 30 KHz centered on a center frequency of 400 KHz. Assuming that all stages are identical,

determine the half power B.W. of single stage. Assume that each stage coupled to get max. flatness.

(b) Differentiate single tuned and stagger tuned amplifier.

7. (a) With the help of neat diagrams, explain the following applications of OP-AMP.

(i) Differential amplifier.
(ii) Summing amplifier.

(b) Design an OP-AMP circuit to give an output $V_o = 3/4\,V_i + 5/6\,V_2 + 6/7\,V_3$, where $V_1 = 1$ V, $V_2 = 2$ V and $V_3 = 3$ V.

8. (a) Explain the concept of "Virtual ground" for OP-AMPs and derive an expression for closed loop gain of inverting configuration of OP-AMP.

(b) Define the following Op Amp parameters: (i) CMRR, (ii) PSRR and (iii) I/P Bias Current.

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[B16 CS 2104]

II/IV B.Tech Degree Examination

FIRST Semester

ELEMENTARY DATA STRUCTURES

MODEL QUESTION PAPER

Electronics and Communication Engineering

Time : 3 Hrs. **Max. Marks : 70**

Question No. 1 is compulsory

Answer any FOUR questions from remaining

All questions carry equal marks

All parts of a question must be answered at one place only

1. [7x2=14 M]
   (a) Explain initialization of two dimensional arrays.
   (b) Explain pre-order traversal.
   (c) Explain level and height of a tree.
   (d) What is an abstract data type.
   (e) Draw the binary tree for the expression
   A*B-(C+D)*(P/Q).
   (f) Explain quick sort.
   (g)Explain pointer and chain of pointers
2. (a) What is the advantage of using array? Give the syntax for declaration, accessing and printing one dimensional array. [7 M]
   (b) Define file. What is the purpose of fopen() and fclose()? [7 M]
3. (a) Define Function? Explain about parameter passing mechanism in functions.[7 M]
   (b) Write a C program to calculate student wise total marks for three students using array of structures. [7 M]
4. (a) What do you mean by data structure? Explain about linear data structure.[7 M]
   (b) Discuss the applications of stack. [7 M]
5. (a) Write an algorithm to convert infix to postfix notation. [7 M]
   (b) Define graph. Explain graph traversal techniques? [7 M]
6. (a) Write a program to implement circular linked list. [7 M]
   (b) What is minimum spanning tree? Explain with an example. [7 M]
7. (a) Define Tree? Explain different tree traversal techniques? [7 M]
   (b) Differentiate binary tree and binary search tree with examples. [7 M]
8. (a) Explain basic search techniques. [7 M]
   (b) What is sorting? Write a program to implement Merge sort. [7 M]

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[B16 EC 2102]

II/IV B.Tech Degree Examination

First Semester

Probability Theory & Random Processes

MODEL QUESTION PAPER

Electronics and Communication Engineering

Time : 3 Hrs. **Max. Marks : 70**

Question No. 1 is compulsory
Answer any FOUR questions from remaining
All questions carry equal marks
All parts of a question must be answered at one place only

1. (a) State Baye's probability theorem? 7x2=14M
   (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. 7M

   (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 average student who failed? 7M

3. (a) Define the distribution and density functions. List the properties of them. Prove any one property of each. 7M
   (b) A random variable X has a probability density function

$$f_X(x)=\frac{C}{x^2+1} \quad -\infty < x < \infty$$

   Find the constant 'c' and also find the probability distribution function of the random variable X. 7M

4. (a)The random variables X and Y have joint probability density function

$$f_{XY}(x,y) = \frac{1}{\pi}, \quad (x^2+y^2) \le 1$$

$$= 0 \quad \text{Otherwise}$$

   Determine $f_X(x) and f_Y(y)$. Are they independent? 7M

(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 $Y = X^2$. 7M

5. a) A random variable has a probability density function

$$f_X(x) = \frac{5}{4}(1 - x^4) for \quad 0 < x \leq 1$$

$$= \quad 0 \text{ elsewhere}$$

Find (i) E(X) (ii) E (4X+2) (iii) $E(X^2)$. 7M

(b) State and prove Chebyshev's inequality. 7M

6. (a) Compute the characteristic function for a random variable X with $f_X(x) = \frac{1}{2}e^{-|x|}$, $-\infty < x < \infty$.

(b) Prove that the random process $X(t) = A\cos(w_0 t + \theta)$is wide sense stationary where A, w_0 are constants and θ is uniformly distributed random variable on the interval (0,2π). 7M

7. (a) Define Autocorrelation and power spectral density for a random process. List their Properties. 7M

(b) State and prove Wiener-Kinchine theorem. Give its significance. 7M

8. (a) Show that the Narrow band noise process can be expressed as in phase and quadrature components. 7M

(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 No/2. 7M

[B16 EC 2201]
II/IV B.Tech Degree Examination
Second Semester
Switching Theory and Logic Design
MODEL QUESTION PAPER
Electronics and Communication Engineering

Time : 3 Hrs. **Max. Marks : 70**

Question No. 1 is compulsory
Answer any FOUR questions from remaining
All questions carry equal marks
All parts of a question must be answered at one place only

[7x2=14M]

1.
a) Convert 1096_{10} in to Binary, Octal and Hexadecimal numbers.
b) Realize two input X-OR Gate by using only NOR Gates.
c) Differentiate between Decoder and Encoder.
d) Define a sequential logic circuit.
e) Compare Synchronous and Asynchronous counters.
f) Define Static-1 hazard and Static-0 hazard.
g) What is a critical race?

2. (a) Simplify the following functions by using basic Boolean laws

i. $\bar{x}\bar{z} + xyz + x\bar{z} = Y$
ii. $A\overline{B}C + (\overline{B}+\overline{C})(\overline{B}+\overline{D}) + \overline{(A + C + D)} = Y$

(b) Simplify the function by using K-Map

$f(a,b,c,d,e) = \pi M(0,1,4,5,6,7,9,11,15,18,25,30.31) + d(10,14,20)$

3. (a) Simplify the given function by using Quine–McCluskey method
$F(w,x,y,z) = \Sigma m(1,2,4,6,7,8,9,10,12,14,15)$

(b) Find standard POSE for $A+C+\overline{B}\overline{D} = Y$

4. (a) Design an 8:1 Multiplexer with only NAND Gates.

(b) Implement the given functions by using a 3 to 8 Decoder and logic Gates.

(i) $f_1(A,B,C) = \Sigma m(0,1,5,7)$
(ii) $f_2(A,B,C) = \Sigma m(1,3,5,7)$
(iii) $f_3(A.B,C) = \Sigma m(1,3,5.6.7)$

5. (a) Design and draw a BCD to 7 segment Decoder circuit for active low outputs.

(b) (i) Convert T-Flip-Flop in to a D-Flip-Flop
(ii) What is race around problem? How to avoid it?

6. (a) What is lockout in counters? Design a Mod-10 synchronous counter by using T-Flip-Flops.

(b) Design a 3-bit right shift register and explain the modes SISO and PIPO.

7. (a) Design a Full adder and explain how to implement a 4 bit parallel adder.

   (b) Explain the terms race, critical race and non critical race by taking an example.

8. (a) Design a Sequence detector which produces an output 0 every time the sequence 0101 isdetected, an output 1 at all other times. Assume that overlapping sequence is allowed. Use D-FFs inyour design.

   (b) Explain the following:

   i. Priority encoder
   ii. Ring counter
   iii. Error detecting and Error correcting codes

[B16 EC 2202]

II/IV B.Tech Degree Examination

Second Semester

Electromagnetic Field Theory and Transmission lines

MODEL QUESTION PAPER

Electronics and Communication Engineering

Time : 3 Hrs. **Max. Marks : 70**

Question No. 1 is compulsory

Answer any FOUR questions from remaining

All questions carry equal marks

All parts of a question must be answered at one place only

1. 7X2=14M

a) What is relaxation time?

b) The vector magnetic potential due to a current distribution is $\bar{A} = (x\bar{a}_x + xy\bar{a}_y + xyz\,\bar{a}_z)$ wb/m. Find the magnetic flux density $\bar{B}$ at (1,2,3).

c) Write Maxwell's equations for time varying fields using phasor notation.

d) Define Brewster angle and give an expression for it.

e) A uniform plane wave travelling in a medium has $\bar{E} = 10\, e^{-0.5x}\ \text{Cos}\ (10^8\, t - 2x)\bar{a}_y$ V/m. Find propagation constant and velocity of wave propagation.

f) A 50 Ω transmission line is terminated by a 150 Ω load resistance. Calculate reflection

g) coefficient at the load and the voltage standing wave ratio on the line.

h) What is dominant mode? Give the dominant mode for TM_{mn} modes.

2 a) Derive an expression for the energy stored in static electric field. 7M

b) Derive an expression for the electric filed due to an infinite line charge. 7M

3 a) Obtain an expression for the magnetic field due to a finite current filament carrying current I along the Z – axis. 7M

b) Obtain the differential form of Ampere's circuital law. 7M

4. a) Derive Maxwell's equations in integral and differential form. 8M

b) In a lossless medium $\bar{E} = 10\ \text{Cos}\ (10^8\, t - 2z)\ \bar{a}_x$ V/m. Find the displacement current densityand find $\bar{H}$ using Maxwell's equations. Assume $\mu_r = 1$. 6M

5 a) Obtain the relation between E and H in a uniform plane wave. 8M

b) Derive wave equations for $\bar{E}$ and $\bar{H}$ for free space conditions and for a conductive medium. 6M

6. a) Discuss reflection of plane waves by a perfect dielectric for oblique incidence. 8M

b) A uniform plane wave at a frequency of 1 GHz is travelling in a conductive medium and has a phase shift constant of 2 rad/m and its amplitude is reduced by 20% for every one meter travelled. Calculate attenuation constant, skin depth and velocity of the wave. 6M

7 a) Obtain an expression for the input impedance of a transmission line with characteristic impedance Z_o and terminating impedance Z_L. 8M

b) Define characteristic impedance and reflection coefficient at load for a transmission line and obtain expressions for them. 6M

8 a) Derive expressions for the electromagnetic field configuration for TE waves in a rectangular waveguide. 8M

b) A rectangular waveguide measures 4.5 cm X 2 cm internally. For the TE_{10} mode, find cutoff frequency , cutoff wave length , guide wavelength , phase and group velocities and characteristic wave impedance. 6M

[B16 EC 2203]
II/IV B.Tech Degree Examination
Second Semester
Pulse and Digital Circuits
MODEL QUESTION PAPER
Electronics and Communication Engineering

Time : 3 Hrs. **Max. Marks : 70**

Question No. 1 is compulsory
Answer any FOUR questions from remaining
All questions carry equal marks
All parts of a question must be answered at one place only

1. [7x2=14 M]
   (a) What is meant by *Linear Wave shaping*?
   (b) State *Clamping circuit theorem*.
   (c) What do you mean by *storage time* in a transistor? How storage time can be reduced?
   (d) What is *Synchronization*?
   (e) What are the advantages of astablemultivibrators?
   (f) Explain the terms *Propagation delay* and *Fan Out*.
   (g) What is the need for commutating capacitors?

2. (a) Derive the expression for rise time of the pulse waveform after passing through low pass RC circuit.
   (b) A symmetrical square wave of ± 5V at a frequency of 5 kHz is applied in a high pass RC circuit

3. (a) Draw the circuit diagram of slicer circuit using Zener diode and explain its operation with the help of transfer characteristics.
   (b) Explain the transfer characteristics of the emitter coupled clipper and derive the necessary equation.
4. (a) What do you understand by hysteresis? What is hysteresis voltage? Explain how it can be eliminated in a Schmitt trigger?
   (b) Design an astablemultivibrators to generate a square wave if 5kHz frequency and with a duty cycle of 25%.
5. (a) Draw a self-biased binary circuit and derive necessary relations for steady state analysis of the circuit.
   (b) Design a monostable multivibrators to generate an output pulse of 250 μs duration. Assume $h_{fe}(min) = 25$, $I_{cc}(sat) = 5mA$, $V_{CC} = 10V$ and $V_{BB} = -4V$.

6. (a) Explain the working of a Millers time base generator with neat circuit diagram.
   (b) Explain current time base generator with neat sketches.

7. (a) What is Synchronization? Why it is necessary in waveform generators?
   (b) How an astablemultivibrators can be synchronized? Illustrate with waveforms.

8. (a) Compare the RTL and DTL logic families in terms of fan-in, fan-out, propagation delay, power dissipation and noise immunity.

   (b) Find the component values of a bootstrap sweep generator given $V_{CC} = 18V$, $I_c(sat) = 2mA$ and $h_{fe}(min) = 30$.

[B16 EC 2204]

II/IV B.Tech Degree Examination

Second Semester

Analog Communications

MODEL QUESTION PAPER

Electronics and Communication Engineering

Time : 3 Hrs. **Max. Marks : 70**

Question No. 1 is compulsory

Answer any FOUR questions from remaining

All questions carry equal marks

All parts of a question must be answered at one place only

1 (a) Explain need for modulation. 7x2=14M

(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) What is Pre-Emphasis and De-emphasis?

(f) Explain the need of Amplitude Limiter.

(g) Define Resistor Noise and Shot noise

2 (a) Describe one method of generating the amplitude modulation wave. Also sketch the spectrum of an AM signal. 7M

(b) Explain the coherent detection of DSB-SC modulated wave 7M

3 (a) Explain the advantages of SSB system. Describe a method of generating an SSB signal. 7M

(b) Give the block diagram of an Indirect method of FM generation and explain. 7M

4 (a) Describe the operation of a phase locked loop FM demodulator with a neat diagram. 7M

(b) In a FM system when the audio frequency is 500Hz and the AF voltage is 2.4 V, the frequency deviation is 4.8 kHz. If the AF voltage is increased to 7.2V, what is the new deviation? If the AF voltage is raised to 10V, while audio frequency is dropped to 200Hz, what is the deviation? Find the modulation index in each case. 7M

5. (a) Derive the expression for signal -to-noise ratio in DSB-SC system. 7M

(b) Derive the expression for signal -to-noise ratio in FM system. 7M

6. (a) Explain the operation of FM transmitter and draw the modified diagram for frequency stability . 7M

(b) Explain the special devices of Radio telephone transmitter clearly. 7M

7 (a) Explain the operation of an AM receiver with neat schematic block diagram. 7M

(b) What are the factors that govern the choice of Intermediate frequency? 7M

8 (a) Distinguish between AGC and Delayed AGC with the help of neat circuit diagrams7M

(b) Draw the block diagram of a Communication receiver. And briefly explain eachblock. 7M

[B16 EC 2205]
II/IV B.Tech Degree Examination
Second Semester
Signals and systems
MODEL QUESTION PAPER
Electronics and Communication Engineering

Time : 3 Hrs. **Max. Marks : 70**

Question No. 1 is compulsory
Answer any FOUR questions from remaining
All questions carry equal marks
All parts of a question must be answered at one place only

1. [7x2=14M]

(a) Find and sketch the first derivative of the following signal

$$x(t) = u(t) - u(t - a),\ a > 0.$$

(b) Determine whether or not the following signal 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 $x(t) = u(t);\ h(t) = e^{-at}u(t),\ a > 0$. 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 $x[n] = \cos n\pi / 4$.

2. (a) Check whether the following systems are

i) Static or dynamic
ii) Linear or non linear
iii) Causal or no causal
iv) Time invariance or time variant.

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

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

(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

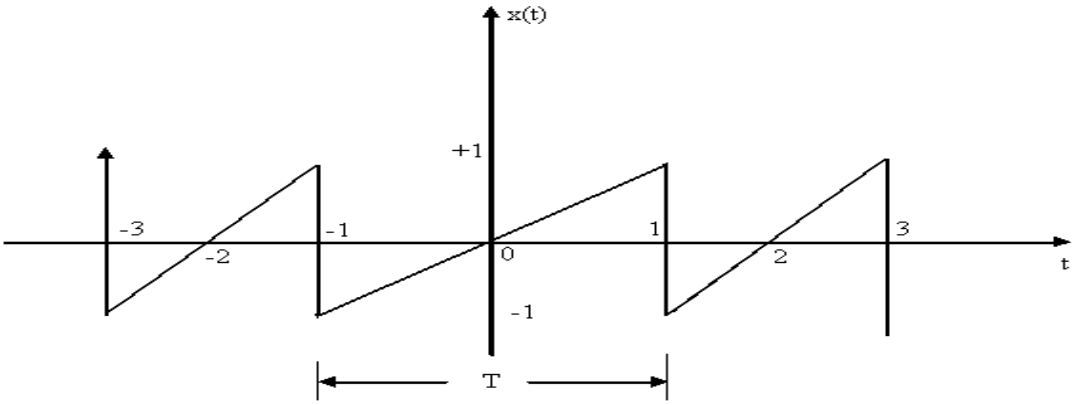
$$x(n) = 2\delta(n+1) - \delta(n) + \delta(n-1) + 3\delta(n-2)$$
$$h(n) = 3\delta(n-1) + 4\delta(n-2) + 2\delta(n-3)$$

(b) Determine the stability of the system described by difference equations

v) $y(n) = 0.6\,y(n-1) - 0.08\,y(n-2) + x(n)$

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

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

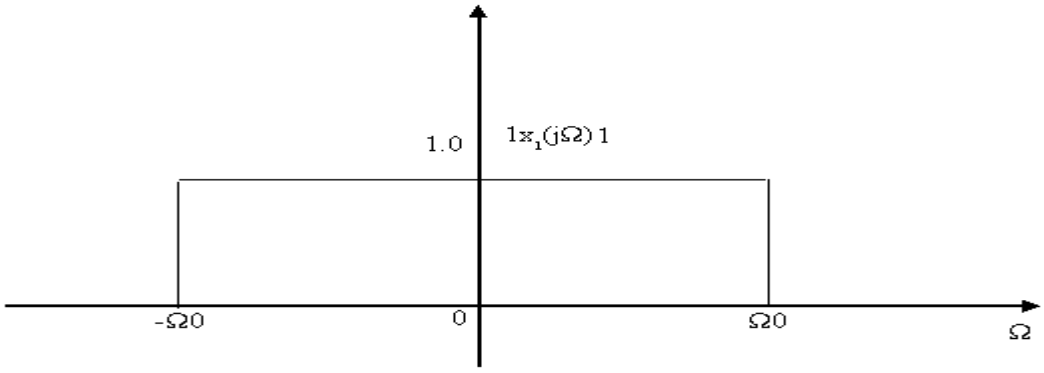
$$x(t) = 2\sin^2(2500\pi\, t)\cos(20{,}000\pi\, t).$$

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) Compare Energy Spectral Density (ESD) and Power Spectral Density (PSD)

7. (a) A signal $x(t)=\text{sin c}(150\pi\, t)$ 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 ROC 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 for the specified Initial condition

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

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

[B16 ENG 2201]

II/IV B.Tech Degree Examination

Second Semester

Environmental Studies

MODEL QUESTION PAPER

(Common to ECE,EEE & ME)

Time : 3 Hrs. **Max. Marks : 70**

Question No. 1 is compulsory

Answer any FOUR questions from remaining

All questions carry equal marks

All parts of a question must be answered at one place only

1. Write short answers for the following:

(a) Give the objectives of Environmental Studies
(b) Define ecosystem
(c) What are hotspots?
(d) What is soil erosion?
(e) What is sustainable development?
(f) State the practical benefits of watershed management
(g) What is biomagnifications movement?

2. Write about structure and function of forest ecosystem

3. Give an account of the various energy resources of India and their merits and demerits.

4. Give the bio-geographical classification of India and add a brief note on threats to biodiversity

5. Explain causes, effects and control measures of water pollution

6. Write a critical account of the effect of population growth on environment.

7. Give an account of rain water harvesting and watershed management with suitable example

8. Write short notes:

a) Conflicts of water
b) Effect of modern agriculture
c) Noise pollution
d) Solid waste management

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