[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 2101]

II/IV B.Tech. DEGREE EXAMINATION

First Semester.

NETWORK ANALYSIS & SYNTHESIS

MODEL QUESTION PAPER

ELECTRICAL ENGINEERING

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

PART-A (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.

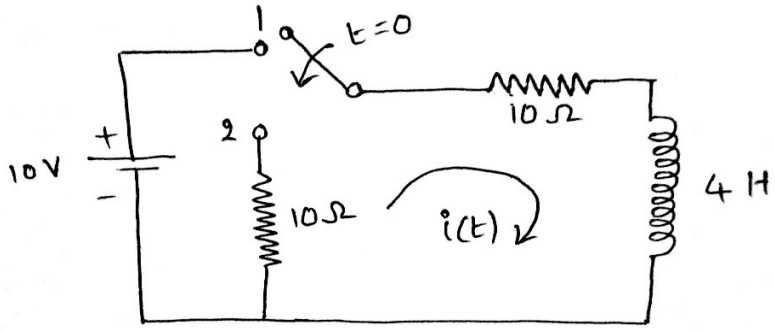
e) Explain Dot convention for mutually coupled circuits.

f) Write down the Hurwitz conditions for stability

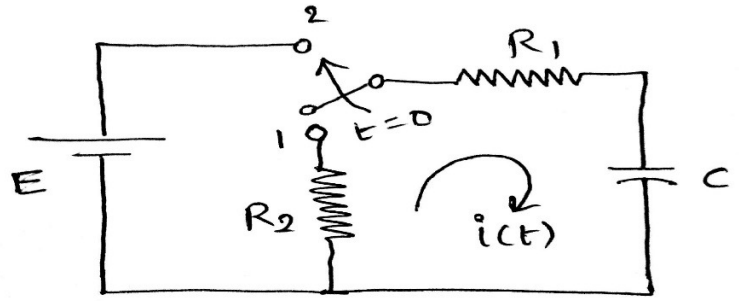
g) Write the Foster form of R-L network

PART-B

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)



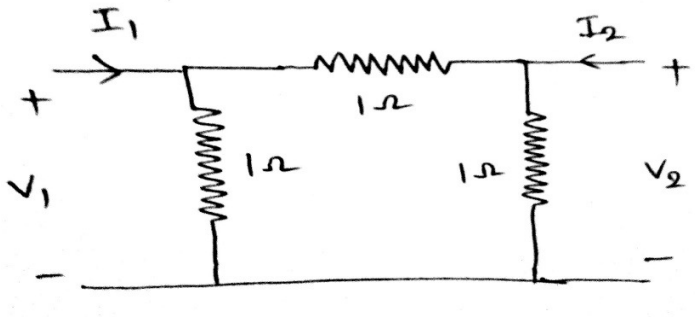
b) Derive the expression for i(t) when the switch is moved from position1 to position 2 at t=0 in the circuit shown. The switch as in position 1 for a long time. (7M)



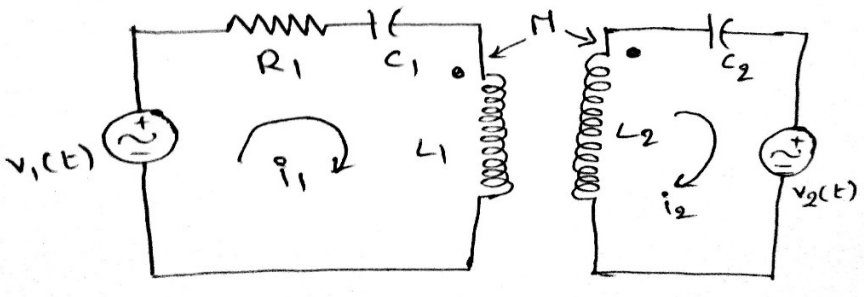
3. a) State and prove convolution theorem. (7M)

b) A Series R-L-C circuit with R=3Ω, L=1H, C=0.5F is excited by a unit step voltage. Obtain the expression for the current i(t) using Laplace transform method. Assume the circuit is initially relaxed. (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)

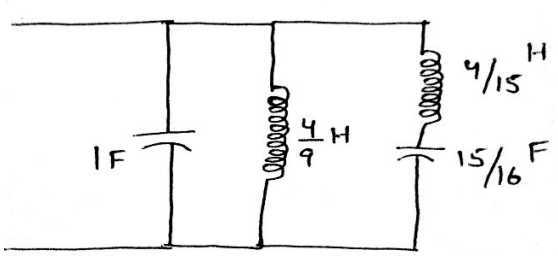
b) Test if the polynomial s^4+8s^2+32 is Hurwitz? (7M

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

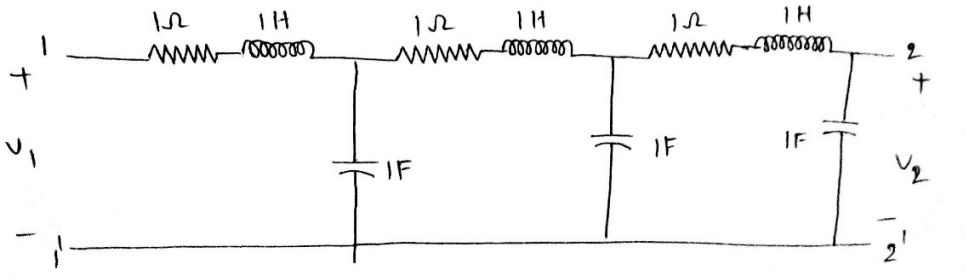
b) Draw the pole zero diagram of the impedance transformed function. (7M)

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

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) A series RL circuit has a constant voltage V, applied at t=0. At what time does $V_R = V_L$ (4M)

[B16 EE 2101]

[B16 EE 2102]

II/IV B.Tech. DEGREE EXAMINATION

First Semester.

ELECTRO MAGNETIC FIELD THEORY

MODEL QUESTION PAPER

ELECTRICAL ENGINEERING

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) What are the various types of charge distributions and explain briefly?.

   b) State coulomb's Law.

   c) Define Electric field intensity and Electric flux density.

   d) Show that $\nabla \cdot \overline{E}$ is zero for the field of a uniform line charge.

   e) Derive the relation between $\overline{D}$ and $\overline{E}$.

   f) State Biot-savert's Law and explain briefly.

   g) Two straight parallel wires separated by 2 m carry 5A and 10 A current in the opposite direction in air. Find the force per unit length?

2. a) Derive an expression for Electric field intensity due to infinite line charge distribution?

   b) A $2\,\mu C$ point charge is located at $A(4,3,5)$ in free space. Find $E_\rho, E_\phi,$ and E_z at $P(8,12,2)$

3. a) Derive an expression for Electric field intensity due to infinite sheet of charge distribution by using Gauss's law?

   b) Uniform line charges of 120nC/m lie along the entire extent of three coordinate axes. Assuming free space conditions. Find Electric field Intensity $\overline{E}$ at P(-3,2,-1).

4. a) State Gauss law and Derive an expression for the Gauss law in Integral form and point form.

   b) Starting from Gauss law as applied to the differential volume element, explain the concept of Divergence.

5. a) Define an electric dipole and derive an expression for $\overline{E}$ due to electric dipole.

   b) Find the stored energy in a system of 4 identical charges of Q = 4nC at the corners of a square of a 1m on a side?

   c) State and prove the Uniqueness theorem.

6. a) Derive an expression for a curl and applying Ampere's Circuital law to an incremental surface.

   b) Explain and derive the boundary conditions of electric field for a dielectric – dielectric medium

7. a) Write down the Maxwell's equations for time varying fields in integral and point form.

   b) Explain clearly why the expression to modified for the magnetic fields which vary with time and derive an expression for the modified Ampere's circuital law.

8 a) The magnetic field intensity of a uniform plane wave in air is 20A/m in the a_y direction. the wave is propagating in the a_z direction at a frequency of $2*10^9$ rad/sec. Find (i) wave length (ii) frequency (iii) time period(iv) amplitude of $\overline{E}$.

   b) State and prove the poyinting theorem and derive an expression for poyinting theorem in integral and point form.

[B16 EE 2103]

II/IV B.Tech. DEGREE EXAMINATION

First Semester.

ELECTRICAL MEASUREMENTS & INSTRUMENTS

MODEL QUESTION PAPER

ELECTRICAL ENGINEERING

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) List sources of measurement error
   (b)Write the principle of frequency meter
   (c)What is the purpose of price gaurd wire bridge?
   (d)what is wetson synchro scope?
   (e)Define leakage factor in magnetic instrument.
   (f)What is a potentiometer?
   (g)What is phase angle error in potential transformer?

2. (a)Describe the working principle of moving coil ammeter
   (b)Discuss various methods of producing controlling torque in indicating instruments

3. (a)Explain about campbell's De saulty's bridge.
   (b)Explain about wein's bridge.

4. What do you understand by attraction type and repulsion type instruments? what is the importanace of deflecting torque in indicating instruments?

5. (a)Explain the working principle of balastic galvanometer
   (b)Explain working principle of hibberts magnetic standard flux meter.

6. (a)Explain about determination of B-H curve using CRO
   (b)Discuss about determination of leakage factor in magnetic measurements

7. (a)Write and explain working principle of AC.polar and co-ordinate type potentiometers
   (b)Explain calibiration of ammeters

8. Derive the Torque equation of Induction type instruments?

[B16 EC 2104]

II/IV B.Tech. DEGREE EXAMINATION

First Semester.

ELECTRONICS DEVICES &CIRCUITS

MODEL QUESTION PAPER

ELECTRICAL ENGINEERING

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

Question No. 1 compulsorily.

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. What is meant by diffusion current in a semi-conductor?

b. A silicon diode has a saturation current of 7.5 pA at room temperature to 300 °K. Calculate the saturation current at 400 ° K.

c. Derive the expression for ripple factor of half wave rectifier.

d. Draw the input and output characteristics of a transistor in CE configuration and mark the cutoff, saturation and active regions.

e. Compare JFET with MosFET

f. Write a short note on diode switching times

g. Draw the equivalent circuit of transistor for high frequencies

2. a. Explain the current components in a PN junction diode and Derive the diode current equation.

b. Briefly explain about avalanche and zener breakdown.

3. a. Explain about intrinsic and extrinsic semiconductors

b. write short note on (i) Hall effect (ii) continuity equation

4. a. Explain the working of Bridge rectifier. Give the expressions for RMS current, PIV, ripple factor and efficiency.

b.A diode whose internal resistance is 20Ω is to supply power to a 100Ω load from 110V(rm s)source supply. Calculate (i) peak load current (ii) the dc load current (iii) the ac load current (iv) the percentage regulation from no load to full load.

5. a. Draw and explain the input and output characteristics of a transistor in CC configuration.

b. Refer to the figure 1 , determine the minimum value of I_B that produce saturation

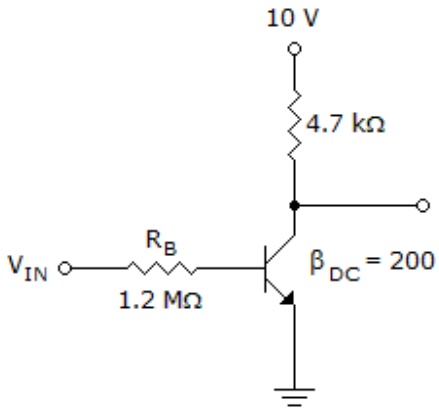


Figure 1

6. a. Explain with the help of neat diagrams, the structure of an N-channel FET and its Volt-ampere characteristics. In what ways it is different from a bipolar transistor.
   b. Describe the kind of operation that takes place in the enhancement mode MOSFET. How does this differ from depletion mode type?

7. a. Explain the performance of FET as a voltage variable resistor.
   b. Show that if a FET is operated at sufficiently low drain voltage, it behaves as a resistance R given by $R = R_O / [1- (VGS / VP)1/2]$ Where R_O is the channel resistance for zero gate voltage.

8. Write a short note on
   a. Photo transistor
   b. Tunnel diode
   c. Diode capacitances

[B16 ME 2106]

II/IV B.Tech. DEGREE EXAMINATION

First Semester.

ENGINEERING MECHANICS &STRENGTH OF MATERIALS

MODEL QUESTION PAPER

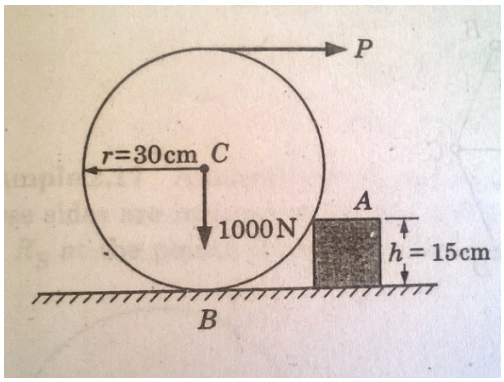
ELECTRICAL ENGINEERING

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.

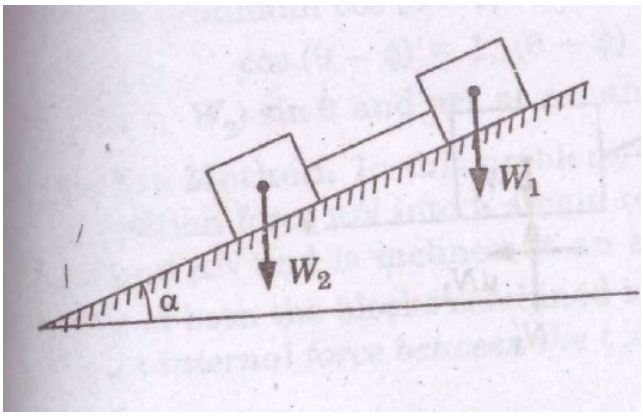
1. Answer the following questions
   (a) State Lame's Theorem. [2 M]
   (b) State Laws of friction. [2 M]
   (c) State Parallel axis theorem. [2 M]
   (d) Differentiate Kinematics and Kinetics [2 M]
   (e) Draw Stress-Strain curve for ductile materials [2 M]
   (f) Write the flexular formula. [2 M]
   (g) Explain various types of supports. [2 M]

2. (a) State and prove the Varignon's theorem. [7 M]
   (b) A uniform wheel of 60 mm diameter and weighing 1000 N rests against a rectangular block 15 cm high lying on a horizontal plane as shown in the figure below. It is to be pulled over this block by a horizontal force P applied to the end of a string wound round the circumference of the wheel. Find the force P when the wheel is just about to roll over the block. [7 M]

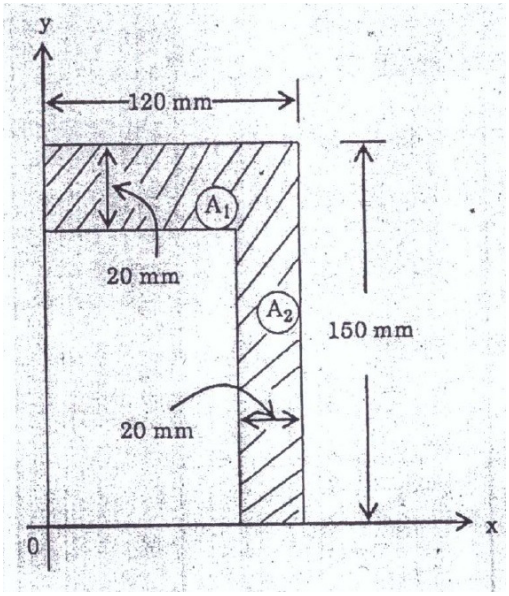


3 (a) Determine the centroid of a triangle. [7 M]
   (b) Two blocks of weight W1= 50 N and W_2=50 N rests on a rough inclined plane and connected by a string as shown in the figure below. The coefficient of friction between the inclined plane and W_1 and W_2 are μ_1=0.3 and μ_2=0.2 [7 M]

respectively. Find the inclination of the plane for which slipping will impend.



4. Find the Moment of Inertia of the area of the L- Section about the Centroidal X and Y axis as shown in the figure below. [14 M]



5. (a) State the Newton's laws of Motion. [7 M]

(b) A particle is thrown with a velocity of 5 m/s at an elevation of 60^0 to the horizontal. Find the velocity of another particle thrown at an elevation of 45^0 which will have a)Maximum horizontal range b) Maximum equal height and c) equal time of flight. [7 M]

6. (a) Explain Shear force and Bending moment. [7 M]
(b) Draw SFD and BMD for a simply supported beam carrying UDL. [7 M]

7. Derive the Torsional Equations and state the relevant assumptions made. [14 M]

8 A steel bar is 900 mm long; its two ends are 40 mm and 30 mm in diameter and [14 M]

the length of each rod is 200 mm. The middle portion of the bar is 15 mm in diameter and 500 mm long. If the bar is subjected to an axial tensile load of 15 kN. Find its total extension. Take E= 200 GN/m^2 (where $1G=10^9$).

[B16 ME 2106]

[B16 EE 2201]

II/IV B.Tech. DEGREE EXAMINATION

Second Semester.

ELECTRICAL MACHINES-I

MODEL QUESTION PAPER

ELECTRICAL ENGINEERING

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) Explain the application of DC series motor?
   b) What are Interpoles ? What should be the polarity of the interpoles with respect to the main poles in a D.C Generator and in a D.C Motor.
   c) Classify different types of DC generators?
   d) Explain why equalizer bar is used for two D.C compound generator to operate in parallel.
   e) Swinburne's test can be performed on dc series motor? If so why? If not why?
   f) Mention cooling methods of transformers?
   g) Draw the phasor diagram of single phase transformer with inductive load.

2) a) Derive the expression for torque in singly excited magnetic system?
   b) A smooth core armature working in a 4 pole field magnet has a gap (iron to iron) of 0.5cm. The area of surface of each pole is $0.1m^2$. The ampere turns absorbed by each pole are 3000. Calculate:
      i) Mechanical force exerted by each pole on the armature.
      ii) Energy stored in the four air gaps.

3) a) Explain the phenomenon of commutation in DC machines and discuss the methods adopted for improving commutation.
   b) A compensated generator has an inter pole air gap of 0.082m and a flux density in the inter pole air gap of 0.36T. The ratio of pole arc to pole pitch is 0.65. If the armature ampere turns per pole is 16200, determine the ampere turns per pole for the compensated winding and for inter pole winding.
   c) A 6 pole machine has an armature with 90 slots and 8 conductors per slot and runs at 1000 rpm, the flux per pole is 0.05wb. Determine the induced emf if winding is
      i) Lap connected ii) Wave connected

4) a) Briefly describe the methods of speed control of DC shunt motor?
   b) a 500 v dc shunt motor takes 8 amperes on no-load the armature and field resistances are 0.2 and 250 ohms respectively. Find the efficiency of the machine when running as a motor taking a current of 90 amperes from the supply.

5) a)What are the necessary conditions for parallel operation. Explain parallel operation of two shunt generators.

b) Explain the characteristics of dc series and shunt motor?

6) a) write the procedural steps to calculate the losses an efficiency of dc machine using swinburn's test b) In Hopkinson's test on two identical machines the following readings were obtained. Line current: 460V, motor armature current: 300A, Field currents are 5A and 4.4A for motor and generator respectively. Calculate the efficiency of each machine.

7) a) Derive the approximate expression for regulation of a single phase transformer. Hence, obtain the condition for regulation to be maximum .

b) A 20 KVA 2500/250 v, 50 HZ, single phase transformer has following results:
O.C Test (L.V side): 250 v, 1.4 amp, 105 watts
S.C Test (H.V side): 104 v, 8 amp, 320 watts
Calculate the efficiency at full load and 0.8 pf lagging?

8) a) Explain the Scott-connection in three phase Transformer?

b) Two transformers A and B of different ratings but equal voltage ratios share a load of 500KVA at 0.8 p.f. Lagging at 400V by operating in parallel. Transformer A has a rating of 500KVA, resistance drop of 1.5% and reactance drop of 5%. Transformer B has a rating of 1000KVA, resistance drop of 1% and reactance drop of 4%. Calculate load shared by each transformer and the power factor at which it is working.

[B16 EE 2202]

II/IV B.Tech. DEGREE EXAMINATION

Second Semester.

SIGNALS & SYSTEMS

MODEL QUESTION PAPER

ELECTRICAL ENGINEERING

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) A continuous time LTI system is characterized by its impulse response $h(t) = a^t u(t)$. Determine whether the System causal and stable?

b) Determine the fundamental period for the given signal $h[n] = Cos((^{4\pi}/_{17})n)$.

c) Explain briefly about (i) Time-shifting (ii) Time-scaling (iii) Time-inversion.

d) Find the energy of the given discrete time signal $h[n] = (0.6)^n u[n]$.

e) Derive the relation between Z- transform and Fourier transform ?

f) Explain briefly the methods of reconstruction of a continuous time signal from its samples?

g) What are the convergence conditions for the validity of the Fourier series?

2 a) Find the impulse response of a system described by the first order difference equation $y[n] + 2y[n-1] = x[n]$. Assume the condition of initial rest.

b) Find the convolution sum for the following signals as:

$x[n] = \propto^n u[n]$ and $h[n] = \beta^n u[n]$.

3 a) Classify the Systems and Explain all the system properties with examples.

b) A discrete time LTI system has an impulse response $h[n] = a^n u[n+2]$.Determine whether the system BIBO stable, Causal and memoryless?

4 a) A stable LTI system that is characterized by the differential equation

$$\frac{d^2y(t)}{dt^2} + 4\frac{dy(t)}{dt} + 3y(t) = \frac{dx(t)}{dt} + 2x(t)$$

. Find the impulse response of the system?

b) Find the Fourier transform for the signal x (t) = t e^{-at} u(t) using frequency Differentiation property?

5 a) Show that for continuous time signals, the convolution of the two signals in time domain is equivalent to multiplication of their spectra in the frequency domain.

b) Determine the transfer function for the system described by the difference equation y[n]+ 3 y[n-1]+ 2 y[n-2] = 5x[n-1]+2x[n-2]. And find the pole- zero's of the above system.

6 a) Find the Fourier transform of the signal. $x(t) = e^{-2|(t-1)|}$.

b) Find the best approximation of a signal f (t) = t in terms of the signal x (t) = sin (t) over an interval ($-\pi \leq t \leq \pi$).

7 a) a) Find the convolution integral of the following signals:

$$x(t) = \begin{cases} 1; 0 < t < T \\ 0, otherwise \end{cases} \quad \text{and} \quad h(t) = \begin{cases} t; 0 < t < 2T \\ 0, otherwise \end{cases}$$

b) Determine the impulse response of the system described by the difference equation

y[n] - 3 y[n-1]- 4 y[n-2] = x[n] + 2 x[n-2]. Assume that the system is initially at rest.

8 a) Determine the inverse Z- transform of the following

$$H(z) = \frac{((3-\frac{5}{6}z^{-1})}{(1-\frac{1}{4}z^{-1})(1-\frac{1}{3}z^{-1})}$$

b) A signal $x(t) = \cos 5\pi t + 0.5\cos 10\pi t$ is instantaneously sampled. Find the Maximum Interval of sampling rate from which the signal can be recovered and Find the discrete time signal.

[B16 EE 2202]

[B16 EC 2206]

II/IV B.Tech. DEGREE EXAMINATION

Second Semester.

ANALOG ELECTRONICS CIRCUITS

MODEL QUESTION PAPER

ELECTRICAL ENGINEERING

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. [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 centred on a centre 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.

[B16 ME 2204]

II/IV B.Tech. DEGREE EXAMINATION

Second Semester.

PRIMEMOVERS & PUMPS

MODEL QUESTION PAPER

ELECTRICAL ENGINEERING

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. Answer the following questions
   (a) Differentiate between the impulse and reaction turbine. [2 M]
   (b) What is meant by slip and negative slip. [2 M]
   (c) Define overall efficiency of a centrifugal pump. [2 M]
   (d) Define unit speed, unit power and unit discharge of the turbine. [2 M]
   (e) Explain various processes on a Rankine Cycle. [2 M]
   (f) Differentiate four stroke and two stroke cycle. [2 M]
   (g) What are advantages of gas turbines? [2 M]

2. (a) Explain the working principle of a pelton turbine with neat sketch. [7 M]
   (b) A jet of water having velocity of 30 m/sec strikes a curved vane which is moving with velocity of 15 m/sec. The jet makes an angle 30^0 with the direction of the motion of vane at inlet and leaves at an angle 60^0 to the direction of motion of vane at outlet. Assume vanes are perfectly smooth and calculate: (i) vane angle at inlet & outlet; (ii) workdone/sec per unit mass/sec. [7 M]

3 (a) Explain the characteristics curves of pumps. [7 M]
   (b) A centrifugal pump is to discharge 0.12 m^3/sec at a speed of 1440 rpm against a head of 30 m. The diameter and width of impeller at outlet are 25 cm and 5 cm. The manometric efficiency is 75%. Find the vane angle at outlet. [7 M]

4. (a) Define specific speed of a turbine and obtain the equation for it. [7 M]
   (b) A Kaplan turbine working under head of 29 m develops 1287.57 kW shaft power, the coefficient of flow velocity is 0.62. Diameter of boss is 0.34 times of diameter of runner and overall efficiency is 89%. Find the diameter of runner and speed of the turbine. Take Cu = 0.45. [7 M]

5. (a) Derive the equation for work done by the impeller of a centrifugal pump. [7 M]

   (b) A double acting reciprocating pump running at 40 rpm is discharging 1 m^3 of water per minute. The pump has a stroke of 400 mm. The diameter of the piston is 200 mm. The delivery and suction head are 20 m and 5 m respectively. Find [7 M]

the slip and power required to drive the pump.

6. (a) Compare Otto, Diesel and Dual cycles for the same compression ratio. [7 M]
   (b) Differentiate between petrol and diesel engine. [7 M]

7. (a) List the methods that used in reducing the speed of the turbine rotor. [7 M]
   (b) Derive an expression for simple impulse turbine [7 M]

8 (a) Explain about simple closed cycle gas turbine. [7 M]
   (b) In a gas turbine the compressor is driven by the high pressure turbine. The exhaust from the high pressure turbine goes to a free low pressure turbine which runs the load. The air flow rate is 20 kg/sec and the minimum and maximum temperature are respectively 300K and 1000K. The compressor pressure ratio is 4. Calculate the pressure ratio of the low pressure turbine and the temperature of exhaust gases from the unit. The compressor and turbine are isentropic. Cp of air and exhaust gases=1 $\mathrm{KJ/Kg-K}$ and $\gamma = 1.4$. [7 M]

[B16 EE 2203]

II/IV B.Tech. DEGREE EXAMINATION

Second Semester.

ELCTRICAL POWER GENERATION,TRANSMISSION & DISTRIBUTION

MODEL QUESTION PAPER

ELECTRICAL ENGINEERING

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) What is water hammering effect? How to eliminate it?
   b) What is the difference between load curve & load duration curve?
   c) Draw the 1-line diagram of A.C Power supply system.
   d) What is the importance of Inter-Connector in Distribution system?
   e) Define GMR and GMD.
   f) Explain SKIN EFFECT.
   g) Why the Capacitance effect is neglected in the Shot Transmission line?
   h) Write the Importance of String Efficiency.

2.a) Draw the schematic diagram of thermal power plant and explain its components.

b) What are the different types of tariffs and explain each one.

3. a) Explain radial and ring main distribution systems and also write advantages and dis-advantages of each with neat sketch.

b) A ring main can be considered to be a Quadrilateral whose perimeter is 300mt. The system is fed at a point A at 240V. Loads are taken off the points B,C and D and are 100A, 70A, and 50A res. If AB= 70mt, DC = 90m and CB = 80m and the resistance of each conductor is 0.2 Ω/Km , find the voltage at points B and C.

4. a) State Kelvin's law and write its limitations.

b) A 2-wire feeder carries a constant current of 250A throughout the year . The portion of capital cost which is proportional to the area of cross-section is RS 5 per Kg of the copper conductor. The interest and depreciation per annum and the cost of energy is 5Paise per kWh. Find the most economical cross sectional area of the conductor. Given that the density of copper is 8.93gm/cm^3 And its Resistivity is $1.73 * 10^{-8}$ Ω-mt.

5. a) Derive the necessary equations and draw the vector diagrams for a Middle - condenser method of Medium Transmission line and derive A,B,C & D constants.

b) Derive the expression of Inductane for a 1-phase transmission line.

6. a) Describe the methods of equalizing the potential distribution across a string of suspension insulators.

b) A Transmission line has a span of 214m between the level supports. The conductors have a cross-section area of 3.225 square-cm. Calculate the safety factor under the following conditions-
Vertical sag: 2.35m; wind pressure: 1.5 Kg/m run Breaking stress: 2540Kg/ square-cm
Weight of conductor : 1.125 Kg/m.

7. a) Explain Capacitance and Intersheath Grading of cables.

b) In a **5** insulator disc string, capacitance between each unit and earth is 1/6 of the mutual capacitance. Find the voltage distribution across each insulator in the string has a percentage of the voltage of the conductor to earth. Find the string efficiency.

8. a) Compare HVDC & EHV-AC Transmission.

b) What is mean by **Bundling** Conductors? Write the Advantages of Bundled conductors.

c) Explain String Chart.

[B16 EE 2203]

[B16 ENG 2201]

II/IV B.Tech. DEGREE EXAMINATION

Second Semester.

ENIVRONMENTAL STUDIES

MODEL QUESTION PAPER

(Common to ECE,EEE& ME)

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

Question No. 1 compulsorily.

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. 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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