DADI INSTITUTE OF ENGINEERING & TECHNOLOGY

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NH-5, Anakapalle – 531002, Visakhapatnam, A.P.

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Department of Electronics & Communication Engineering

SUBJECT:SIGNALS &SYSTEMS **REGULATION:R16**

NAME OF THE FACULTY: K.SOMESWARA RAO **SEMESTER& BRANCH: III/I & EEE**

Unit 1

1(a) Find the even and odd components of the signal x(t) = $\cos(\omega t+\frac{\pi}{3})$

(b)A function f(t) = {1 for $0<t\leq0.5$ & $0.5<t\leq1$ using f(t) = c1sint +c2 sin3t. Compute the

coefficients c1, c2.

2(a) Find the even and odd components of the signal x(t) =sin2t + sin2t.cos2t +cos2t

(b) Discuss orthogonality in signals using relevant expressions. Explain the term

complete set. Give examples of complete sets.

3. a) Derive the expression for mean square error when a function is approximated by a set of orthogonal signals.

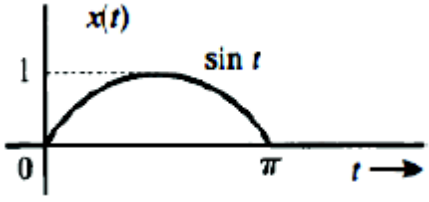
(b)Find the even and odd components of the signal x(t) = tu(t)

4(a) Find the even and odd components of the signal x(t) = $(1+t_2+t_3)\cos_2 10t$. (7M)

(b) Present the analogy between vectors and signals.

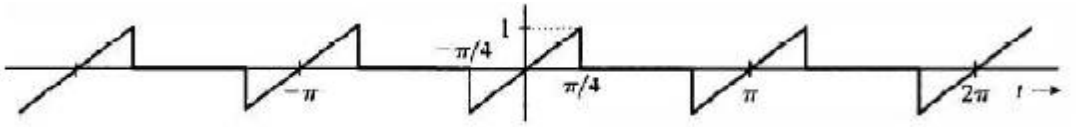
5 (a) Discuss orthogonality in complex functions

(b) Compute the energy of the signal x(t) shown below

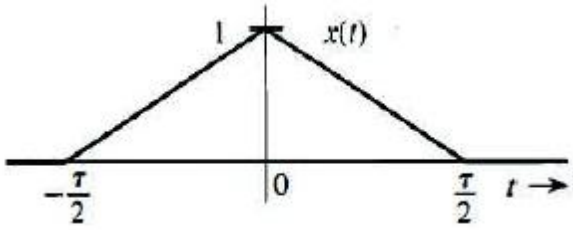


Unit 2

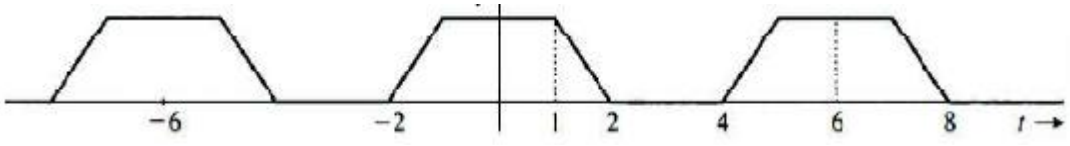
1(a) Find the trigonometric Fourier series for the signal x(t) shown below.



(b) Compute the Fourier transform of the signal x(t) applying differentiation in time property of Fourier transform

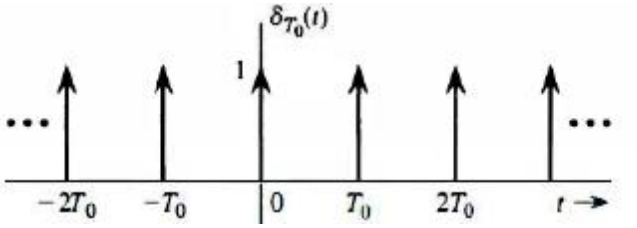


2(a) Find the complex exponential Fourier series for the signal x(t) shown below

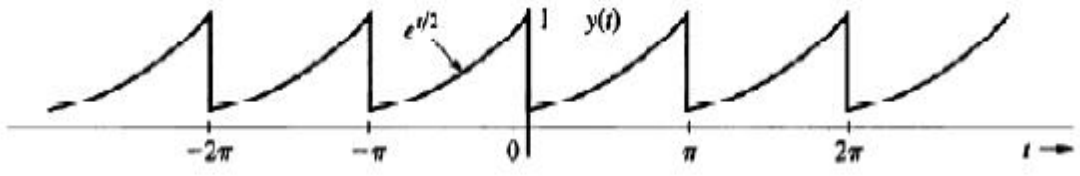


(b) State and prove differentiation in time domain property of Fourier transform.

3(a) Compute the Fourier transform of the signal represented below



(b) Find the trigonometric Fourier series for the signal y(t) shown below



4(a) Find the Fourier transform of the signum function. (5M)

(b) Write the properties of Fourier series. (5M)

5(a) Find the Fourier transform of x(t) = e-a |**t**|

(b)Write duality property of Fourier transform.

(c) A signal x(t) = 5sin(250t) + 6 sin(200_t), find the sampling rate to avoid aliasing.

Unit3

1(a) Compare impulse sampling, natural sampling and flat top sampling with relevant diagrams.

1(b) What is aliasing effect? Explain using relevant diagrams. Suggest the remedies to avoid aliasing.

2(a) Explain flat top sampling with relevant expressions and waveforms. (7M)

2(b) What is Nyquist rate of sampling? A signal x(t) = 10sinc(500t), find its Nyquist rate. Where sinc(x) = $\frac{sin\,(\pi x)}{\pi x}$

3(a)Explain natural sampling with relevant waveforms and expressions.

(b) Explain reconstruction of signals from samples using relevant expressions

4State and prove sampling theorem for band limited signals.

5(a) Write short notes on band pass sampling

(b) Discuss the effects of under sampling on recovery of signal.

(c)State sampling theorem for band pass signals.

Unit 4

1(a) Derive the relationship between autocorrelation function and energy spectral density of an energy signal.

1(b) Stating the properties and relevant mathematical expressions check whether the following systems are LTI or not?

i) y(t) = 2x(t) + 3x(3t)

2(a) Define cross correlation function, write its properties and prove any two of them.

2(b) Derive the relationship between bandwidth and rise time.

3(a) A system is given by y(t) = _

i) Check whether the system is BIBO stable. (Let x(t) be a square wave.)

ii) Is the system causal? Justify your answer.

b) Write the properties of autocorrelation function and prove two of them.

4(a) A system represented by y(t) = 2x(t-2) + 2x(t+2).

i) Is the system time invariant? Justify your answer.

ii) Is the system causal? Justify your answer.

4(b) Explain detection of signal in the presence of noise using correlation

5(a) Write the conditions for distortion less transmission.

(b) Explain the characteristics of ideal LPF

(c)Explain the characteristics of ideal HPF.

Unit 5

1(a)Find the inverse Laplace transform of

$$G(s) = \frac{s}{s^2 + 2s + 2}, \quad \sigma > -1$$

b)Find the Laplace transform of $-te^{-\alpha t}\,u(-t)$

2(a) Find the inverse Laplace transform of

$$G(s) = \frac{e^{-2s}}{s^2 + 2s + 2}, \quad \sigma > -1$$

2(b) Find the Laplace transform of $-e^{-\alpha t}\sin(\omega_0 t)\,u(-t)$

3(a) Find the inverse Laplace transform of

$$G(s) = \frac{4}{(s+3)(s+8)}, \quad \sigma > -3$$

(b)Find the Laplace transform of $e^{-\alpha t}\sin(\omega_0 t)\,u(t)$

4Find the inverse Laplace transform of

$$G(s) = \frac{4s}{(s+3)(s+8)}, \quad \sigma > -3$$

Unit 6

14(a) Using the z-domain differentiation property find the Z transform of

$x[n] = n(5/8)^n\, u[n]$

b) Find the inverse of

$$X(z) - \frac{z-1}{3z^2-2z+2}, \quad |z| < 0.8165$$

2(a) Using convolution property find the Z transform of

$$x[n] = (0.9)^n\, u[n] * (0.6)^n\, u[n]$$

(b) Find the inverse Z transform of

$$X(z) = \frac{z^2}{(z-1/2)(z-3/4)}, \quad |z| < 1/2$$

3(a) Find the inverse Z transform of X(z) = ln(1+az-1) ; ROC |z|>a (7M)

b) Find the Z transform and ROC of

$$x[n] = (0.8)^n u[n] + (0.6)^n u[-(n+1)]$$

5(a)Find the inverse Z transform of

$$X[z] = \frac{-z(z+0.4)}{(z-0.8)(z-2)}$$

(b)Find the Z transform and ROC of $x[n] = (1.2)^n\, u[n] + (3)^n\, u[-n-1]$

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Academic Year : 2018-2019
Name of the Faculty : MOHAMMAD SHAFFI
Designation : Asst. Professor
Department : EEE
Year/Semester : III –I Semester
Subject : PULSE and DIGITAL CIRCUITS

QUESTION BANK

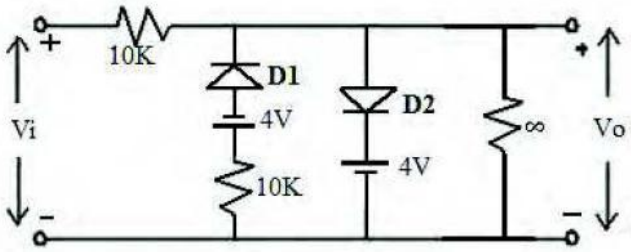
UNIT-I

1. a) Prove that a low pass circuit acts as an integrator. Derive an expression for the output voltage levels under steady state conditions of a low pass circuit excited by a ramp input.(5M)
   b) Explain RLC ringing circuit with a neat sketch.(5M)
2. a) Draw the output waveform of an RC high-pass circuit with a square wave input under different time constants. Derive the expression for percentage of tilt. (5M)
   b) What is an attenuator? How can an uncompensated attenuator be modified as a compensated attenuator. Give the comparison between perfect compensation, under compensation and over compensation. (5M)
3. a) Derive an expression for the output of low pass RC circuit excited by a step input.Draw the output for different time constants.(5M)
   b) Draw the response of an RC high pass circuit when applied with exponential input. Explain the response for different time constants. (5M)
4. a) An RC low-pass filter is fed with a symmetrical square wave. The peak-to-peak amplitude of the input waveform is 10 V and its average value is zero. It is given that RC=*T/2* where *T* is the period of the square wave. Determine the peak-to-peak amplitude of the output waveform. (5M)
   b) Prove that et = T/2RC for ramp as input to the High pass RC-Circuit? (5M)
5. a) Explain the working principle of rate-of-rise amplifier? (5M)
   b) Explain the working of attenuator as a CRO Probe? (5M)

UNIT-II

1. a) Give the circuits of different types of shunt clippers and explain their operation with the help of their transfer characteristics .(5M)
   b) State and prove clamping circuit theorem.(5M)
2. a) Write short notes on practical clamping circuits. (5M)

b) A voltage signal of (10 Sinwt) is applied to the circuit with ideal diodes shown in figure below. Estimate the maximum & minimum values of output waveform and maximum current through each diode. Also draw the input-output waveforms with proper explanation.(5M)



3. a)Draw the basic circuit diagram of negative peak clamper circuit and explain its Operation.
   b) Give some applications of clipping & Clamping circuits. (5M)
4. a) With neat circuit diagram, explain the working of an emitter coupled clipper. (5M)
   b) Explain the clamping circuit considering the source resistance and the diode forward resistance. (5M)
5. a) A symmetrical 50 Hz square wave whose peak to peak excursions are ± 100 V with respect to ground is to be positively clamped at 25 V. Draw the necessary circuit diagram and output waveform for this purpose. (5M)
   b) Design a diode clamper to restore the negative peaks of the input signal to zero level. Use a silicon diode with R_f= 50 Ω and R_r= 400 kΩ. The frequency of the input signal is 5 kHz.(5M)

UNIT –III

1. Explain the terms pertaining to transistor switching characteristics.
   i) Rise time.[2M] ii) Delay time. [2M] iii) Turn-on time.[1M]
   iv) Storage time.[2M] v) Fall time.[2M] vi) Turn-off time.[1M]
2. a) Describe the sequence of events in an n-p-n transistor to change from cutoff to saturation and vice versa. How does temperature affect the saturation junction of a transistor? (5M)
   b) Briefly discuss the influence of breakdown voltages on the choice of supply voltage in a transistor switch. (5M)
3. a) Design a Schmitt trigger circuit using npn silicon transistors with V_{BE} = 0.7V, $V_{CE(sat)}$ = 0.2V, $h_{fe(min)}$ = 60 and $I_{c(ON)}$= 3mA to meet the following specifications: V_{cc} =12V, upper threshold voltage, V_{UT}= 4V, lower threshold voltage,V_{LT}=2V. (5M)
   b) What are transpose capacitors? Explain how the commutating capacitors will increase the speed of a fixed-bias binary. (5M)
4. a) With neat circuit diagram, Explain the working of fixed bias bistable multi vibrator. (5M)
   b) Calculate the component values of a mono stable multi vibrator developing an output pulse of 500 μs duration. Assume $h_{fe(min)}$ = 25, $I_{CE(min)}$= 5 mA, V_{CC}= 10 V and V_{BB} = -4V. (5M)
5. a) Draw the circuit of a bistable multivibrator with symmetrical collector triggering. (5M)
   b)What are commutating capacitors? Show a symmetrical triggering arrangement for bi-stable multivibrator and explain its working. (5M)

UNIT -IV

1. a) Explain the operation of a Monostable multivibrator and derive for the pulse width with necessary waveforms & circuirts. (5M)
   b) Design a collector coupled astable multivibrator using NPN silicon transistors with h_{fe}=40, r_{bb}=200ohms supploied with V_{cc}=10V and circuit component values are R_c=1.2Kohms and C=270 pF. (5M)
2. a) Draw the circuit diagram of an astable multivibrator and obtain all the steady state voltages and currents. Show how it acts as a voltage to frequency converter. (5M)
   b) Design and draw a collector-coupled ONE-SHOT using silicon npn transistors with $h_{FE(MIN)}$ =20. In stable state, the transistor in cut-off has V_{BE} = -1V and the transistor in saturation has base current, I_B which

is 50% excess of the $I_{B(MIN)}$ value. Assume V_{CC} = 8V, $I_{C(SAT)}$ =2mA, delay time = 2.5ms & $R_1 = R_2$. Find R_C, R, R_1, C and V_{BB} . (5M)

3. a) Design a stable multi vibrator to generate a square wave of 1 kHz frequency with a duty cycle of 25% using silicon n-p-n transistors with $h_{FE(MIN)}$ = 40. (5M)

b) Design a collector coupled one-shot with a gate width of 3 ms using NPN transistors Assume necessary data. (5M)

4. Explain the operation of a Monostable multivibrator and derive for the pulse width with necessary waveforms & circuirts.[10M]

5. a) Derive the equation for voltage-to-frequency converter when a stable multi vibrator is used as a basic circuit. (5M)

b) The Schmitt trigger circuit also called sinusoidal to square converter? Explain the working principle. (5M)

UNIT -V

1. Explain the working of a transistor Bootstrap sweep circuit and derive expression for the slope sweep error. (10M)
2. a) Why the time base generators are called sweep circuits? Give most important applications of time –base generators. (5M)
   b) What are the different methods of generating time-base waveforms? Explain about each briefly. (5M)
3. Explain the working of Transistor Miller sweep circuit. What are its advantages over Bootstrap sweep circuits? (5M)
4. a) Define and derive the terms slope error, displacement error and transmission error. (5M)
   b) How is deviation of linearity expressed? What do you mean by sweep time and restoration time? (5M)
5. Explain the basic principles of Miller and Bootstrap time-base generators. Give the comparison of both the generation methods. (10M)

UNIT-VI

1. a) Draw the circuit diagram of a unidirectional sampling gate which delivers an output only at the coincidence of a number of control voltages and explain its working. (5M)
   b) Explain how to cancel the pedestal in a sampling gate with suitable circuit diagram. (5M)
2. a) Explain the function of a sampling gate used in Sampling Scopes also explain how sampling gate is used in chopping amplifiers. (5M)
   b) Explain how the loading of the control signal is reduced when the number of inputs increases in a sampling gate. (5M)
3. a) Explain about unidirectional diode sampling gate. Write its advantages and disadvantages. (5M)
   b) With neat circuit diagram, Explain bidirectional sampling gate using transistors. (5M)
4. a) What is meant by synchronization? Why it is needed? Explain. (5M)
   b) Explain about four diode sampling gate. (5M)
5. a) Explain about phase delay and phase jitters. (5M)
   b) Explain how pedestal can be reduced in gate circuit. (5M)

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QUESTION BANK (POWER ELECTRONICS)

Academic Year	:	**2018-19**
Name of the Faculty	:	**G.JAGADEESH**
Designation	:	**Assistant Professor**
Department	:	**Electrical &Electronics Engineering**
Year/Semester	:	**III YEAR –I SEMESTER**
Subject	:	**POWER ELECTRONICS**

Unit-1

1a).Explain about snubber circuit and derive the condition for Rs? [5M]

b) What is a MOSFET? Explain its V-I characteristics briefly. Also write its advantages over other switches.[5M]

2 a) Discuss about switching characteristics of an SCR during turn on and off. [5M]

b) Explain the diode bridge rectifier with R load and capacitive filter with neat circuit diagram and necessary waveforms. [5M]

3a).Explain various turn-on methods of an SCR. [8M]

3b) A thyristor operating from a peak supply voltage of 400V has the following specifications: Repetitive peak current, Ip = 200A, (di/dt)max = 50A/μs, (dv/dt)max = 200V/μs. Choosing a factor of safety 2 for Ip, (di/dt)max and (dv/dt)max , Design a suitable snubber circuit. The minimum value of load resistance is 10 ohm?[5M]

4a) Explain the static V-I characteristics of a thyristors and different modes of operation. [5M]

b) Briefly explain the V-I characteristics of an IGBT [5M]

5a.Following are the specifications of a thyristor operating from a peak supply of 500 V. Repetitive peak current I_p = 250 A $(di/dt)_{max}$ = 60A/μs , $(dVa/dt)_{max}$ = 200V/μs .Take a safety factor of 2 for the three specifications mentioned above. Design a suitable Snubber circuit if the min. load resistance is 20 Ω. Take zeta= 0.65 [5M]

b) Explain the dynamic characteristics of SCR. [5M]

Unit-2

1a.Derive the expression for output voltage of single-phase full converter by considering source inductance.[5M]

b) Single phase fully controlled converter is connected to a load comprised of 2ohms resistance and 0.3H inductance. The supply voltage is 230V at 50Hz. Estimate the average load voltage, average load current and input power factor for a firing angle of 200. Assume continuous and ripple free load current [5M]

2) Describe the working of single phase half controlled converter for alpha= 30o with relevant waveforms and derive expression for average output voltage.[10M]

3 a) Describe the working of single-phase fully controlled bridge converter in the Rectifying mode and inversion mode. And derive the expressions for average output voltage and rms output voltage.[5M]

b) Single phase fully controlled bridge is used for obtaining a regulated converter dc output voltage. The rms value of ac input voltage is 220V and firing angle is maintained at 300, so that the load current is 4A.

(a) Calculate the d.c. output voltage and active and reactive power input.

(b) Assuming load resistance remains same and if free-wheeling diode is used at the output, calculate dc output voltage. The firing angle is maintained at 300.[5M]

4 a) Derive the expressions for the following performance factors of single-phase fully Controlled bridge converter.

(i)Input power factor (ii) Voltage ripple factor

(iii) Active power input (iv) Reactive power input[5M]

b) The 1-phase semi converter circuit is connected to a 120V, 60 Hz supply. Determine the harmonic factor, distortion factor and input power factor if delay angle is alpha =90 deg. [5M]

5) explain single phase fully controlled rectifier with a)center tapped configuration b) bridge configuration.?. [5+5M]

6. A Single phase full converter delivers a constant load current I_o. Express its source current in Fourier series and derive expressions for the following performance parameters. (**i**) Displacement factor (**ii**) Power factor (**iii**) THD (**iv**) Current distortion factor [10M]

Unit-3

1.Describe the working of three phase half controlled converter with R load for alpha=30o with relevant waveforms and derive the expression for average output voltage [10M]

2) A 3-phase_ fully controlled bridge converter is supplying DC-load of 400V, 60A from a 3-phase, 50Hz, 660V (line) supply. If the thyristors have a voltage drop of 1.2V when conducting, then neglecting overlap, compute.
a) Firing angle of thyristor.
b) RMS value of thyristor currents.
c) Mean power loss in thyristors . [10M]

3. Explain the operation of three phase fully controlled bridge converter with RL load. Draw the voltage and current waveforms for alpha = 45 degrees. List the firing sequence of SCRs. [10M]

4). Explain the operation of three phase fully controlled bridge converter with RLE load. Draw the voltage and current waveforms for alpha =60 degrees. List the firing sequence of SCRs.[10M]

5).Explain the operation of a three phase dual converter in the non circulating current mode with the help of relevant waveforms. Derive the expression for the average output voltage. [5M]
b) A three phase fully controlled bridge converter is fed from a 3-phase 400 V, 50Hz mains. For firing angle of 60_0, output current is 25 A and output voltage is 250 V.Calculate the load resistance, source inductance and angle of overlap. [5M]

Unit-4

1) Explain the operation of Buck-Boost chopper with relevant waveforms in CCM and DCM derive the expression for average output voltage.[10M]

2) Explain the operation of Boost chopper IN CCM & DCM with relevant waveforms and derive the expression for average output voltage.[10M]

3) Explain the operation of Buck chopper in CCM & DCM with relevant waveforms and derive the expression for average output voltage.[10M]

4)principle of operation of forward converter[10M]

5) principle of operaton of fly back converter[10M]

Unit-5

1 a) With a neat circuit diagram, explain the principle of operation of a single phase half bridge inverter.[5M]
b) A single PWM full bridge inverter feeds an RL load with R = 10 ohms and L =10 mH. If the source voltage is 120V, find out the total harmonic distortion in the output

voltage and in load current. The width of each pulse is 120 degrees and output frequency is 50Hz. [5M]

2. Explain the operation of three-phase bridge inverter for 180o mode of operation with aid of relevant phase and line voltage waveforms.[10M]

3.What are different applications of inverters? Explain the operation of 3ph bridge inverter for 120 degrees mode of operation with aid of relevant phase and line voltage waveforms.[10M]

4a) With a neat circuit diagram, explain the principle of operation of a single phase full bridge inverter.[5M]
b) A single phase full bridge inverter uses a uniform PWM with two pulses per half cycle for voltage control. Plot the distortion factor, fundamental component, and lower order harmonics against modulation.[5M]

5) What is the different pulse width modulation techniques used for inverters? [8M]

6)explain auto sequential commutayed current sourse inverter

Unit-6

1 a) Explain the operation of single phase half wave converter with RL load. Draw the output voltage waveform and derive the expression for average load voltage.[5M]

b) A single phase full-wave ac voltage controller feeds a load of R=20 ohm with an input voltage of 230V, 50Hz. Firing angle for both the thyristors is 450. Calculate
(i) rms value of output voltage.
(iii) Average and rms current of thyristors. [5M]

2 a) Explain RC firing circuit with suitable waveforms. [5M]
2b) A 230V, 50Hz, one-pulse SCR controlled converter is triggered at a firing angle of 400 and the load current extinguishes at an angle of 2100. Find the average output voltage and the average load current for R=5 ohm and L=2mH.[5M]

3 a) Explain the operation of single phase AC voltage controller with R load. Draw the necessary waveforms.[5M]
b) A 230V, 1kW electric heater is fed through a single phase AC voltage controller from 230V, 50Hz Source. Find the load power for a firing angle delay of 700. Derive the expression used.[5M]

5a) Discuss the principle of phase control in single-phase full-wave ac voltage controller. Derive the expression for the rms value of its output voltage. [5M]
b) A single phase full wave ac voltage controller controls load power. The input is 230 V, 50 Hz. The load circuit consists of R= 3 Ω and w_L = 4Ω.Determine
(i) The control range of firing angle
(ii) Maximum value of RMS load current
(iii) Maximum power
(iv) Power factor [5M]

6 a) A single phase full wave ac voltage cocontroller feeds a load of R= 20 Ω, with an input voltage of 230 V, 50 Hz. Firing angle for both the thyristors is 45^0.Calculate
(**i**) rms value of output voltage (**ii**) load power and input pf
(**iii**) average and rms current of thyristors [5M]

b) A resistive load of 10 Ω is connected through a half-wave SCR circuits to 220v, 50Hz, single- phase source. Calculate the power delivered to load for a firing angle of 60^0.Find also the value of input power factor. [5M]

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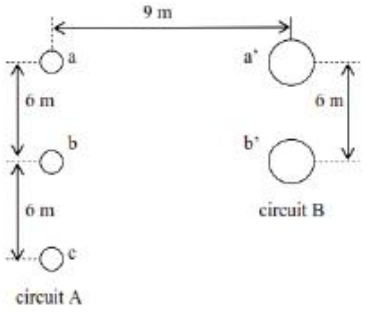
SUB: Power Systems – II **Name of the Faculty: J.DILEEP KUMAR**

Sections: III EEE A & B **Year: 3rd Year** **SEM:1st**

UNIT – 1

1. a) Find GMD, GMR for each circuit, inductance for each circuit and total inductance per meter for two circuits that run parallel to each other. One circuit consists of three 0.25 cm radius conductors. The second circuit consists of two 0.5 cm radius conductors as shown in the figure below:



b) Define Geometric mean distance in a transmission line?

2. a) Derive the expression for inductance of a three phase double circuit line.
b) Three conductors of three phase line are arranged at corners of triangle of sides 2m, 3.2m and 4m. The diameter of the conductor is 2.5cm. Calculate the inductance and capacitance of a three phase three wire system.

3. a) Derive the expression for the capacitance of a transposed unsymmetrical 3 phase system?
b) Derive the expression for the capacitance of a conductor in a double circuit hexagonal spaced three phase system?

4. a) Derive the expression for the capacitance of a three phase line?
b) Calculate the loop inductance of a single phase line with two parallel conductors spaced 3.7m apart. The diameter of each conductor is 1.5m?

5. a) What are bundled conductors? Discuss the advantages of bundled conductors, when used for overhead lines.
b) A 3-phase, 50 Hz, 66 kV overhead transmission line has its conductors arranged at the corners of an equilateral triangle of 3m sides and the diameter of each conductor is 1.5 cm. Determine the inductance and capacitance per phase, if the length of line is 100 km. And also calculate the charging current.

UNIT – 2

1. a) Analyze a short transmission line with the help of phasor diagram?

b) A 220kv 50Hz 3 phase transmission line is 56km long. The resistance per phase is 0.14 ohms/km, the inductance per phase is 1.32mH/km and the shunt capacitance is negligible. Use the short line model to find the voltage and power at the sending end, voltage regulation and efficiency when the line is supplying a 3 phase load of 400MVA, 220KV at 0.7 power factor lagging?

2. A three phase short transmission line has resistance and reactance per phase as 4.5ohms and 6.7 ohms respectively. The sending end and receiving end voltages are 11kv and 100 KV respectively, for some receiving end load at 0.8 power factor lagging calculate the output power, sending end power factor and the efficiency of the line?

3. A three phase 50Hz transmission line, 100km long delivers 25MW at 100KV at 0.75 power factor lagging. The resistance and reactance of the lines per phase per kilometer are 0.32 ohms and 0.57 ohms respectively while the admittance is 2.5*10-6 mho/ km/ph. calculate the efficiency of the transmission by using nominal π method?

4. a) Analyze a medium transmission line with nominal π method and draw the phasor diagram?
b) Analyze a medium transmission line with nominal T method and draw the phasor diagram?

5. A 3-phase, 3km long line delivers 3000 kW at a power factor of 0.8 lagging to a load. If the voltage at the supply end is 11 kV, determine the voltage at the load end, percentage regulation, sending end power factor and the efficiency of transmission. The resistance and reactance per km of each conductor are 0.4 ohm and 0.3 ohm respectively.

UNIT – 3

1. a) Analyze the long transmission line by rigorous solution?
b) Derive the A, B, C, D constants when two transmission lines are connected in cascade?

2. a) Explain about the equivalent 'T' model of a long transmission line?
b) Explain about the equivalent 'π 'model of a long transmission line?

3. A 3 phase 50Hz, 180km long transmission line has three conductors each of 0.6cm radius, spaced at the corners of an equilateral triangle of side 4m. the resistance of each conductor is 0.2 ohm/km and the line delivers 20MVA at 110kv at 0.85 lagging power factor, then find the A,B,C,D constants , sending end voltage and current , efficiency, regulation of the line?

4. A three-phase, 50 Hz, 150 km long transmission line has three conductors each of 0.7 cm radius spaced at the corners of triangle of sides 2 m, 3.5m and 4.5m. The resistance of each conductor is 0.4 ohms per km and the line delivers 50 MVA at 132 kV and at a lagging p.f. of 0.85. Determine ABCD constants as long line (both real and complex angle methods).

5. With reference to long transmission line, give physical interpretation of the terms of characteristic impedance and propagation constant? What is meant by surge impedance?

UNIT – 4

1. a) Derive the reflection and refraction coefficients of a line terminated with a resistance?
b) Discuss the concept of travelling waves on a transmission line?

2. a) Explain the transient behavior of a line when it is open circuited at the receiving end?

b) A rectangular wave travels along a 500km line terminated with a resistance of 1000 ohms. The line has a resistance of 0.32 ohm/km and surge impedance of 400 ohm. If the voltage at the termination point after two successive reflections is 200kv. Find the amplitude of the incoming surge?

3. When the transmission line is terminated through a resistance, how do you find out the expressions of reflection and refraction coefficient?

4. A 500 kV, 2 μsec, duration rectangular surge passes through a line having surge impedance of 350 ohms and approaches a station at which the concentrated earth capacitance is 3×10^3 PF. Calculate the maximum value of surge transmitted to the second line.

5. The ends of two long transmission lines, A and C are connected by a cable B, 1km long. The surge impedances of A, B, C are 400, 50 and 500 ohms respectively. A rectangular voltage wave of 25 kV magnitude and of infinite length is initiated in A and travels to C, determine the first and second voltages impressed on C.

UNIT – 5

1. a) What is meant by Ferranti effect and prove it in a transmission line?
   b) Explain about the effect of radio interference due to corona on the transmission lines?

2. a) Explain about the effect of charging current on the regulation of a transmission line?
   b) Discuss about the shunt capacitive compensation with phasor diagram?

3. a) What are skin and proximity effects on transmission lines?
   b) Find the critical disruptive voltage and the critical voltages for local and general corona on a 3- phase overhead transmission line, consisting of 3-stranded copper conductors spaced 2.5 m apart at the corners of an equilateral triangle. Air temperature and pressure are 21^0C and 73.6 cm of Hg respectively. Take conductor diameter 10.4 mm, irregularity factor 0.85, local and general surface factors 0.7 and 0.8 respectively.

4. Explain the phenomenon of corona. How can the corona loss be minimized in transmission lines?

5. a) What are the factors affecting corona?
   b) What is skin effect? On what factors does it depend?

UNIT – 6

1. a) Derive the expression for sag of a transmission line between two supports of equal heights?
   b) Discuss how the ice formation and wind are affecting the weight of the conductor?

2.a) Explain briefly about the string efficiency improvement methods?
   b) Define String efficiency of suspension insulator string.

3. a) What is sag template? Explain the construction of pin type insulator.
   b) Derive the expression for string efficiency of a string of 3- insulators.

4. An overhead line has the following data: span length 185m, difference in levels of supports 5m, conductor diameter 1.82cm, weight per unit length of conductor 2.5kg/m, wind pressure 49kg/m^2 of projected area. Maximum tensile stress of the conductor 4250kg/cm^2. Factor of safety 5. Calculate the allowable sag in meters at the lower support.

5. A three phase over head line is being supported by three discs suspension insulators, the potential across the first and second insulators are 12 and 18 kV respectively. Calculate (i) the line voltage, (ii) the ratio of capacitance between pin and earth to self-capacitance of each unit, (iii) the string efficiency.

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Subject: Renewable Energy sources **Designation: Asst. Prof**

Department: EEE

UNIT-I

1. (a) Write a note on total solar energy received in India.
   (b) Write about Energy conservation principle

2. (a) Explain about solar radiation on Tilted surfaces
   (b) Find the angle subtended by beam radiation with the normal to a flat plate collector at 9 AM for the day on nov 3, 2003. The collector is in Delhi (28 ^{0} 35'N, 77^0 12'E), inclined at an angle of 36^0 with the horizontal and is facing due south.

3. (a). What are the advantages, and limitations of renewable energy sources?
   (b). Explain briefly the different types of solar energy measuring instruments?

4. (a). Distinguish between diffuse radiation and beam radiation.
   (b). Describe about solar geometry.

5. (a). What are conventional sources of energy?
   (b). Explain the importance of solar energy in the present day energy crisis?

UNIT- 2

1. (a) What are the main components of a flat plate solar collector, explain the function of each?
   (b)Describe the classification of solar energy collectors.

2. (a) Explain the effect of design Parameters on performance
   (b) Explain the different types of line focusing type concentrating type collectors

3. (a) What are the applications of solar air heaters
   (b) Explain in detail about solar ponds.

4. (a) Explain Transmissivity of cover system
   (b) Explain central receiver tower

5. (a) Explain Compound Parabolic Concentrator(CPC)
   (b) Explain the effects of various parameters affecting the performance of a collector.

UNIT- 3

1. (a) Explain about Photovoltaic effect.
   (b) Write about efficiency of solar cells.

2. (a) What is maximum power point tracking?
   (b) Discuss about techniques of MPPT.

3. (a) Explain P & O technique.
   (b) Explain about applications stand alone PV systems

4. (a) Explain about hill climbing Technique.
5. (b)Explain with a neat sketch the working principle of standalone and grid Connected solar system.

6. (a)Describe the working of a solar power plant
   (b)Compare solar PV system with solar thermal system

UNIT- 4

1. (a) Write and explain wind power equation
   (b) Define Tip speed ratio.

2. (a) What are the advantages of wind power?
   (b) Define Vertical Axis Wind Turbine (VAWT).

3. (a) Explain Horizontal axis wind mills with neat sketch
   (b) What is meant by pitch control and Yaw control

4. (a)Write about wind energy extraction.
5. (b) Write about Tip speed ratio.

6. (a) Wind at one standard atmospheric pressure and 15^0 C has a speed of 10m/s. A 10 m diameter wind turbine is operating at 5 rpm with maximum efficiency of $)%. Calculate the total power density in wind stream.
   (b) Explain the main applications of wind energy

UNIT- 5

1. (a) Classification of small hydro power plants.
   (b) Classify the water turbines.

2. (a) Explain about specific speed of wind energy
   (b) It is required to develop 15MW at 214 rpm under a head of 100mt with a single runner. What is type of turbine to be installed?

3. (a) Explain energy potential estimation for a tidal power.
   (b) Explain in detail about types of tidal power plant

4. (a)What is the minimum tidal range required for the working of tidal power plant?
   (b)Draw the schematic layout of a tidal powerhouse

5. (a) Explain important components of tidal power plant.
   (b) Write about advantages and disadvantages of tidal power.

UNIT- 6

1. (a) What is the difference between Bio mass and biogas
   (b) Explain about dry and wet fermentation process

2. (a) Explain pyrolysis.
   (b) Explain the classification of biogas plants

3. (a) Explain about direct combustion of heat
   (b) Write about digesters and sizers

4. (a) Write about fuel cell classification.
   (b) Write about Efficiency of a fuel cell.

5. (a) Explain how electrical energy can be generated from geothermal energy
   (b) Explain about energy analysis of geo thermal plant.