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10AL51

Fifth Semester B.E. Degree Examination, Dec.2015/Jan.2016
Management and Entrepreneurship

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

PART – A

1 a. Explain the various functions of management. **(10 Marks)**
b. Explain the roles of a manager. **(10 Marks)**

2 a. Discuss the importance of planning. Differentiate between strategic planning and tactical planning. **(10 Marks)**
b. With a flow chart, explain the steps involved in decision making. **(10 Marks)**

3 a. What are the principles of an organization? Explain. **(10 Marks)**
b. Explain briefly the steps involved in selection process. **(10 Marks)**

4 a. Explain briefly Herzberg's theory of motivation. **(10 Marks)**
b. What are the essentials of a sound control system? Explain. **(10 Marks)**

PART – B

5 a. Define the term 'Entrepreneur'. Differentiate between entrepreneur and Intrapreneur. **(10 Marks)**
b. Explain the stages in entrepreneurial process. **(10 Marks)**

6 a. What are the steps involved in setting up of small scale industry (SSI)? Explain. **(10 Marks)**
b. What are the objectives and functions of world trade organization (WTO)? Explain. **(10 Marks)**

7 a. Explain the objectives and functions of NSIC and KSFC. **(10 Marks)**
b. Write short notes on KSSIDC and SISI. **(10 Marks)**

8 a. Explain in detail the guidelines for preparation of project report. **(10 Marks)**
b. What are the various network analysis techniques? Differentiate between PERT and CPM. **(10 Marks)**

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10EE52

Fifth Semester B.E. Degree Examination, Dec.2015/Jan.2016
Signals and Systems

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Define signals and systems. Explain classification of signals. **(06 Marks)**

b. State whether the following signals given are periodic or not. If periodic, find the fundamental period:

i) $x[n] = \cos\left(\frac{\pi n}{2}\right) + \sin\left(\frac{\pi n}{4}\right)$

ii) $x(t) = \cos(2\pi t).\sin(4\pi t)$ **(06 Marks)**

c. Consider the system whose output is $y(t) = \cos\omega_c + x(t)$. Determine whether it is:

i) memoryless ii) causal iii) linear
iv) time invariant v) stable **(08 Marks)**

2 a. The impulse response of a linear time invariant system is $h[n] = \{1, \underset{\uparrow}{-1}, 1, -1\}$. Determine the response of the system to the input signal $x[n] = \{1, \underset{\uparrow}{2}, 3, 1\}$. **(06 Marks)**

b. Compute y[n] in the Fig.Q2(b). Given $h_1[n] = \left(\frac{1}{2}\right)^n u[n]$, $h_2[n] = u[n-2]$, $h_3[n] = \delta[n] + \delta[n-1]$.

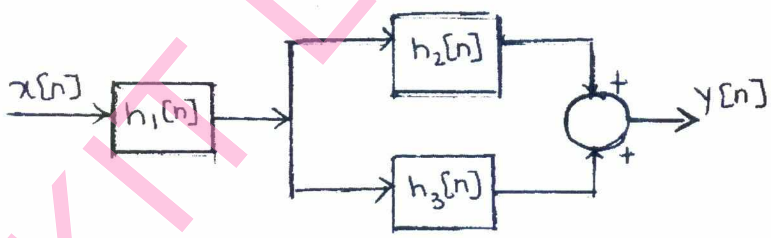

Fig.Q2(b) **(06 Marks)**

c. Let the impulse response of a LTI system be $e^{-2(t+1)}u(t+1)$. Find the output y(t) if the input is u(t). Also plot y(t). **(08 Marks)**

3 a. Determine the conditions so that the continuous time system with impulse response $h(t) = e^{at}u(-t)$ is stable. Also find out whether the system is (i) causal, (ii) memoryless. **(06 Marks)**

b. Represent the differential equation given below in direct form I and II:

$$\frac{d^2y(t)}{dt^2} + 3\frac{dy(t)}{dt} + 2y(t) = \frac{d^2x(t)}{dt^2} + \frac{dx(t)}{dt}$$ **(06 Marks)**

c. Find the zero input response (ZIR) and forced response for the system described by the difference equation: $y[n] - \frac{1}{4}y[n-2] = 2x[n] + x[n-1]$. Given x[n] = u[n]; y(-2) = 8; y[-1] = 0. **(08 Marks)**

4 a. State and prove Parseval's theorem in Continuous Time Fourier Series (CTFS). **(06 Marks)**

b. Find the complex Fourier coefficient for the periodic waveform shown in Fig.Q4(b).

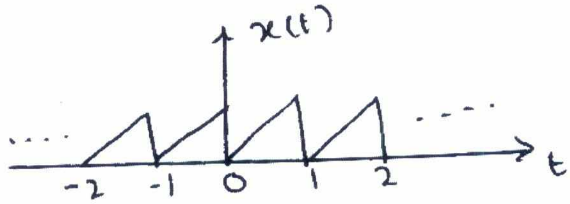

Fig.Q4(b) **(06 Marks)**

c. Determine the Fourier coefficient for the periodic sequence x[n] shown in Fig.Q4(c).

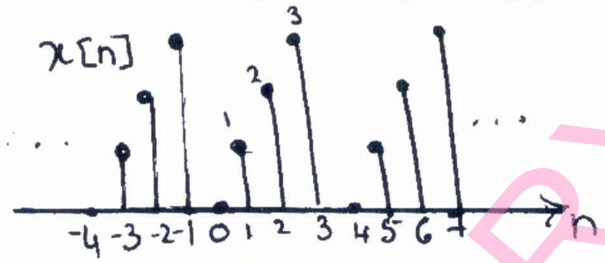

Fig.Q4(c) **(08 Marks)**

PART – B

5 a. State and prove the following properties in continuous time Fourier transform:

i) Time shifting

ii) Differentiation in time **(06 Marks)**

b. Given that x(t) has the Fourier transform $X(j\omega)$, express the Fourier transform of the signals listed below in terms of $X(j\omega)$.

i) $x_1(t) = x(t-1) + x(-2-t)$

ii) $x_2(t) = x(6-3t)$

iii) $x_3(t) = \dfrac{d^2x(t-4)}{dt^2}$ **(06 Marks)**

c. The differential equation of a system is given by,

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

Find out the frequency response of the system. Also find the impulse response. **(08 Marks)**

6 a. Find the Fourier transform of the rectangular pulse given below:

$$x[n] = 1 \quad \text{for} \quad -2 \le n \le 2$$
$$= 0 \quad \text{otherwise}$$

Also obtain the magnitude plot. **(06 Marks)**

b. Use DTFT properties to find the Fourier transform of the following signals:

i) $x_1[n] = (n-5)\,u(n-5) - u(n-6)$

ii) $x_2[n] = \left(\dfrac{1}{3}\right)^n u[n-3]$ **(06 Marks)**

c. Using DTFT, find the total solution to the difference equation for discrete time $n \ge 0$, $5y[n+2] - 6y[n+1] + y[n] = (0.8)^n u[n]$. **(08 Marks)**

7 a. Define Region of Convergence (ROC) in Z transforms and list out any five properties of ROC. **(06 Marks)**

b. Using the properties of Z transform, find the Z transform of these signals:

i) $x_1[n] = n\left(\frac{5}{8}\right)^n u[n]$

ii) $x_2[n] = (0.9)^n u[n] * (0.6)^n u[n]$

iii) $x_3[n] = \left(\frac{2}{3}\right)^n u[n+2]$ **(06 Marks)**

c. Find the inverse Z transform of $X(z) = \frac{z}{2z^2 - 3z + 1}$.

i) By partial fraction method for $|z| < \frac{1}{2}$.

ii) By power series expansion method for $|z| > 1$. **(08 Marks)**

8 a. Using the basic definition of z transform and linearity property of z transform, find the z transform of $x[n] = a^{|n|}$ for $0 < a < 1$. Also give its ROC. **(06 Marks)**

b. A linear LTI system is characterized by the system function $H(z) = \frac{3 - 4z^{-1}}{1 - 3.5z^{-1} + 1.5z^{-2}}$. Determine h[n] for system is (i) stable, (ii) causal. **(06 Marks)**

c. Determine the output of the system y[n], for the system described by the difference equation $y[n] + 3y[n-1] = x[n] + x[n-1]$ if the input is $x[n] = \left(\frac{1}{2}\right)^n u[n]$ and y(-1) = 2 is the initial condition. **(08 Marks)**

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10EE53

Fifth Semester B.E. Degree Examination, Dec.2015/Jan.2016
Transmission & Distribution

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. What are the advantages and limitations of high voltage AC transmission? **(04 Marks)**

b. Explain Feeder, Distributor and service mains of a distribution scheme. **(06 Marks)**

c. For the same power transmitted over the same distance, show that increase in transmission voltage of a transmission line results in:
i) Reduced weight of conductor material.
ii) Increased efficiency.
iii) Decreased line loss. **(10 Marks)**

2 a. Derive an expression for sag in a overhead line conductor supported at unequal level. **(07 Marks)**

b. Name three types of line vibrators and explain Aeoline vibrators. **(05 Marks)**

c. The towers of height 30 m and 90 m respectively support a transmission line conductor at water crossing. The horizontal distance between the towers is 500 m. If the tension in the conductor is 1600 kgs. Find the minimum clearance of the conductor and water and also clearance midway between the supports. Weight of conductor is 1.5 kg/m. Bases of the towers can be considered to be at water level. **(08 Marks)**

3 a. Define string efficiency. Name the methods of increasing string efficiency and explain the use of Guard Ring. **(08 Marks)**

b. With a neat figure, explain pin type insulator. **(06 Marks)**

c. A three phase over head transmission line is being supported by three discs of suspension insulator. The potential across the first and second insulator are 8 kV and 11 kV respectively. Calculate,
i) The line voltage
ii) The string efficiency. **(06 Marks)**

4 a. Draw and explain the general construction of an underground cable. **(07 Marks)**

b. Derive an expressions for critical disruptive voltage and visual critical voltage with reference to corona. **(06 Marks)**

c. Derive an expression for the insulation resistance of a single core cable. **(07 Marks)**

PART – B

5 a. Derive an expression for the inductance of a single phase two wire line. **(06 Marks)**

b. Derive an expression for line to neutral capacitance for a three phase overhead transmission line when the conductors are unsymmetrically spaced. **(08 Marks)**

c. The three conductors of a three phase line are arranged at the corners of a triangle of sides 2 m, 2.5 m and 4.05 m respectively. Calculate the inductance per km of the line if the conductors are regularly transposed. The diameter of each conductor is 1024 mm. **(06 Marks)**

6 a. Explain how overhead transmission line classified. Also define voltage regulation with respect to performance of transmission line. **(05 Marks)**

b. Derive an expression for sending end voltage and current for a medium transmission line using nominal π-method. **(08 Marks)**

c. A three phase 50 Hz, 150 km line has a resistance, inductor reactance and capacitor shunt admittance of 0.1 Ω, 0.5 Ω and susceptance per phase per km = 3×10^{-6} mho. If the line delivers 50 MW at 110 kV and 0.8 p.f. lagging. Determine the sending end voltage and sending end current. Assume a nominal π-circuit for the line. **(07 Marks)**

7 a. What are the requirements of a good distribution system? **(05 Marks)**

b. Prove that the shape of voltage drop diagram for distributor with uniform loading of $i\frac{A}{m}$, fed at one end is parabola. **(07 Marks)**

c. An electric train taking a constant current of 500 A moves between the two sub-stations 6 kms apart. The two substation are maintained at 500 V and 600 V respectively. The track resistance is 0.05 Ω per km both go and return.
Calculate : i) The point of minimum potential
ii) The currents supplied by each sub-stations at the point of minimum potential. **(08 Marks)**

8 Write short notes on the following:
a. Requirement of power distribution.
b. Radial and ring main distributors.
c. ABCD constants of transmission liner.
d. Transposition transmission lines. **(20 Marks)**

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10EE54

Fifth Semester B.E. Degree Examination, Dec.2015/Jan.2016
DC Machines and Synchronous Machines

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

PART – A

1 a. Explain with a neat sketch, the construction of DC machine. **(08 Marks)**

b. What is difference between lap and wane type of armature windings? (Any four) **(06 Marks)**

c. A short shunt compound dc generator supplies a current of 50 A at a voltage of 200 V. Calculate the generated voltage, if the resistance of the armature, shunt and series field winding are 0.04 Ω, 50 Ω and 0.02 Ω respectively. **(06 Marks)**

2 a. Derive an expression for torque developed by an armature of a DC motor. **(06 Marks)**

b. Explain any two method of speed control of a dc shunt motor. **(08 Marks)**

c. A dc series motor developing 40 NM torque is subjected to the condition that makes field flux to decrease by 30% and armature current to increase by 15%. Calculate the new torque. **(06 Marks)**

3 a. Define the efficiency of DC machine and write the condition for maximum efficiency. **(05 Marks)**

b. With a neat sketch, explain briefly the conduction to determine the efficiency of a given DC motor by Swineburn's test. **(08 Marks)**

c. A 440 V, dc shunt motor rates no load current of 2.5 A, the resistance of shunt field and series field are 550 Ω and 1.2 Ω respectively. The full load current is 32 A. Find the full load output and efficiency of motor. **(07 Marks)**

4 a. Write short notes on: i) Retardation test, ii) Field's test. **(12 Marks)**

b. A retardation test is made on a separately excited dc machine as a motor. The induced voltage falls from 240 V to 220 V in 25 seconds on opening armature circuit and in 6 seconds on suddenly charging the armature connections from supply to a load resistance which takes on average current of 10 A. Find efficiency of machine when running on a motor taking a current of 25 A on a supply of 250 V. The resistance of the armature is 0.3 Ω and that the field winding is 200 Ω. **(08 Marks)**

PART – B

5 a. Explain the detail of the constructional features of a three phase alternator. **(08 Marks)**

b. Derive the expression for pitch factor and distribution factor. **(06 Marks)**

c. A 3ϕ, 50 Hz, 10 pole alternator has 90 slots. The flux/pole is 0.15 web, if the winding is to be star connected to give a line voltage of 11000 V. Find the number of armature conductors to be connected in series/phase. **(06 Marks)**

6 a. Define voltage regulation. With a neat circuit diagram, explain briefly conduction of z.p.f. (Potier) method in laboratory to obtain regulation of alternator. **(10 Marks)**

b. A 1200 KVA, 6600 V, 3 phase star connected alternator has its armature resistance on 0.25Ω/phase and its synchronous reactance as 5 Ω/phase. Calculate its regulation if it delivers a full load (i) at 0.8 p.f. lagging, (ii) 0.8 p.f. leading. **(10 Marks)**

7 a. Write the expression synchronizing power for salient pole machine. (05 Marks)
b. Mention advantages of parallel operation and condition to be satisfied for successful operation of 3 phase alternators. (08 Marks)
c. A 10 MVA, 3 phase alternator has an equivalent short circuit reactance 20%, calculate the synchronizing power of the armature/mechanical degree/phase displacement, when running in parallel on 10000 V, 50 Hz bus bar at 1500 rpm. (07 Marks)

8 a. Explain briefly Blondal diagram. (06 Marks)
b. Explain '∨' and '∧' curves on synchronous motor. (06 Marks)
c. A 230 V, 3ϕ star connected synchronous motor has a resistance of 0.2 Ω/phase and synchronous reactance of 2.2 Ω/phase. The motor is operating at 0.5 pf leading with a line current of 200 A. Determine the value of generated emf/phase. (08 Marks)

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10EE55

Fifth Semester B.E. Degree Examination, Dec.2015/Jan.2016

Modern Control Theory

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Write any four advantages of state variable approach over classical control theory. **(04 Marks)**

b. For the electrical network shown in Fig Q1 (b), consider voltage across capacitor 'C' and current flowing through inductor L as state variables and current flowing through resistor is taken as output variable, obtain the state model. **(10 Marks)**

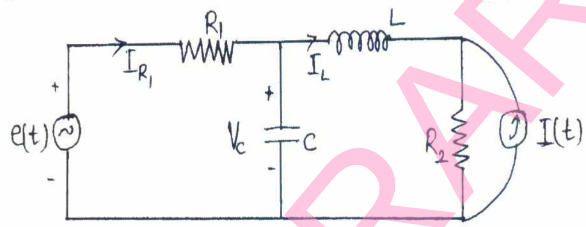

Fig. Q1(b)

c. Explain the term 'state'. For the following differential equations, which represents a multi variable system, obtain state equation and output equation.-

$$\frac{d^2y_1(t)}{dt^2}+4\frac{dy_1(t)}{dt}-3y_2(t)=U_1(t) \rightarrow ①$$

$$\frac{dy_1(t)}{dt}+\frac{dy_2(t)}{dt}+y_1(t)+2y_2(t)=U_2(t) \rightarrow ②$$ **(06 Marks)**

2 a. Represent the following systems in state space

i) Phase variable form $\frac{y(s)}{u(s)}=\frac{4s^3+3s^2+2s+5}{6s^4+11s^3+5s^2+6s+5}$

ii) Jordan canonical form $G(s)=\frac{(s+2)}{(s+5)^2(s+7)^2}$ and obtain their state diagram for both forms. **(14 Marks)**

b. List out atleast one advantage and one disadvantage of selecting i) Physical variable ii) Phase variable and iii) Canonical variable for state space formulation of control systems. **(06 Marks)**

3 a. For the given state model obtain the transfer function.

$$\begin{bmatrix} x_1^1 \\ x_2^1 \\ x_3^1 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & -1 & 1 \\ 0 & -1 & -10 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 10 \end{bmatrix} [u]$$

$$Y = [1\ 0\ 0] \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$$ **(06 Marks)**

b. Consider the matrix A given, obtain the diagonalized matrix.

$$A = \begin{bmatrix} 0 & 1 & 0 \\ 3 & 0 & 2 \\ -12 & -7 & -6 \end{bmatrix}$$ **(10 Marks)**

c. Write a note on "diagonalization". **(04 Marks)**

4 a. Consider the system $x' = AX$ with

$$A = \begin{bmatrix} 0 & 0 & -2 \\ 0 & 1 & 0 \\ 1 & 0 & 3 \end{bmatrix} \quad ; \quad X(0) = \begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}$$

Evaluate e^{At} using Cayley – Hamilton technique. **(08 Marks)**

b. Examine for the observability of the system

$$\begin{bmatrix} x_1^1 \\ x_2^1 \\ x_3^1 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 0 & -2 & -3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u$$

$$Y = [3\ 4\ \ 1] \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$$ **(06 Marks)**

With i) Gilbert's test ii) Kalman's test.

c. Prove that for any assumed state model in phase variable form is controllable and observable. **(06 Marks)**

PART – B

5 a. Obtain the necessary and sufficient condition for arbitrary pole placement.

b. A regulator system is described by $X' = AX + BU$

Where , $A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -1 & -5 & -6 \end{bmatrix}$ and $B = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$ **(12 Marks)**

The system uses a state feed back law of the form U = -KX. The desired pole locations are at $-1 \pm j$, and -10. Determine a suitable state feedback gain matrix by any one method. **(08 Marks)**

6 a. With neat sketches explain,

i) Backlash ii) Saturation iii) Dead zone **(06 Marks)**

b. Explain PI controller with block diagram **(04 Marks)**

c. Consider the system defined by $X' = AX + Bu$,

$$A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{bmatrix}; \quad B = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} \text{; and } C = [1\ 0\ 0].$$

Determine, the observer gain matrix by Ackermann's formula. Assume that the desired eigen values of the observer gain matrix are $\mu_1 = -2 + j3.4641$, $\mu_2 = -2 - j3.4641$ and $\mu_3 = -5$ **(10 Marks)**

7 a. Determine the kind of singularity for each of the following differential equations.
i) $y'' + 3y' + 2y = 0$ ii) $y'' - 8y' + 17y = 34$ **(08 Marks)**

b. Explain the phenomenon of jump resonance. **(06 Marks)**

c. Discuss the basic concept of phase – plane method. **(06 Marks)**

8 a. A system is described by the following equation $x' = Ax$, where $A = \begin{bmatrix} 0 & 1 \\ -1 & -1 \end{bmatrix}$

Assuming matrix Q to be indentity matrix, Solve for matrix P in the equation $A^T P + PA = -Q$. Use Liapunov theorem and determine the stability of the origin of the system. Write the Liapunov function V(x). **(10 Marks)**

b. Define : i) Stability ii) Asymptotic stability iii) Asymptotic Stability in the large in the sense of Liapunov. **(06 Marks)**

c. Show that the following quadrate form is positive definite.
$V(x) = 8x_1^2 + x_2^2 + 4x_3^2 + 2x_1x_2 - 4x_1x_3 - 2x_2x_3$ **(04 Marks)**

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Fifth Semester B.E. Degree Examination, Dec.2015/Jan.2016

Linear ICs and Applications

Time: 3 hrs. Max. Marks:100

Note: 1. *Answer FIVE full questions, selecting at least TWO questions from each part.*
2. *Standard resistance and capacitance data table may be used.*

PART – A

1 a. Sketch and explain a high Zin capacitor coupled voltage follower, hence derive an expression for its input impedance and write the design steps. **(08 Marks)**

b. Show that if f_2 is desired upper cut off frequency then use of C_f in an inverting amplifier reduces the gain by 3dB at f_2 from its normal voltage gain. **(06 Marks)**

c. Design the inverting amplifier to operate in a signal frequency range of 10Hz to 1KHz. If the load resistance is 250Ω. The voltage gain is 50 and the output voltage amplitude is 2.5V. Use 741 op-amp ($I_{B(max)}$ = 500nA) **(06 Marks)**

2 a. Explain phase lead and phase lag compensation methods along with frequency response. **(08 Marks)**

b. Consider a 741 op-amp with slew rate of 0.5V/μs is used as a voltage follower. Calculate :
i) The slew rate limited cut off frequency if the sine wave output is 6V.
ii) Calculate the maximum peak value of the sinusoidal output voltage, if the circuit operates with unity gain cut-off frequency of 800KHz
iii) Calculate the maximum peak value of the output voltage, if the upper cut off frequency is 8KHz. **(06 Marks)**

c. List the precautions that should be (minimum six) observed for an op amp circuit stability. **(06 Marks)**

3 a. Draw a precision full wave rectifier circuit using a precision half wave circuit and a summing circuit. Explain its working and draw all relevant waveforms. **(08 Marks)**

b. Sketch and explain the working op-amp sample-and –hold circuit. **(08 Marks)**

c. The Diode clamping circuit has ±10V, 1KHz square wave input. Calculate the tilt on the output waveform, given C_1 = 1 μF, R_1 = 56KΩ. **(04 Marks)**

4 a. With a neat circuit diagram and waveforms, explain operation of inventing Schmitt trigger circuit. **(08 Marks)**

b. Draw the circuit of an op – amp monostable multivibrator. Show the relevant waveforms and explain the operation. **(06 Marks)**

c. Design an astable multivibrator circuit using a BIFET op-AMP to operate the frequency of 1KHz and amplitude of ± 9V. **(06 Marks)**

PART – B

5 a. Draw the circuit of a Triangular/rectangular waveforms generator which has frequency and duty cycle controls. Explain the circuit operation with relevant waveforms for small duty cycle. **(10 Marks)**

b. With a neat circuit diagram, explain the operation of op-Amp based RC phase shift oscillator. **(06 Marks)**

c. Using a BIFET op – Amp with a supply of ± 12V. Design a wein bridge oscillator having an output frequency of 15KHz. Assume $C_1 = C_2 = C = 0.01\ \mu F$. **(04 Marks)**

6 a. Sketch the circuit of second order active low pass filter. Explain its operation with the expected frequency response and indicate the design steps. **(08 Marks)**

b. Design a Butterworth Second – order high pass filter circuit to have a cut off frequency of 6KHz. Calculate the actual cut off frequency for the circuit using the selected component values. $C_1 = 1000pF$, $C_2 = C_1 = 1000pF$. **(06 Marks)**

c. Explain with a block diagram and response curve, how Band stop filter can be obtained using low pass, high pass and a summing circuit. **(06 Marks)**

7 a. What is phase locked loops? Explain the working of the Building blocks of PLL. **(06 Marks)**

b. Draw the circuit of power amplifier using op-AMP as an input stage and briefly explain. **(06 Marks)**

c. Define DC voltage regulator. Explain the terms line regulation load regulation and Ripple Regulation for a DC voltage regulator. **(08 Marks)**

8 a. With a neat circuit diagram explain the operation of an adjustable output regulator. **(06 Marks)**

b. Mention the salient features of a 723 regulator. **(06 Marks)**

c. A 12V, 40mA 723 regulator is to be designed with short circuit protection. The short circuit current is to be 45mA. Calculate resistor values for R_1, R_2, R_3 and calculate the IC power dissipation when supplying 40mA and at short circuit. Given $I_2 = 1mA$, $V_{R2} = V_{ref} = 7.15V$. **(08 Marks)**

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