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10AL51

Fifth Semester B.E. Degree Examination, June/July 2016
Management and Entrepreneurship

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Define management, explain the levels of management. **(10 Marks)**
b. Define planning. Explain the types of plans with example. **(10 Marks)**

2 a. Explain in details any five functions of management. **(10 Marks)**
b. List and explain the characteristics of planning. **(10 Marks)**

3 a. Discuss the steps commonly followed by organizations in selection procedure. **(10 Marks)**
b. Discuss the different sources of recruitment. **(10 Marks)**

4 a. What are the purposes of communications in an organization? **(10 Marks)**
b. Discuss all the steps involved in a control process. **(10 Marks)**

PART – B

5 a. Define entrepreneur. Discuss four key elements in context to entrepreneurship. **(06 Marks)**
b. Explain entrepreneurs based on the type of business. **(08 Marks)**
c. Discuss three barriers in connection with entrepreneurship. **(06 Marks)**

6 a. Discuss steps in the location of small scale industry. **(10 Marks)**
b. Explain the important factors in the selection of a small scale industry site. **(10 Marks)**

7 a. Discuss in detail on sources of finance for small scale industry. **(10 Marks)**
b. Elaborate on objectives and functions of SIDBI. **(10 Marks)**

8 a. Define project, discuss at least four criteria to select a project. **(10 Marks)**
b. What are the needs of network techniques in project? Explain two types of network techniques in project implementation. **(10 Marks)**

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10EE52

Fifth Semester B.E. Degree Examination, June/July 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 the following with examples i) Signals and Systems ii) Power and Energy Signals **(05 Marks)**

b. A continuous time signal is described by

$X(t) = t; \quad 0 \le t \le 1$

$2 - t; \quad 1 \le t \le 2$

Sketch even and odd component of the signal. **(05 Marks)**

c. A continuous time signal x(t) is shown in Fig Q1(c). Plot the following signals

i) $x[-2(t+1)]$ ii) $x\left(\frac{t}{2}+1\right)$ iii) $x(-2t-1)$

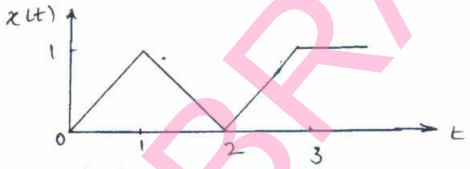

Fig. Q1(c)

(06 Marks)

d. Check whether sequence y(t) = log x(n) is Linear, Time invariant, Memory, causal and stable? **(04 Marks)**

2 a. Given input x(n) = u(n) – u(n – 3) and impulse response h(n) = [1, 3, 2, -1, 1]. Determine the response y(n) using convolution sum. **(06 Marks)**

b. Using convolution integral, determine the output of an LTI system for an input $x(t) = e^{-at}$; $0 \le t \le T$ and impulse response $h(t) = 1$; $0 \le t \le 2T$. **(08 Marks)**

c. Determine the range of 'a' and 'b' for which the LTI system with impulse response

$h(n) = a^n$; $n \ge 0$ is stable

b^n; $n < 0$ is stable **(02 Marks)**

d. Check whether the system whose impulse response is $h(t) = e^{-t}\,u(t-1)$ i) Stable, Memory less and causal. **(04 Marks)**

3 a. Determine the complete response of system whose difference equation is $y(n) - \frac{1}{4}y(n-1) - \frac{1}{8}y(n-2) = x(n) + x(n-1)$ with input $x(n) = 2^n\,u(n)$ and initial conditions $y(-1) = 2$ and $y(-2) = -1$. **(08 Marks)**

b. Determine the natural response of the system whose differential equation is $\frac{d^2y(t)}{dt^2} + 4y(t) = 3\frac{dx(t)}{dt}$ with initial conditions $y(0) = 1, \frac{d}{dt}y(0) = 1$ **(06 Marks)**

c. Draw the direct form – I and direct form – II implementation of the following differential equation $\frac{2d^3y(t)}{dt^3} + \frac{dy(t)}{dt} + 3y(t) = x(t)$. **(06 Marks)**

4 a. State and explain following Fourier series properties.
   i) Frequency shift
   ii) Convolution. **(10 Marks)**

b. For the signal $x(t) = \sin \omega_o t$, find the Fourier series and draw its spectrum. **(05 Marks)**

c. Find the time domain signal corresponding to the DTFs coefficient

$$x(k) = \cos\left(\frac{16\pi}{17}k\right)$$ **(05 Marks)**

PART – B

5 a. State and explain Parsavel's theorem. **(06 Marks)**

b. Obtain the Fourier transform of the following signals
   i) $x(t) = e^{-at}\, u(t)\ ;\ a > 0$
   ii) $x(t) = \delta(t)$ **(08 Marks)**

c. The impulse response of a continuous time signal is given by $h(t) = \frac{1}{R_C} e^{-t/RC} u(t)$. Find the frequency response and plot the magnitude and phase response. **(06 Marks)**

6 a. State and explain following DTFT properties i) Time shift ii) Linearity. **(06 Marks)**

b. Determine the DTFT of the following signals
   i) $x(n) = u(n)$ ii) $x(n) = 2^n u(-n)$. **(07 Marks)**

c. Obtain frequency response and impulse response of the system described by the difference equation $y(n) - \frac{1}{4}y(n-1) - \frac{1}{8}y(n-2) = 3x(n) - \frac{3}{4}x(n-1)$ **(07 Marks)**

7 a. What is z – transform? Mention properties of Region of convergence (ROC). **(05 Marks)**

b. Determine z transformation and its ROC of the following signals
   i) $x(n) = u(n)$
   ii) $x(n) = \cos \Omega_o\, nu(n)$. **(07 Marks)**

c. Determine inverse z – transformation of following function x(z)

$$x(z) = \frac{1}{1 - \frac{3}{2}z^{-1} + \frac{1}{2}z^{-2}}$$ for i) $|z| > 1$ ii) $|z| < \frac{1}{2}$ iii) $\frac{1}{2} < |z| < 1$. **(08 Marks)**

8 a. State and prove final value theorem of z transformation. **(06 Marks)**

b. Determine natural, forced and complete response of the system described by $y(n) - \frac{1}{2}y(n-1) = 2x(n)$ with initial conditions $y(-1) = 3$ and input $x(n) = 2(-\frac{1}{2})^n$. **(08 Marks)**

c. A DT – LTI system is given by

$$H(z) = \frac{3 - 4z^{-1}}{1 - \frac{7}{2}z^{-1} + \frac{3}{2}z^{-2}}$$

Specify the ROC of H(z) and determine h(n) for
   i) Stable system
   ii) Causal system
   iii) Non causal system. **(06 Marks)**

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10EE53

Fifth Semester B.E. Degree Examination, June/July 2016
Transmission and Distribution

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Explain the typical line diagram of transmission and distribution scheme, indicating the standard voltages. **(06 Marks)**

b. Explain the effects of high voltage transmission base on the conductor volume, transmission efficiency, percentage line drop. **(08 Marks)**

c. What are the different types of transmission systems? Explain the advantages and disadvantages of high voltage transmission. **(06 Marks)**

2 a. Derive an expression for SAG of a line conductor suspended between unequal level supports taking into the effect of ice and wind loading. **(08 Marks)**

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

c. Discuss the significances of sag and tension calculations. **(04 Marks)**

3 a. Explain the different methods of improving the string efficiency of insulator for equal voltage distribution. **(09 Marks)**

b. A 3 phase overhead transmission line is supported by three disc suspension type insulators. The potential across the first and second insulator is 8 KV and 11 KV respectively. calculate the : i) line voltage ii) the ratio of shunt capacitance to self capacitance iii) string efficiency. **(06 Marks)**

c. Explain the different types of insulator testing. **(05 Marks)**

4 a. Explain the Ciorona formation in overhead T_r in terms of V_d and V_v lines. And the factors affecting the corona power loss. **(08 Marks)**

b. Derive an expression for insulation resistance of a single core cable. **(06 Marks)**

c. A single core cable,, 2.5 km long has a conductor of radius 15 mm and an insulation thickness of 5.6 mm. The dielectric has a resistivity of 8×10^{12} ohm/mt, and a relative permittivity of 2.8. Find the insulation resistance and capacitance per meter length of the cable. **(06 Marks)**

PART – B

5 a. Derive an expression for inductance of a 3 phase line with unsymmetrical spacing but transposed. **(10 Marks)**

b. Find the inductance per phase per km of double circuit 3 phase line system is shown in the Fig.Q5(b). The conductors are transposed and are of radius 0.75 cm each. The phase sequence is ABC. **(10 Marks)**

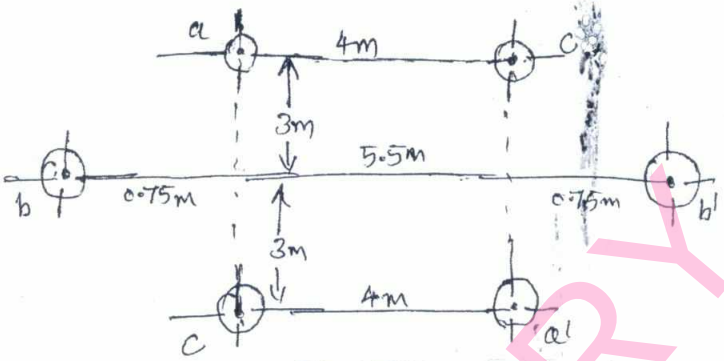

Fig. Q5(b)

6 a. Derive an expression for the capacitance per phase with equilateral spacing. **(10 Marks)**

b. A 3 phase, 50 Hz, 6 KV overhead line conductors are placed in a horizontal plane as shown in Fig. Q6(b). The conductor diameter is 1.25 cm. If the line length is 100 km. Calculate the capacitance per phase and charging current per phase. Assume complete transposition of lines. **(06 Marks)**

Fig. Q6(b)

c. Write a note on transposition of line. **(04 Marks)**

7 a. Derive an expression for sending end and receiving end voltage and currents for a nominal T model of medium transmission line. Also draw the phasor diagram. **(10 Marks)**

b. A 3 phase, 50 Hz overhead transmission line has the following constants per phase : $R = 28\ \Omega$, $X = 63\ \Omega$, and $Y = 4 \times 10^{-4}$ mho. If the load at the receiving end is 75 MVA at 0.8 pf lag with 132 KV between lines. Calculate the voltage, current and pf at the sending end. Use nominal π model. **(10 Marks)**

8 a. Explain how a two wire DC distributor with concentrated load fed at both end can be represented by single line diagram. **(08 Marks)**

b. A 3 phase ring distributor ABCD, fed at A at 11 KV supplies balanced loads of 40 A at 0.8 pf lag at B, 50 A at 0.707 pf lagging at C and 30 A at 0.8 pf lagging at D. The load currents are referred to the supply voltage at A. The impedances of the various sections are :

Section AB = $(1 + j2)\Omega$, section BC = $(2 + j3)\Omega$

Section CD = $(1 + j1)\Omega$, section DA = $(3 + j4)\Omega$

Calculate the currents in each section and station bus bar voltages at B, C and D, **(12 Marks)**

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10EE54

Fifth Semester B.E. Degree Examination, June/July 2016
DC Machines and Synchronous Machines

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Derive an emf equation for DC generator with usual notations. **(05 Marks)**

b. Explain the armature reaction in DC machines with neat diagram and derive the equations for:
i) DC magnetizing ampere turns/ pole
ii) Cross magnetizing ampere turns/pole. **(08 Marks)**

c. The data for open circuit characteristics of a DC shunt generator driven at rated speed is given as :

If (A)	0.5	1	1.5	2.0	2.5	3.0	3.5
E_0(V)	60	120	138	145	149	151	152

If the resistance of field circuit is adjusted to 53 Ω. Calculate the O.C. voltage and load current when the terminal voltage is 100 V, neglect armature reaction and assume R_a = 0.1Ω. Use graph sheet. **(07 Marks)**

2 a. What is Back EMF? Explain the significance of Back EMF. **(05 Marks)**

b. Explain in brief the Ward–Leonard speed control of DC motors. **(07 Marks)**

c. A 250 V DC shunt motor has R_a = 0.08Ω. When connected to 250V DC supply it develops back emf of 242V at 1500 rpm. Determine : i) armature current ii) armature current at start iii) back emf if armature current is changed to 120 A iv) the speed of the machine if it is to be operated as a generator in order to deliver an armature current of 87A at 250V. **(08 Marks)**

3 a. What are the losses occurring in a DC machine. Explain how do they vary with load. Derive the condition for maximum efficiency of a DC generator. **(10 Marks)**

b. A long shunt compound generator delivers a F.L. current of 800A at 500V. The shunt field resistance is 100Ω. The magnetic and mechanical losses combined together are equal to 12 KW. If the full load efficiency is 92%. Calculate : i) armature resistance (R_a) and series field resistance (R_{sb}) given that $R_a = 2R_{se}$ ii) load corresponding to maximum efficiency and iii) maximum efficiency. **(10 Marks)**

4 a. Explain Swinburn's test to determine efficiency of a motor and generator. **(10 Marks)**

b. Explain field's test as applied to two similar DC series motors. **(10 Marks)**

PART – B

5 a. Derive an expression for emf equation of an alternator and also mention the methods adopted to eliminate harmonics in the voltage in an alternator. **(10 Marks)**

b. A 12 pole three phase, 600 rpm, star connected alternator has 180 slots. There are 2 coil sides per slot and total 10 conductors per slot. If the flux per pole is 0.05 wb determine from first principles i) rms value of emf in a conductor ii) rms value of emf in a turn iii) rms value of emf in coil iv) per phase induced emf. Assume full pitch coil. **(10 Marks)**

6 a. Explain clearly the ZPF method of determining the regulation of an alternator [potiers triangle method) **(10 Marks)**

b. The open circuit and SC test is conducted on a 3 phase, star connected, 866V. 100 KVA alternator. The O.C test results are :

If Amp	1	2	3	4	5	6
V_{oc} line volts	173	310	485	605	728	790

The filed current of 1A, produces a S.C current of 25A. The armature resistance per phase is 0.15Ω. Calculate its full load regulation at 0.8 lagging power factor condition. **(10 Marks)**

7 a. Explain parallel operation of alternator along with necessary condition and discuss the factors on which the division of load between two alternators take place when they are working in parallel. **(10 Marks)**

b. A 230V, 3 phase, 5 KVA star connected salient pole alternator with $x_d = 12\Omega$ and $x_q = 7V$ delivers full load current at unity power factor. Calculate the excitation voltage neglecting resistance. **(10 Marks)**

8 Write short notes on :

a. Why synchronous motor is not self starting **(07 Marks)**

b. Operation of synchronous motor at constant load variable excitation **(07 Marks)**

c. Synchronous condenser. **(06 Marks)**

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10EE55

Fifth Semester B.E. Degree Examination, June/July 2016
Modern Control Theory

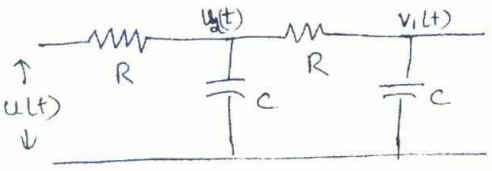
Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. What are the advantages of modern control theory over conventional control theory? **(05 Marks)**

b. For the system shown, write the state equations satisfied by them. Bring these equations in vector matrix form, **(07 Marks)**



Take R = 1 MΩ and C = 1 μF

Fig. Q1 (b)

c. A Feedback system is characterized by the closed loop transfer function,

$$T(s) = \frac{s^2 + 3s + 3}{s^3 + 2s^2 + 3s + 1}$$

Draw the signal flow graph and obtain the state model in second companion form. **(08 Marks)**

2 a. Obtain the state space representation of the given system in Jordan canonical form.

$$\frac{y(s)}{U(s)} = \frac{2s^2 + 6s + 7}{(s+1)^2(s+2)}$$ **(12 Marks)**

b. Obtain the transfer function for the state model represented by, $\dot{x} = Ax + Bu$, $y = Cx + DU$, where $A = \begin{bmatrix} -1 & 1 \\ -1 & -10 \end{bmatrix}$, $B = \begin{bmatrix} 0 \\ 10 \end{bmatrix}$, $C = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$, $D = [0]$ **(08 Marks)**

3 a. Prove that the modal matrix M diagonalizes the system matrix A. **(04 Marks)**

b. For the matrix, $A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -2 & -4 & -3 \end{bmatrix}$, find i) Eigen values ii) Eigen vectors iii) Modal matrix **(08 Marks)**

c. Compute the state transition matrix for, $A = \begin{bmatrix} 0 & -3 \\ 1 & -4 \end{bmatrix}$ using i) Laplace – transformation method. ii) Cayley-Hamilton method. **(08 Marks)**

4 a. Define state transition matrix and list its properties. **(04 Marks)**

b. A linear time invariant system is characterized by,

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} -1 \\ 2 \end{bmatrix} [u]; \quad y = \begin{bmatrix} 1 & -1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

Compute the response y(t) to a unit step input assuming $X(0) = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$. **(12 Marks)**

c. Evaluate the controllability of the system with $\dot{x} = Ax + BU$ where $A = \begin{bmatrix} 0 & 0 & -6 \\ 1 & 0 & -11 \\ 0 & 1 & -6 \end{bmatrix}$, $B = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$. **(04 Marks)**

PART – B

5 a. A system is described by following state model:

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -1 & -5 & -6 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u$$

Compute the state feedback gain matrix "K" so that the control law to $u = -Kx$ places the closed loop poles at $-2 \pm j4, -5$, using direct substitution method. **(10 Marks)**

b. Consider the system, $\dot{X} = AX + Bu$ and $y = CX$

where $A = \begin{bmatrix} 0 & 20.6 \\ 1 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$, $C = \begin{bmatrix} 0 & 1 \end{bmatrix}$

Design a full order state observer using Ackermann's formula. **(10 Marks)**

6 a. What is PI and PD controller? What are its effect on system performance? **(06 Marks)**

b. Discuss pole placement by state feedback. What is the necessary condition for design using state feedback? **(06 Marks)**

c. Explain Backlash and Jump resonance with respect to non-linear systems. **(08 Marks)**

7 a. What are singular points? Explain different singular points based on the location of Q point. **(08 Marks)**

b. A linear second order servo system is described by the state equation,

$\ddot{e} + 2\xi\omega_n \dot{e} + \omega_n^2 e = 0$

where $\xi = 0.15$ and $\omega_n = 1$ rad/sec, $e(0) = 1.5$ and $\dot{e}(0) = 0$. Construct the phase trajectory using the method of isocline. **(12 Marks)**

8 a. Define : i) Positive definiteness ii) Negative definiteness iii) Positive semidefiniteness iv) Negative semidefiniteness v) Indefiniteness. **(05 Marks)**

b. Explain Kravoski's theorem with example. **(07 Marks)**

c. Examine the stability of a non-linear system governed by the equations,

$\dot{x}_1 = -x_1 + 2x_1^2 x_2$; $\dot{x}_2 = -x_2$. Assume $2x_1 x_2 < 1$. **(08 Marks)**

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10EE56

Fifth Semester B.E. Degree Examination, June/July 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. ***Datasheets of typical resistors, capacitors and op-amps are permitted.***

PART – A

1 a. With a neat circuit diagram, explain the operation of a high input impedance capacitor coupled voltage follower. Obtain the expression for input impedance of the circuit. **(08 Marks)**

b. Sketch the circuit of a capacitor coupled non-inverting amplifier using a single polarity power supply. Briefly explain its operation. **(06 Marks)**

c. Using LF353 BIFET op-amp, design a high zin capacitor-coupled non- inverting amplifier to have a low cutoff frequency of 200Hz. The input and output voltages are to be 15mV and 3V respectively, and the minimum load resistance is 12kΩ. **(06 Marks)**

2 a. With neat sketches, explain the operation of a phaselog frequency compensation network. **(06 Marks)**

b. Discuss the effect of slew rate on bandwidth and output amplitude. **(08 Marks)**

c. With a neat circuit, explain zin mod method of frequency compensation. Write the equation for the feedback factor. **(06 Marks)**

3 a. With a neat circuit diagram, explain the operation of high input impedance fullwave precision rectifier. Draw the voltage waveforms at various points in the circuit and write the appropriate equations to show that fullwave rectification is performed. **(12 Marks)**

b. Design a non-saturating precision halfwave rectifier to produce 2V peak output from a sinewave input with a peak value of 0.5V and frequency of 1MHz. Use a bipolar op-amp with a supply voltage of ± 15V. **(08 Marks)**

4 a. With a neat circuit diagram and waveforms, explain the operation of invering Schmitt trigger circuit with different LTP and UTP.. **(06 Marks)**

b. Draw an op-amp based monostable multivibrator circuit. Explain its operation showing all relevant waveforms. **(08 Marks)**

c. Using a BIFET op – amp, design an astable multivibrator to have ± 9V output with a frequency of 1KHz. **(06 Marks)**

PART – B

5 a. With a neat circuit and waveforms, explain the operation of triangular/rectangular waveform generator which has frequency and duty cycle controls. **(10 Marks)**

b. Using a BIFET op-amp with a supply of ± 12V, design a weinbridge oscillator to have an output frequency of 15KHz. **(04 Marks)**

c. With a neat circuit diagram explain the operation of RC phaseshift oscillator. Draw the output voltage and feedback voltage waveforms of the circuit. **(06 Marks)**

6 a. With a neat circuit and frequency response, explain the working of second order highpass filter. **(06 Marks)**

b. Design a second order lowpass active filter using a 741 op-amp to have a cutoff frequency of 1KHz. (for 741, $I_{B(max)} = 500nA$). **(08 Marks)**

c. Design a single stage bandpass filter having a voltage gain of 1 and a passband from 300Hz to 30KHz. **(06 Marks)**

7 a. With a block diagram, explain the operation of a phaselocked loop. **(06 Marks)**

b. Explain the theory of operation of the switched capacitor filter. List out the advantages of a switched capacitor filter. **(08 Marks)**

c. What is an universal active filter? List the salient feature of FLT – U2 specialized IC filter. **(06 Marks)**

8 a. With a neat sketch explain the working of a dc voltage regulator. Write the equation for the line regulation, load regulation and ripple rejection. **(10 Marks)**

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

c. Calculate the resistances of R_1 and R_2 for the LM217 voltage regulator to produce an output voltage of 9V. **(04 Marks)**

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