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10AL51

Fifth Semester B.E. Degree Examination, Dec.2016/Jan.2017
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. Differentiate between Administration and Management. **(10 Marks)**
b. Briefly explain, whether management is a Science or Art. **(10 Marks)**

2 a. Explain the importance of planning. **(10 Marks)**
b. Explain the hierarchy of plans. **(10 Marks)**

3 a. Briefly explain the techniques of selection. **(10 Marks)**
b. Briefly explain the principles of organization. **(10 Marks)**

4 a. Briefly explain the Maslow's hierarchy of needs. **(10 Marks)**
b. Differentiate between Autocratic, Participative and Free – Rein leadership styles. **(10 Marks)**

PART – B

5 a. Define the term "Entrepreneur". Explain the functions of an entrepreneur. **(10 Marks)**
b. Explain the various barriers of entrepreneurship. **(10 Marks)**

6 a. Define "Small Scale Industry" and State the characteristics of a SSI. **(10 Marks)**
b. Explain the functions of WTO. **(10 Marks)**

7 a. Explain the objectives of KSFC. **(10 Marks)**
b. Explain the objectives of TECSOK. **(10 Marks)**

8 a. Define Project. State and explain the classifications of projects. **(10 Marks)**
b. Explain the criteria's for selecting a project. **(10 Marks)**

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10EE52

Fifth Semester B.E. Degree Examination, Dec.2016/Jan.2017
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. Explain about power and energy signal with example. Determine whether signal given in Fig Q1(a) is power or energy signal, find corresponding value. **(06 Marks)**

b. Find out the even and odd component of the following signals. **(06 Marks)**

i) $x(t) = \cos t + \sin t + \sin t \cos t$ ii) $x(t) = 1 + t + 3t^2 + 6t^3 + 9t^4$

iii) $x(t) = 1 + t\cos t + t^2 \sin t + t^3 \sin t \cos t$

c. For the given signal x(t) shown in Fig Q1(c) sketch and label

(i) x(0.5t) (ii) x(t+3) (iii) x(3t+2) (vi) x(-3(t-1)) **(08 Marks)**

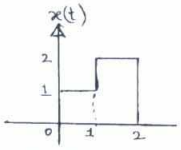

Fig Q1(a)

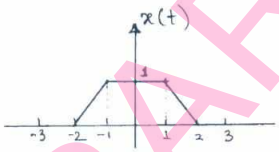

Fig Q1(c)

2 a. Impulse response of a system is given by $h[n] = \begin{cases} 1 & n = 0 \\ 1/2 & n = 1 \\ 0 & \text{otherwise} \end{cases}$

Input for the given system is $x[n] = \begin{cases} 2 & n = 0 \\ 4 & n = 1 \\ -2 & n = 2 \\ 0 & \text{otherwise} \end{cases}$

Find out the output y[n] of the system. **(06 Marks)**

b. Given impulse response of the system $h[n] = \left[\frac{1}{2}\right]^n u[n-2]$. Find out step response of the system. **(08 Marks)**

c. Draw direct form – I and direct form – II implementation for the following difference equation. $y[n] + \frac{1}{4}y[n-1] - \frac{1}{8}y[n-2] = 2x[n] + 3x[n-1]$ **(06 Marks)**

3 a. Obtain the convolution integral for a system with input x(t) and impulse response h(t), as shown in Fig Q3(a). **(08 Marks)**

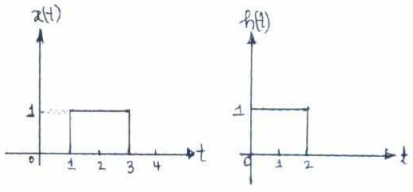

Fig Q3(a)

b. For the given impulse response determine whether system is memory less, stable and causal, justify your answer. $h[n] = [2]^n u[-n]$. **(04 Marks)**

c. Find out the complete solution for the system described by the following differential equation.

$\frac{d^2y(t)}{dt^2} + 5\frac{d}{dt}y(t) + 6y(t) = x(t)$, Where $x(t) = e^{-t}\,u(t)$

With initial conditions $y(0) = -\frac{1}{2}, \left.\frac{d}{dt}y(t)\right|_{t=0} = \frac{1}{2}$ **(08 Marks)**

4 a. Determine the Fourier series representation of the square wave shown in Fig Q4(a)

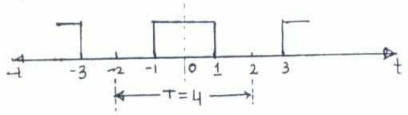

Fig Q4(a) **(08 Marks)**

b. Determine the discrete Fourier series representation for the following signal.

$x[n] = \cos \pi/3\, n + \sin \pi/4\, n$ **(06 Marks)**

c. State and prove the time shift and frequency shift property of Fourier series. **(06 Marks)**

PART – B

5 a. Using the properties of Fourier Transform find out Fourier transform of the following signals.

i) $x(t) = \sin(\pi t)e^{-2t}\,u(t)$ ii) $x(t) = e^{-3(t-2)}$ **(12 Marks)**

b. Obtain the Fourier Transform of the following signals.

i) $x(t) = u(t)$ ii) $x(t) = e^{-\alpha t}\,u(t)$

iii) $x(t) = 1 \quad -0.5 \le t \le 0.5$

$= 0$ elsewhere. **(08 Marks)**

6 a. Find DTFT of the following signal

i) $x[n] = \left[\frac{1}{2}\right]^{n+2} u[n]$ ii) $x[n] = n\left[\frac{1}{2}\right]^{2n} u[n]$ iii) $x[n] = -\left[\frac{1}{2}\right]^{n} u(-n-1)$ **(12 Marks)**

b. An LTI causal system is having a frequency response as $H(e^{j\Omega}) = \frac{e^{j\Omega}}{1+\cos\Omega}$. Obtain linear constant difference equation of the system. **(08 Marks)**

7 a. Obtain z transform and the ROC and location of poles and zero's of x(z), for the following x[n].

i) $x[n] = \left[\frac{1}{2}\right]^{n} u[n] + \left(-\frac{1}{3}\right)^{n} u[n]$ ii) $x[n] = -\left(\frac{3}{4}\right)^{n} u(-n-1) + \left(-\frac{1}{3}\right)^{n} u[n]$ **(10 Marks)**

b. Obtain inverse 'z' transform of the given x(z) using partial fraction expansion

$x(z) = \frac{1 - z^{-1} + z^{-2}}{\left(1 - \frac{1}{2}z^{-1}\right)\left(1 - 2z^{-1}\right)\left(1 - z^{-1}\right)}$ i) with ROC $1 < |z| < 2$ ii) with ROC $|z| < \frac{1}{2}$ **(10 Marks)**

8 a. Use convolution property of 'z' transform to obtain x(z) for the given x(n)

$x(n) = u(n-2) * \left(\frac{2}{3}\right)^{n} u(n)$ **(06 Marks)**

b. Obtain inverse z transform of $x(z) = \frac{2 + z^{-1}}{1 - \frac{1}{2}z^{-1}}$ with ROC $|z| > \frac{1}{2}$ **(06 Marks)**

c. Solve the following linear constant coefficient difference equation using z transform method

$y[n] - \frac{1}{2}y[n-1] = x[n]$ with given input $x[n] = \left(\frac{1}{3}\right)^{n}$ and initial condition $y[-1] = 1$ **(08 Marks)**

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10EE53

Fifth Semester B.E. Degree Examination, Dec.2016/Jan.2017
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. Draw the line diagram of a typical power supply scheme indicating the standard voltages. **(06 Marks)**

b. Explain the following components of distribution:
(i) Substation (ii) Distribution substation (iii) Feeder (iv) Distributor
(v) Service mains **(10 Marks)**

c. State the advantages of high voltage transmission. **(04 Marks)**

2 a. Prove that the conductor takes the shape of a catenary when the sag and span are comparable. **(10 Marks)**

b. An overhead transmission line conductor is supported between two towers 300 m apart, having a difference in level of 10 m. The conductor diameter is 2.0 cm and weight is 2.3 kg/m. Calculate the sag under lower support if factor of safety is 3. The maximum tensile strength of conductor material is 4200 kg/m^2. **(10 Marks)**

3 a. (i) Discuss the desirable properties of insulators.
(ii) Compare pin type insulator and suspension type insulator.
(iii) Why string efficiency should be as high as possible? What are different methods used in practice for improving the string efficiency? **(12 Marks)**

b. Each line of a three phase system is suspended by a string of three similar insulators. If the voltage across the line unit is 20 KV, calculate the line to neutral voltage and string efficiency. Assume that the shunt capacitance between each insulator and earthed metal work of tower to be $\frac{1}{10}^{th}$ of the capacitance of the insulator. **(08 Marks)**

4 a. State and explain factors affecting corona and corona loss. **(06 Marks)**

b. A 132 KV, 3-phase line with 1.956 cm diameter conductor is built so that corona takes place if the line voltage exceeds 210 KV (rms). If the value of potential gradient at which ionization occurs can be taken as 30 KV per cm, find the spacing between the conductors. (Assume $\delta = 1$, $m_0 = 1$). **(04 Marks)**

c. What is meant by grading of cables? Briefly explain various methods of grading. **(10 Marks)**

PART – B

5 a. Calculate the inductance of conductor due to internal flux and external flux. **(10 Marks)**

b. Write short note on transposition of transmission line. **(05 Marks)**

c. Calculate the inductance of each conductor in a 3-phase-3wire system. Conductors are arranged in a horizontal plane with spacing $d_{31} = 4m$, $d_{12} = d_{23} = 2$ m. The conductors are transposed and have a diameter of 2.5 cm. **(05 Marks)**

6 a. Find the capacitance of single phase line 40 km long consisting of 2 parallel wires each 4 mm in diameter and 2 m apart. Determine the capacitance of the same line taking into account effect of ground. The height of conductor above ground is 5 m. **(08 Marks)**

b. Derive expression for the capacitance per phase of a 3-phase line with
(i) Equilateral spacing.
(ii) Unsymmetrical spacing (single circuit) transposed. **(12 Marks)**

7 a. What are generalized circuit constants of a transmission line? Determine the ABCD constants of a medium transmission line using nominal T-model and prove AD – BC = 1. **(10 Marks)**

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

8 a. Write short note on radial and ring main distribution system. **(06 Marks)**

b. What are the requirements of a good distribution system? **(04 Marks)**

c. A two wire DC distributor AB 600 m long is loaded as under.

Distance from A (meters)	150	300	350	450
Load in amperes	100	200	250	300

The feeding point A is maintained at 440 V while B maintained at 430 V. If each conductor has resistance of 0.01 Ω per 100 m.
Calculate :
(i) The current supplied from A and B.
(ii) The power dissipated in the distributor. **(10 Marks)**

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10EE54

Fifth Semester B.E. Degree Examination, Dec.2016/Jan.2017
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. Mention the types of armature windings and derive the EMF equation of a d.c. generator. **(06 Marks)**

b. With neat diagrams, explain the process of commutation in d.c. machines. **(08 Marks)**

c. A lap wound d.c. generator has 1000 armature conductors and 10 poles. The rated armature current is 800 A. Find the number of conductors of compensating winding per pole to give full armature reaction compensation, if the pole face covers two-third of pole pitch. **(06 Marks)**

2 a. With neat diagrams, explain the characteristics of a d.c. series motor. **(06 Marks)**

b. With the help of a neat diagram, explain the Ward-Leonard method of speed control. **(07 Marks)**

c. A 4-pole series wound fan motor draws an armature current of 50A, when running at 2000 rpm on a 230 V dc supply with four coils connected in series. Now these coils are connected in two parallel groups of two coils in series. Assuming the flux per pole to be proportional to the exciting current and load torque proportional to the square of speed, find the new speed and armature current with armature resistance of 0.2 Ω and resistance of each field coil is 0.05 Ω. **(07 Marks)**

3 a. Draw and explain the power flow diagram and derive the condition for maximum efficiency in a d.c. motor. **(06 Marks)**

b. Explain the brake test to determine the efficiency of a d.c motor and mention its demerits. **(07 Marks)**

c. A d.c. shunt motor rated at 12.5 kW output runs at no-load at 1000 rpm from a 250 V supply consuming an input current of 4 A. The armature resistance is 0.5 Ω and shunt field resistance is 250 Ω. Calculate efficiency of the machine when delivering full load output of 12.5 kW while operating at 250 V. **(07 Marks)**

4 a. With a neat diagram, explain the field's test on d.c series motors. **(06 Marks)**

b. What are the merits and demerits of Hopkinson's test? **(06 Marks)**

c. The Hopkinson's test on two similar d.c. shunt machines gave the following full load data: Line voltage = 110 V, Line current = 48A, Motor armature current = 230 A, Field currents are 3 A and 3.5 A. The armature resistance of each machine is 0.035 Ω. Calculate the efficiency of each machine assuming a brush contact drop of 1 V per brush. **(08 Marks)**

PART – B

5 a. Define pitch factor and distribution factor. What are the effects of distribution and chording of winding? **(07 Marks)**

b. Explain the armature reaction in a synchronous machine with different power factor loads. **(06 Marks)**

c. A three phase, 16 pole, star connected alternator has 192 slots with 8 conductors per slot. The coil span is 160° (ele), speed of the alternator is 375 rpm and flux per pole is 55 mWb. Calculate the phase and line voltages. **(07 Marks)**

6 a. Define voltage regulation of a 3ϕ alternator and explain the ZPF method of determining the voltage regulation for lagging p.f. load. **(10 Marks)**

b. A 415 V, 30 kVA, 50 Hz, 3ϕ star connected alternator has the following O.C. test data:

I_f in Amps	6	12	18	24	28
E_L in Volts	282	408	435	459	474

An excitation of 8A produced full load current in the armature on short circuit. If R_a = 0.5 Ω/phase, calculate the voltage regulation at full-load, 0.707 p.f. lagging by a) EMF method and b) MMF method. **(10 Marks)**

7 a. Explain slip test for the determination of direct axis and quadrature axis reactances. **(06 Marks)**

b. Derive the power flow equations including armature resistance and draw power angle characteristics of a synchronous machine. **(07 Marks)**

c. Two, 15 kVA, 400 V, 3ϕ alternators in parallel supply a total load of 25 kVA at 0.8 p.f. lagging. If one alternator shares half the power at unity p.f., determine the p.f. and kVA shared by the other alternator. **(07 Marks)**

8 a. With phasor diagram, explain the effect of operation at constant load with variable excitation of a synchronous motor. **(07 Marks)**

b. Explain the V and inverted V curves of a synchronous motor. **(06 Marks)**

c. A 20 MVA, 3ϕ, star connected, 11 kV, 2 pole, 50 Hz salient-pole synchronous motor has reactances of X_d = 5 Ω, X_q = 3 Ω. At full-load, unity p.f. and rated voltage find the excitation voltage and the active power. **(07 Marks)**

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10EE55

Fifth Semester B.E. Degree Examination, Dec.2016/Jan.2017
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. Obtain the state model of the system whose transfer function is given by,

$$G(s) = \frac{s^2 + 2s + 1}{s^3 + 3s^2 + 4s + 5}$$ **(06 Marks)**

b. Obtain the state model of armature controlled DC motor. **(10 Marks)**

c. Mention the advantages of modern control theory. **(04 Marks)**

2 a. A system is described by the, $A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -2 & -4 & -3 \end{bmatrix}$. Find eigen values, eigen vector and modal matrix. **(08 Marks)**

b. Obtain the state model of mechanical system shown in Fig. Q2 (b) by using minimum number of state variables. **(06 Marks)**

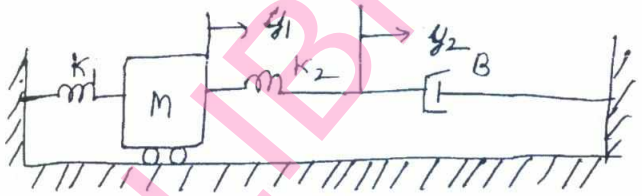

Fig. Q2 (b)

c. Obtain the state model of the electrical network shown in Fig. Q2 (c) by choosing $v_1(t)$ and $v_2(t)$ as state variables. **(06 Marks)**

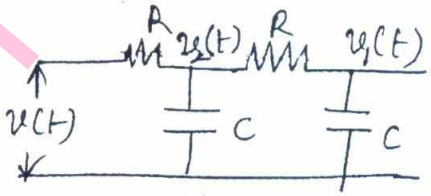

Fig. Q2 (c)

3 a. What are the properties of state transition matrix? **(04 Marks)**

b. Obtain state transition matrix for the system described by $\dot{x}(t) = \begin{bmatrix} 0 & 1 \\ -4 & -4 \end{bmatrix} x(t)$ by,

(i) L.T. method (ii) C-H technique. **(10 Marks)**

c. Obtain the transfer function of the following system:

$$A = \begin{bmatrix} -1 & 0 & 1 \\ 1 & -2 & 0 \\ 0 & 0 & 3 \end{bmatrix}, \quad B = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}, \quad C = \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}^T$$ **(06 Marks)**

4 a. Define controllability and observability. **(04 Marks)**

b. Find the step-response for the system represented by state equation,

$\dot{X} = AX + BU$ and $Y = CX$ where

$A = \begin{bmatrix} 0 & 1 \\ -6 & -5 \end{bmatrix}$; $B = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$; $C = \begin{bmatrix} 1 & 0 \end{bmatrix}$ **(10 Marks)**

c. Check controllability and observability of the following model:

$A = \begin{bmatrix} 0 & 0 & 0 \\ 1 & 0 & -3 \\ 0 & 1 & -4 \end{bmatrix}$, $B = \begin{bmatrix} 40 \\ 10 \\ 0 \end{bmatrix}$, $C = \begin{bmatrix} 0 & 0 & 1 \end{bmatrix}$ **(06 Marks)**

PART – B

5 a. Explain the following:

(i) P + D controller (ii) P + I controller (iii) P + I + D controller **(06 Marks)**

b. Consider the system defined by,

$\dot{x} = Ax + Bu$, where $A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -1 & -5 & -6 \end{bmatrix}$, $B = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$. By using state feedback control $u = -Kx$ it is desired to have closed loop poles at $s = -1 \pm j1$, $s = -10$. Determine the state feedback gain matrix K. **(08 Marks)**

c. Design full order state observer with the block diagram. **(06 Marks)**

6 a. What is non-linear system? What are the properties of non-linear system? Explain them. **(08 Marks)**

b. Explain the following non linearities :

(i) Relay with dead zone (ii) Backlash (iii) Saturation (iv) Friction. **(12 Marks)**

7 a. What are singular points? Explain them. **(06 Marks)**

b. Explain isoclines method of sending phase trajectories. **(06 Marks)**

c. Construct phase trajectory by delta method for non linear system represented by differential equation $\ddot{x} + 4|x|\dot{x} + 4x = 0$. Choose initial conditions as x(0) = 1.0 and $\dot{x}(0) = 0$. **(08 Marks)**

8 a. Define (i) Positive definiteness (ii) Negative definiteness (iii) Indefiniteness **(06 Marks)**

b. Explain Liapunov stability theorem. **(06 Marks)**

c. Use Krasookii's method to show that the equilibrium state x = 0 of the system described by,

$\dot{x}_1 = -3x_1 + x_2$

$\dot{x}_2 = x_1 - x_2 - x_2^3$

is asymptotically stable in large. **(08 Marks)**

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10EE56

Fifth Semester B.E. Degree Examination, Dec.2016/Jan.2017
Linear IC's 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.***
3. ***741 Datasheet allowed.***

PART – A

1 a. With a neat circuit diagram, explain the operation of a capacitor coupled voltage follower. **(06 Marks)**

b. Design a high Z_{in} capacitor –coupled non investing 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 [using BIFET operational Amplifier]. **(08 Marks)**

c. With a neat sketch, briefly explain the circuit of a capacitor coupled inverting amplifier. **(06 Marks)**

2 a. Define: i) Loop gain ii) Loop phase shift iii) Unity gain band width. **(06 Marks)**

b. Sketch circuit for lag compensation, lead compensation and miller effect compensation. Explain the operation of each circuit, and each affects the op-amp frequency response. **(10 Marks)**

c. Briefly explain stray capacitance effect, load capacitance effect. **(04 Marks)**

3 a. With a neat circuit diagram, show how a half wave precision rectifier can be combined with a summing circuit to produce a full wave precision rectifier. Draw the voltage wave form for a relevant stage. Write a equation to show that full wave rectifier is performed. **(08 Marks)**

b. Draw the diagram for an op-amp sample – and – hold circuit. Sketch the signal, control and output voltage waveforms carefully explain the circuit operation. **(06 Marks)**

c. A ±5V 10KHz square wave from a signal generator with source resistance of 100Ω is to have its positive peak clamped at ground level. The tilt on the output is not to exceed 1% of peak amplitude of the wave. Design a suitable op-amp circuit using ±12V supply. **(06 Marks)**

4 a. Sketch the circuit diagram of an op-amp monostable multi-vibrator, draw the circuit wave forms and explain its operation. **(08 Marks)**

b. Analyse the Schmitt trigger circuit in figure to determine the UTP and LTP. Assume that the op-amp is rail to rail operated and that the diode forward voltage drop is 0.7V. **(06 Marks)**

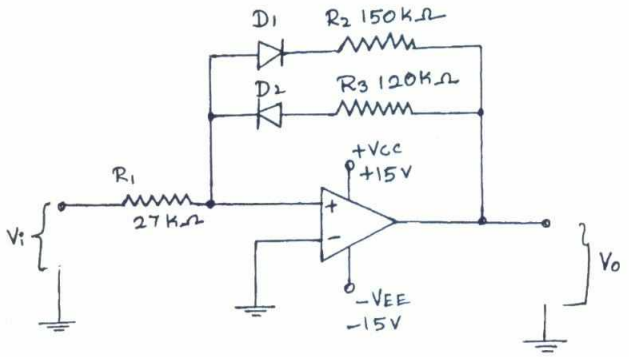

Fig Q4(b)

c. Design a zero crossing detector using 741 op-amp with $\pm 15V$ supply. Determine the typical output voltage swing and the typical input voltage level above and below the ground level at which the output switches, Also calculate the rise time of the output voltage. **(06 Marks)**

PART – B

5 a. Draw the circuit diagram of triangular/rectangular wave form generator using op-amps. Sketch the circuit waveforms, and explain its circuit operation. **(08 Marks)**

b. Design a Wein bridge oscillator to have frequency of 1KHz. Use a 741 op-amp with $V_0 \pm 9V$. **(06 Marks)**

c. Show how the output amplitude of a phase shift oscillator can be stabilized by means of inverse parallel connected diodes. Explain how the circuit limits the output amplitude. **(06 Marks)**

6 a. Derive expression for gain and angle of first order low pass butter worth filter. Draw the frequency response curve. Explain its operation. **(08 Marks)**

b. Design a single stage band pass filter have unity voltage gain and a pass band from 300Hz to 30KHz. **(06 Marks)**

c. Show how the circuit of a single stage wide band pass filter can be modified for narrow band operation. Briefly explain. **(06 Marks)**

7 a. Draw the basic block diagram and waveforms for a PLL system, Indentify each component part ad explain its function. **(08 Marks)**

b. Explain the theory of operation of the switched capacitor filter. **(08 Marks)**

c. Distinguish between small signal amplifier and power amplifier. **(04 Marks)**

8 a. Define :
   i) Line regulation
   ii) Ripple rejection **(04 Marks)**

b. With a neat circuit, explain working of a precision voltage regulator. **(08 Marks)**

c. Design a voltage follower type regulator circuit using 741 op-amp with following specification.
   i) Output voltage 12V
   ii) Maximum load current – 50mA. **(08 Marks)**

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