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10AL51

Fifth Semester B.E. Degree Examination, June/July 2018
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. Explain the term management and discuss the functions of management. **(08 Marks)**
b. Explain modern management approaches. **(12 Marks)**

2 a. Explain the steps involved in planning process with an example. **(08 Marks)**
b. Explain the hierarchy of plans of a organization. **(12 Marks)**

3 a. Explain with a block diagram line and matrix type of organization. **(08 Marks)**
b. Explain the principles of organization. **(12 Marks)**

4 a. Explain the requirements of effective direction. **(06 Marks)**
b. Explain Maslaw's hierarchy of needs theory. **(08 Marks)**
c. Differentiate between co-ordination and cooperation. **(06 Marks)**

PART – B

5 a. Explain the concept of entrepreneurship and its evolution. **(08 Marks)**
b. Explain the types of entrepreneur. **(12 Marks)**

6 a. Explain the characteristics of small enterprises. **(08 Marks)**
b. Explain the advantages of small enterprises. **(12 Marks)**

7 a. Explain the activities of Karnataka Industrial Area Development Board (KIADB). **(10 Marks)**
b. Explain the activities of Karnataka State Small Industries Development Corporation (KSSIDC). **(10 Marks)**

8 Explain various details which should be included in a project work. **(20 Marks)**

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10EE52

Fifth Semester B.E. Degree Examination, June/July 2018
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. Sketch the even and odd components of the following signals.

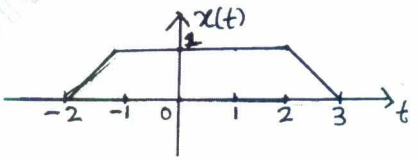

Fig Q1 a (i)

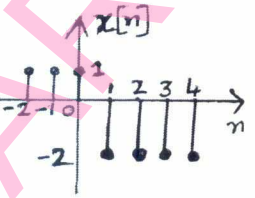

Fig Q1 a (ii) **(08 Marks)**

b. A continuous time signal x(t) shown below. Draw the signal $y(t) = \{x(t) + x(2-t)\}u(1-t)$

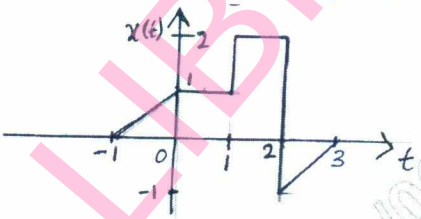

Fig Q1 (b) **(06 Marks)**

c. i) What is the average power of the triangular wave shown below?
ii) For the trapezoidal pulse shown below, find the total energy.

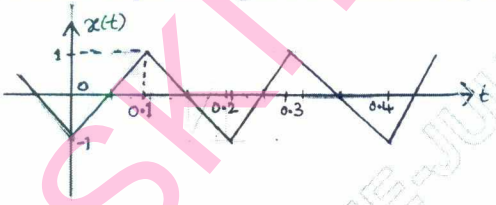

Fig Q1 c (i)

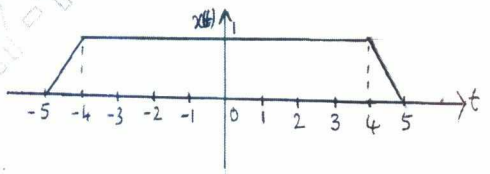

Fig Q1 c (ii) **(06 Marks)**

2 a. Derive an expression for convolution sum. **(06 Marks)**

b. If h(t) = u(t) – u(t – 3) and x(t) = u(t) – u (t – 1), determine the output y(t) = x(t) * h(t). **(10 Marks)**

c. Determine the convolution of the two sequence x[n] = {1, 2, 3, 4} and h[n] = {1, 1, 3, 2}. **(04 Marks)**

3 a. Two LTI systems whose impulse responses are given by $h_1(t) = e^{-2t}\,u(t)$ and $h_2(t) = e^{-t}\,u(t)$ are connected in cascade. Find the overall impulse response h(t) and check for stability. **(06 Marks)**

b. Find the natural and forced responses of the system described by the differential equation.
$\frac{d^2y(t)}{dt^2}+3\frac{dy(t)}{dt}+2y(t)=x(t)+\frac{dx(t)}{dt}$ With $y(0)=0,\ \left.\frac{dy(t)}{dt}\right|_{t=0}=1, x(t)=5u(t)$. **(08 Marks)**

c. Draw the direct form I and direct form II for LTI system described by the difference equation $y[n]+\frac{1}{2}y[n-1]-\frac{1}{3}y[n-3]=x[n]+2x[n-2]$ **(06 Marks)**

4 a. State and prove frequency and time shift properties of Fourier series. **(08 Marks)**

b. Determine the DTFS representation for the sequence $x[n]=\cos^2\left[\frac{\pi}{4}n\right]$ **(06 Marks)**

c. Find the Fourier series coefficient of the signal x(t) shown below and draw its spectra.

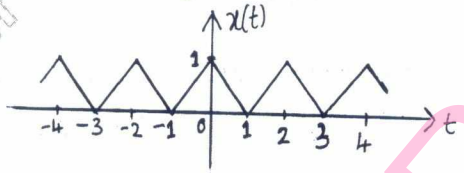

Fig Q4(c) **(06 Marks)**

PART – B

5 a. State and prove convolution property of the Discrete Time Fourier Transform (DTFT). **(06 Marks)**

b. Find DTFT of the sequence $x[n]=a^{|n|};|aK|$. **(04 Marks)**

c. Using appropriate properties, Find the DTFT of the signal $x[n]=\text{Sin}\left[\frac{\pi}{4}n\right]\left[\frac{1}{4}\right]^n u[n-1]$. **(10 Marks)**

6 a. State and prove Time differentiation and Frequency differentiation properties of the Fourier Transform (FT). **(08 Marks)**

b. Find the Fourier Transform of the following :
i) $x(t)=e^{-3t}u(t-1)$ ii) $x(t)=t\,e^{-2t}\,u(t)$ **(06 Marks)**

c. Find the Fourier Transform of the following signal using appropriate properties
$x(t)=\text{Sin}(\pi t)e^{-2t}\,u(t)$. **(06 Marks)**

7 a. What is Region of Convergence (ROC)? List the properties of ROC. **(06 Marks)**

b. Determine the z – Transform of the following :
i) $x[n]=\left[\frac{1}{3}\right]^n \text{Sin}\left[\frac{\pi}{4}n\right]u[n]$ ii) $x[n]=\left[\frac{1}{2}\right]^{|n|}$ **(08 Marks)**

c. Using appropriate properties, find the z-transform of $x[n]=n\left[\frac{1}{2}\right]^n u[n-3]$. **(06 Marks)**

8 a. Solve the following difference equation using unilateral z-transform.
$y[n]-\frac{3}{2}y[n-1]+\frac{1}{2}y[n-2]=x[n],\ n>0$ With initial conditions $y[-1]=4$, $y[-2]=10$ and $x[n]=\left[\frac{1}{4}\right]^n u[n]$. **(10 Marks)**

b. If a system is described by the following equation $y[n]-\frac{3}{4}y[n-1]+\frac{1}{8}y[n-2]=x[n]$, Find the impulse response and step response. **(10 Marks)**

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10EE53

Fifth Semester B.E. Degree Examination, June/July 2018
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 and explain the line diagram of a typical power supply scheme indicating the standard voltages. **(10 Marks)**

b. Why it is necessary to use high voltage for power transmission? **(05 Marks)**

c. What are the effects of Sag and tension on the conductor of a transmission line? **(05 Marks)**

2 a. Obtain the expression for sag in a freely suspended conductor when the supports are at different levels considering ice and wind affects. **(10 Marks)**

b. 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 kg, find the maximum clearance of the conductor and water and also clearance midway between the supports, weight of the conductor is 1.5 kg/m. Bases of the towers can be considered to be at water level. **(10 Marks)**

3 a. Define string efficiency. How the string efficiency of an insulator is improved by using different methods? **(10 Marks)**

b. A string of 4 insulators has a self capacitance equal to 10 times pin to earth capacitance. Find the voltage distribution across various units as a percentage of total voltage across the string. **(10 Marks)**

4 a. Explain capacitance grading of cables with appropriate derivation. **(10 Marks)**

b. A single core cable has a conductor diameter of 2.5 cm and a sheath of inside diameter 6 cm. Calculate the maximum stress. It is desired to reduce the maximum stress by using two intersheath. Determine maximum stress by using two intersheath. **(05 Marks)**

c. Write a note on testing of cables. **(05 Marks)**

PART – B

5 a. Show that the inductance of a double circuit 3 phase line can be calculated by method of GMD and GMR. Assume complete transposition. **(08 Marks)**

b. The 3 conductors of a 3 phase line are arranged at the corners of a triangle of size 2 m, 2.5 m, and 4.5 m. Calculate the inductance per km of the line when conductors are regularly transposed. The diameter of each conductor is 1.24 cm. **(07 Marks)**

c. Explain the terms self GMD and mutual GMD. **(05 Marks)**

6 a. Explain with reasons the presence of ground on the capacitance can be taken into account by the method of images. Hence find the earth effect on the capacitance of single phase line. **(10 Marks)**

b. Derive the expression for capacitance of a 3 phase line with unsymmetrical spacing. **(10 Marks)**

7 a. Two transmission line having generalized circuit constants A_1 B_1 C_1 D_1 and A_2 B_2 C_2 D_2 are connected in (i) series (ii) parallel. Develop expression for overall constants ABCD in terms of A_1 B_1 C_1 D_1 and A_2 B_2 C_2 D_2. **(10 Marks)**

b. Derive an expression for ABCD constants of a medium transmission line using nominal π-method. Show that $AD - BC = 1$. **(10 Marks)**

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

b. Compare radial and ring main distribution system. **(05 Marks)**

c. Explain how a 2-wire DC distribution with concentrated load fed at one end can be represented by a single line diagram. **(10 Marks)**

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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.

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10EE55

Ffith Semester B.E. Degree Examination, June/July 2018

Modern Control Theory

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Mention five advantages of modern control theory (MCT), over classical control theory. **(05 Marks)**

b. Consider a system given by $G(s) = \frac{s+3}{s^2+3s+2}$, obtain the state space representation in:

i) Controllable canonical form
ii) Observable canonical form **(05 Marks)**

c. Write the state variable formulation of the network shown in Fig.Q1(c), where all components are of unity magnitude.

Fig.Q1(c) **(10 Marks)**

2 a. Derive the transfer function from state model. **(05 Marks)**

b. Consider a system having state model $\dot{X} = AX + BU$ and $Y = CX + DU$ where $A = \begin{bmatrix} -2 & -3 \\ 4 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 3 \\ 5 \end{bmatrix}$, $C = [1 \quad 1]$, $D = [0]$, obtain its transfer function. **(05 Marks)**

c. Reduce the given state model into its canonical form by diagonalising matrix A. $\dot{X} = AX + BU$; $Y = CX + DU$ where $A = \begin{bmatrix} 0 & 1 & -1 \\ -6 & -11 & 6 \\ -6 & -11 & 5 \end{bmatrix}$, $B = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$, $C = [1 \quad 0 \quad 0]$, $D = [0]$. **(10 Marks)**

3 a. Diagonalize the matrix A where $A = \begin{bmatrix} 4 & 1 & -2 \\ 1 & 0 & 2 \\ 1 & -1 & 3 \end{bmatrix}$. **(06 Marks)**

b. For the transfer function T(S), obtain the state model in canonical form $T(S) = \frac{s(s+2)(s+3)}{(s+1)^2(s+4)}$ **(08 Marks)**

c. A system is described by the following differential equations. Represent the system in state space. $X^{(3)} + 3X^{(2)} + 4\dot{X} + 4X = U_1 + 3U_2 + 4U_3$ and the outputs are $Y_1 = 4\dot{X} + 3U_1$; $Y_2 = X^{(2)} + 4U_2 + U_3$. **(06 Marks)**

4 a. What is STM? State atleast five properties of STM. **(06 Marks)**

b. Find the STM of $A = \begin{bmatrix} 0 & 0 & -2 \\ 0 & 1 & 0 \\ 1 & 0 & 3 \end{bmatrix}$ by Caley Hamilton method. **(06 Marks)**

c. Given the state model of the system $\dot{X} = AX + BU$ and $Y = CX + DU$ where $A = \begin{bmatrix} 0 & 1 \\ -4 & -5 \end{bmatrix}$ $B = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$ $C = [1 \quad 0]$, $D = [0]$ with initial conditions $X(0) = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$. Determine:

i) The state transition matrix (STM).
ii) The state and output X(t) and Y(t) for a unit step input.
iii) Inverse state transition matrix. **(08 Marks)**

PART – B

5 a. Determine the controllability and observability of $\dot{X} = AX + BU$ and $Y = CX + DU$ where $A = \begin{bmatrix} -3 & 1 & 0 \\ 1 & -2 & 1 \\ 1 & 1 & 0 \end{bmatrix}$ $B = \begin{bmatrix} 0 \\ 2 \\ 2 \end{bmatrix}$ $C = [1 \quad 2 \quad -1]$, $D = [0]$ using (i) Kalman's test and (ii) Gilbert's test. **(10 Marks)**

b. For a homogeneous equation $\dot{X} = AX$ the following three different initial conditions are $\begin{bmatrix} e^{-t} \\ -e^{-t} \\ 2e^{-t} \end{bmatrix}$; $\begin{bmatrix} e^{-2t} \\ -2e^{-2t} \\ 0 \end{bmatrix}$; $\begin{bmatrix} -2e^{-3t} \\ -6e^{-3t} \\ 0 \end{bmatrix}$.

i) Identify the initial conditions ii) Find the system matrix A iii) Find STM. **(10 Marks)**

6 a. Consider a system defined by $\dot{X} = AX + BU$ where $A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -1 & -5 & -6 \end{bmatrix}$; $B = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$. It is desired to have closed loop poles at -1±j2 and -10. Determine the state feedback gain matrix K using (i) Direct substitution method and (ii) Ackerman's method. **(10 Marks)**

b. For a system defined by $\dot{X} = AX + BU$ and $Y = CX + DU$ where $A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{bmatrix}$; $B = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$; $C = [1 \quad 0 \quad 0]$. Determine the observer gain matrix by (i) Direct substitution method and (ii) Ackerman's method. **(10 Marks)**

7 a. Mention five properties of non linear systems and explain (i) dead zone (ii) backlash. **(10 Marks)**

b. Explain the concept of limit cycles used in non linear systems. **(10 Marks)**

8 a. Determine the stability of a nonlinear system governed by the equations $\dot{X}_1 = -X_1 + 2X_1^2X_2$, $\dot{X}_2 = -X_2$ using Lyapunov's method. **(08 Marks)**

b. Determine the stability of a system described by $A = \begin{bmatrix} -1 & 1 \\ -2 & -4 \end{bmatrix}$. **(08 Marks)**

c. Explain: i) Asymptotic stability, ii) Stability in the sense of Lyapunov. **(04 Marks)**

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10EE56

Fifth Semester B.E. Degree Examination, June/July 2018

Linear ICs and Applications

Time: 3 hrs. Max. Marks:100

Note: 1. *Answer any FIVE full questions, selecting at least TWO questions from each part.*
2. *Use of 741 data sheet is permitted.*
3. *Use standard resistor and capacitor chart is permitted.*

PART – A

1 a. Explain the operation of high input impedance capacitor coupled voltage follower. Develop the expression for input impedance Z_{in}. **(08 Marks)**

b. Discuss the need to set upper cut off frequency of an OPAMP. Show how upper cut off frequency can be set for an inverting amplifier. **(06 Marks)**

c. Design a capacitor coupled voltage follower using 741 OPAMP. The lower cut off frequency of circuit is to be 50 Hz. Take $R_L = 3.9\ K\Omega$. **(06 Marks)**

2 a. Discuss briefly phase-lag compensation for frequency compensation. **(08 Marks)**

b. Discuss the compensation for stray capacitance effect with necessary circuit. **(06 Marks)**

c. What are the precautions to be observed for OPAMP circuit stability? **(06 Marks)**

3 a. Mention advantage of precision rectifier over ordinary diode rectifier. Sketch circuit of precision full wave rectifier using half wave rectifier and summer. Explain the working of the circuit. **(08 Marks)**

b. Explain the operation of voltage follower peak detector with necessary circuit diagram. **(06 Marks)**

c. With a neat circuit explain operation of a 2-bit flash ADC. **(06 Marks)**

4 a. A capacitor coupled zero crossing detector is to handle 1 kHz square wave input with peak-to-peak amplitude of 6V. Design a suitable circuit using OPAMP 741 with ±12V supply. Also estimate minimum slew rate of circuit. **(08 Marks)**

b. Sketch the circuit of OPAMP astable multivibrator. Explain its operation with relevant waveforms. **(06 Marks)**

c. Discuss how trigger points can be adjusted to realize a different UTP and LTP for a inverting Schmitt trigger circuit. **(06 Marks)**

PART – B

5 a. Explain with necessary circuit operation of triangular/rectangular waveform generator. Draw waveforms at various output points. **(08 Marks)**

b. Explain with necessary circuit how diodes may be used for output amplitude stabilization with Wein bridge oscillator. **(06 Marks)**

c. Design phase shift oscillator to have a frequency of 3.5 kHz. Use OPAMP 741 with ±12V supply. **(06 Marks)**

6 a. Sketch circuit of a single stage band pass filter. Explain the lowpass and highpass operation of circuit. **(08 Marks)**

b. Design a 2nd order lowpass filter for a cutoff frequency of 2 kHz using OPAMP 741. **(06 Marks)**

c. Explain how band stop filter can be realized using lowpass filter, highpass filter and summer. **(06 Marks)**

7 a. Explain the theory of operation of switched capacitor filters. **(06 Marks)**

b. Explain with block diagram the operation of PLL. **(08 Marks)**

c. Draw circuit representation of LM380 power amplifier and discuss its features. **(06 Marks)**

8 a. Discuss about the various parameters used to measure regulator performance. **(06 Marks)**

b. Explain the operation of adjustable output regulator with necessary circuit. **(08 Marks)**

c. Sketch regulator using LM340IC voltage regulator. Briefly discuss LM340 and its performance. **(06 Marks)**

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