Code No.: **50208** | **MR15**

# MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)

(Affiliated to JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD)

Gundlapochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad

## II B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, DECEMBER -2018

Subject: **CONTROL SYSTEMS**

Branch: **EEE**

**Time: 3 hours** **Max. Marks: 60**

### PART – A

**Answer ALL questions of the following** **5x2Mark=10 Marks**

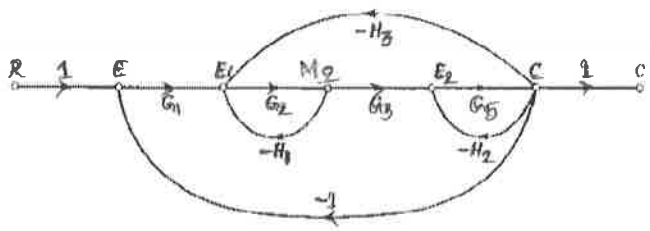
1. Explain about Mason's gain formula.
2. Define the transient response, and draw the time response of first order system with step input.
3. Define BIBO Stability. What is the necessary condition for stability?
4. What is phase and gain cross over frequency?
5. Draw the signal flow graph of the system described by the state model.

### PART-B

**Answer any FIVE Questions of the following** **5x 10 Marks= 50Marks**

1. a) Explain the components of feedback control system.

   b) Find the transfer function C/R of the following signal flow graph shown in Fig. using Mason's Gain formula.




2. Discuss basis for framing the rules of block diagram reduction techniques. What are the drawbacks of block diagram reduction techniques?
3. Define delay time ($t_d$), rise time ($t_r$), peak time ($t_p$), peak overshoot ($M_p$), settling time ($t_s$) and steady state error ($e_{ss}$)?
4. a) A Unity feedback system is characterized by an open loop transfer function $G(s) = K/S(S+10)$. Determine gain 'K' so that system will have a damping ratio of 0.5. For this value of 'K' determine settling time, peak overshoot and time to peak overshoot for a unit step input. Also obtain closed loop response in time domain.

   b) How steady state error of a control system is determined. How it can be determined.

5. The open loop transfer function of a unity feedback system is given by $G(s) = K(s+9)/s(s^2+4s+11)$ Sketch the root locus of the system.

6. a) Calculate the values of K and for the point in s-plane at which the root locus of

$$G(s)H(s)=\frac{K}{s(s+2)(s^2+2s+2)}$$ intersects the imaginary axis. **[6M]**

b) Summarize the effects of addition of open loop poles on a given system. **[4M]**

7. Draw the Bode plot for the system having G(s) =10 /s(1+0.01s)(1+0.1s) and obtain the gain and phase cross over frequencies.

8. a) Give transfer function for the state model of linear time invariant system given by

$$X(t) = AX(t) + BU(t) \ \& \ Y(t) = CX(t) + DU(t).$$

b) Write short notes on Controllability and observability.

Code No.: **50209**

**MR15 - 2015-16 Batch**

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## II B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, DECEMBER -2018

Subject: **Linear System Analysis**

Branch: **EEE**

**Time: 3 hours** **Max. Marks: 60**

### PART – A

**Answer ALL questions of the following** **5x2Mark=10 Marks**

1. Define discrete time signal?
2. How do you interpret the negative frequency in exponential Fourier spectra?
3. Find the Laplace transform of a function $f(t) = te^{-t}u(t-\tau)$.
4. What is the role of PSD?
5. State any two properties of Z-transform.

### PART-B

**Answer any FIVE Questions of the following** **5x 10 Marks= 50Marks**

1. Explain about the step signal and draw the waveforms represented by following step function.

   **(i)** $f_1(t) = 4U(T-1)$

   **(ii)** $f_2(t) = -4U(T-2)$

   **(iii)** $f(t) = f_1(t) + f_2(t)$

   **(iv)** $f(t) = f_1(t) - f_2(t)$

2. a) Define Impulse signal and write its properties

   b) Classify the Continuous Time Systems.

3. a) Obtain the Laplace transform of ramp signal

   b) Explain about the effect of symmetry in exponential Fourier series.

4. a) Find the Fourier transform of function F (t) =u (t+1)2u (t) +u (t-1)

   b) Obtain the fourier transform of $x(t) = te^{-at}\,U(t)$

5. a) In a series LC circuit, the supply voltage being $v(t)=Vm\ Cost$, find $i(t)$ with zero initial conditions.

   Assume L = 1H, C=1F.

   b) State and prove convolution theorem?

6. a) Find the laplace transform of $\sin\omega t$?

   b) Explain shifting theorem?

7. Find the autocorrelation, power spectral density and power of the following signal

   $x(t) = 5+4 \sin (10\pi t + 30^0)$ **10M**

8. a) Give the Properties of the ROC.

   b) Properties of region of convergence in Z – transform.

Code No.: **50206** | **MR15**

# MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)

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## II B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, DECEMBER -2018

Subject: **Power Generation & Distribution**

Branch: **EEE**

**Time: 3 hours** **Max. Marks: 60**

**PART – A**

**Answer ALL questions of the following** **5x2Mark=10 Marks**

1. What is the function of condenser?
2. Define the Distributor and Feeder.
3. Write limitations of indoor substation.
4. Where is the installing location of synchronous condenser in transmission line?
5. What is the Block rate tariff? Give an example.

**PART-B**

**Answer any FIVE Questions of the following** **5x 10 Marks= 50Marks**

1. a) Show the path of flue gases in Thermal Power Station, and write the advantages of it.
   b) What are the functions of moderator and control rods in a nuclear power plants?
2. a) Describe the merits and demerits of pulverized fuel firing boilers
   b) Differentiate between fission and fusion.
3. a) What are the Design features of Distribution Systems?
   b) Write short notes on plant use factor and demand factor.
4. A d.c two wire distributors are fed at $F_1$ and $F_2$ at 220V and 225V respectively. The total length of the distributor is 250m. The loads tapped off from fed end $F_1$ are

| Load in Ampere | 20 | 40 | 25 | 35 |
|---|---|---|---|---|
| Distance in meter | 50 | 75 | 100 | 200 |

   By consideration of Distributor Resistance 0.5Ω/meter (i.e., 0.5Ω per meter). Find the minimum load voltage point in the distributor.
5. a )What is a bus bar? Discuss about different schemes of bus bar arrangements.
   b) Draw a single line diagram of layout of an outdoor substation.
6. a) What is the difference between indoor and outdoor substations? What are the factors which are to be considered for a selection of a site of a substation.
   b) Explain the Double Buy Bar system in Air insulated sub-stations.
7. A synchronous motor improves the power factor a load of 200W from 0.8 lagging to 0.9 lagging. Simultaneously the motor carries a load of 80kW.find
   i) The leading kVAR supplied by the motor ii) kVA rating of the motor and
   iii) the power factor at which the motor operates
8. a) Write short notes on
   i) Two part tariff ii) Three part tariff
   iii) Briefly discuss for what type of consumers they are used
   b) Explain how a load duration curve is plotted. What is its use?

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## II B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, DECEMBER -2018

Subject: **DC MACHINES & TRANSFORMERS**

Branch: **EEE**

**Time: 3 hours** **Max. Marks: 60**

### PART – A

**Answer ALL questions of the following** **5x2Mark=10 Marks**

1. Express the energy stored in magnetic field in different forms.
2. What is the function of Commutator in D.C Generator?
3. If a DC Motor is connected across an a.c source, what will be the result? Why?
4. Draw the Phasor diagram of Transformer under no-Load condition?
5. What is the purpose of Scott connection?

### PART-B

**Answer any FIVE Questions of the following** **5x 10 Marks= 50Marks**

1. Two coupled coils have self and mutual inductances as expressed below:

   $L_{11}=1+\frac{1}{X}$ ; $L_{22}=0.5+\frac{1}{X}$ : $L_{12}=L_{21}=\frac{1}{X}$

   These coupled coils are valid over a certain range of linear displacement X, in cms. The first coil is excited by a constant current of 20A and the second one by constant current of 10A. Evaluate

   a) Mechanical work done if x changes from 0.5 to 1 cm.

   b) Energy supplied by the two electrical sources in (a) above.

2. a) Describe about energy in magnetic systems.

   b) Explain the theory of multiple excited system.

3. a) A 75 kW, 250 V compound dc generator has the following data $R_a=0.04\Omega$, $R_{se}=0.004\Omega$, $R_{sh}=100\Omega$, Brush drop is 2V. Compare the generator induced e.m.f when fully loaded i) Long shunt compound ii) Short shunt compound.

   b) Derive the E.M.F equation of DC Generator?

4. a) Explain open circuit characteristics of DC generator **[4]**

   b) A separately excited D.C. generator has armature circuit resistance of 0.1 ohm and the total brush drop is 2 v. when running at 1000 r.p.m, it delivers a current of 100A at 250 V to a load of constant resistance. If the generator speed drop to 700 r.p.m, with filed current unaltered, find the current delivered to load. **[6]**

5. a) What is the need of a starter in D.C motors?

   b) Derive the condition for the maximum efficiency of D.C Motors?

6. a) Explain how the efficiency of a dc machine is calculated from Swinburne's test.

   b) Explain how the direction of rotation of the motor is reversed

7. A 25 KVA, 2200/220V, 50 Hz, 1-Phase transformer has the following test data:

   OC Test: 220V, 12 A, 90W (LV side)

   SC Test: 60V, 7A, 300W (HV side)

   Calculate the parameters of equivalent of the transformer referred to LV side.

8. a) Explain about the saving of conductor material in an auto transformer

   b) State what are on-load and off-load tap-changing. How is on-load tap changing implemented? What are its applications?

Code No.: **50408** | **MR15**

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## II B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, DECEMBER -2018

Subject: **DIGITAL ELECTRONICS**

Branch: **EEE**

**Time: 3 hours** **Max. Marks: 60**

### PART – A

**Answer ALL questions of the following** **5x2Mark=10 Marks**

1. Convert the following number in decimal i) $(1011.11101)_2$ ii) $(FACE17)_{16}$.
2. Obtain the canonical sum of products of the function Y = AB + ACD
3. Write HDL code for Half Adder?
4. The $t_{pd}$ for each flip-flop is 50 ns. Determine the maximum operating frequency for MOD – 32 ripple counter.
5. What are the capabilities and limitations of finite state machines (FSM)

### PART-B

**Answer any FIVE Questions of the following** **5x 10 Marks= 50Marks**

1. a) Express the Decimal Digits 0 - 9 in BCD, 8-4-2-1 and Excess-3. [5]

   b) Convert the Hexadecimal number 1010 to Decimal and then to Binary. [5]

2. a) Perform the following additions in excess-3 code [5]

   i) 37+28 ii) 247.6+359.4

   b) What is a Gray code? And write the applications. [5]

3. a) Using K-map obtain the minimal SOP expression for the given switching function and implement it using basic logic gates.

   $f(a, b, c, d) = \sum m(0, 2, 8, 9) + d(3, 7, 10, 11, 14, 15)$ [5]

   b) Simplify the given expression using Quine - McCluskey method

   $f(w, x, y, z) = \sum m(1, 3, 5, 10, 11, 12, 13, 14, 15)$ [5]

4. a) Simplify the following Boolean function for minimal SOP form using K-map: [5]

   $f(W,X,Y,Z) = \sum m(0,1,2,3,4,6,8,9,10,11)$

   b) Simplify the following Boolean function using K-map: [5]

   f(A,B,C,D) = A'B'+AC'+B'C+A'BC'

5. a) Explain about Carry look-ahead adder in detail. [5]

   b) Design 4*16 decoder using 3*8 decoders with block diagram. [5]

6. a) Design BCD to gray code converter and realize logic gates. [5]

   b) Design 2*4 decoder using NAND gates. [5]

7. a) Write the Design steps of synchronous counters. [5]

   b) Write the applications of i) flip-flops ii) shift registers. [5]

8. Explain the procedure of state minimization using the merger graph and merger table. [10]

Code No.: 50410 MR15

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## II B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, DECEMBER -2018

Subject: **PULSE AND DIGITAL CIRCUITS**

Branch: **Common to EEE & ECE**

**Time: 3 hours** **Max. Marks: 60**

### PART – A

**Answer ALL questions of the following** **5x2Mark=10 Marks**

1. Explain the criteria for a good differentiating circuit?
2. Explain how a Schmitt trigger circuit acts as a comparator?
3. Draw the circuit diagram of a one shot multivibrator?
4. List the applications of sampling gates
5. What is practical clamping?

### PART-B

**Answer any FIVE Questions of the following** **5x 10 Marks= 50Marks**

1. a) Derive a condition for a perfect attenuation in Compensated attenuator.

   b) Define Rise time. Derive the relation between rise time and time constant.

2. Discuss the response of RC high-pass circuit to different types of input voltages along with input and output waveforms.
3. a) Explain the transfer characteristics of the emitter coupled clipper and derive the necessary equations.

   b) Explain the physical process involved in the transistor rise time and fall time.
4. a) Explain how transistor acts as switch.

   b)Write a short note on Piece-wise linear diode characteristics.
5. Explain the operation of MonostableMultivibrator with the asymmetrical triggering circuit with a neat sketch.
6. Design an Astable multi-vibrator to produce an un-symmetrical wave $T_1$=0.5ms and $T_2$=0.4ms. The amplitude of square wave is 15V. Assume $h_{fe(min)} = 20$, $I_{c(sat)} = 5mA$ and $V_{CE(sat)} = 0V$.
7. a) Write a short note on TTL gate.

   b) Compare the performances of various logic families
8. a) Explain the working of a simple transistor sweep circuit with necessary circuit diagram and different wave forms?

   b) Draw the circuit to generate a linear sweep what is the necessity of generating a trapezoidal wave?

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## II B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, DECEMBER -2018

Subject: **SPECIAL FUNCTIONS AND COMPLEX ANALYSIS**

Branch: **Common to EEE & ECE**

**Time: 3 hours** **Max. Marks: 60**

### PART – A

**Answer ALL questions of the following** **5x2Mark=10 Marks**

1. Evaluate $\int_0^1 x^3 \sqrt{1-x}\ dx$ using $\beta - \Gamma$ functions.
2. Show that $J_{\frac{3}{2}}(x) = \sqrt{\frac{2}{\pi x}}\left(\frac{1}{x}\sin x - \cos x\right)$
3. Evaluate $\int_C \frac{\sin 3z}{z+\frac{\pi}{2}}\, dz$ where C is the circle $|z| = 5$.
4. Expand the function $\frac{\sin z}{z-\pi}$ about $z = \pi$
5. Find the invariant points of the transformation $\omega = \frac{1+z}{1-z}$.

### PART-B

**Answer any FIVE Questions of the following** **5x 10 Marks= 50Marks**

1. a)Prove that $\Gamma(\frac{1}{2}) = \sqrt{\pi}$

   b)Prove that $\int_0^{\frac{\pi}{2}} Sin^2(\theta) Cos^4(\theta) d\theta = \frac{\pi}{32}$
2. Solve in series the equation $\frac{d^2y}{dx^2} + xy = 0$
3. State and prove the generating function for $P_n(x)$.
4. a) Prove that $\frac{n}{x} J_n(x) + J^1_n(x) = J_{n-1}(x)$

   b) Prove that $(2n+1)P_n(x) = P^1_{n+1}(x) - P^1_{n-1}(x)$
5. Evaluate $\int_C \frac{e^z}{(z^2+\pi^2)^2}$ where C is (i) $|z|=2$. (ii) $|z|=4$.
6. a) Prove that the function $f(x) = \begin{cases} \frac{x^3(1+i)-y^3(1-i)}{x^2+y^2}, & (z \neq 0) \\ 0, & (z = 0) \end{cases}$ is continuous and the Cauchy-Riemann equations are satisfied at the origin, yet $f^1(0)$does not exit.

   b) Evaluate $\int_C \frac{dz}{z \sin z}$ :C is the unit circle about origin
7. a) Evaluate $\int_C \frac{e^{-z}}{z^2} dz$, C: $|z| = 1$.

   b) State and prove Cauchy-Residue theorem.
8. Show that the transformation $\omega = \frac{2z+3}{z-4}$ changes the circle $x^2 + y^2 - 4x = 0$ into the straight line $4u + 3 = 0$.