**Duration – 3 Hours**                                                                 **Total Marks - 80**
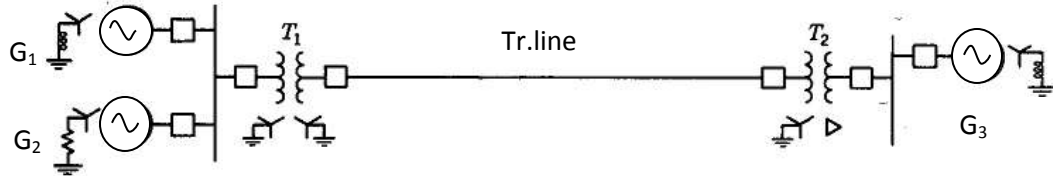
**N.B.: -** (1) Question No.**1** is compulsory.
   (2) **Attempt** any **Three**questions out of remaining **five** questions.
   (3) Assume suitable data if necessary and justify the same.

Q 1.     Answer **all questions**.

A)   Draw the positive, negative and zero sequence diagram for the power       **05**
     system given below.



B)   Discuss the importance of short circuit MVA for fault analysis in power     **05**
     system
C)   Illustrate the significance of surge impedance loading in transmission line.  **05**
D)   Explain the significance of volt time curve in fault analysis.                **05**

Q 2 a)   Derive the necessary equation to determine the fault current for an L-G fault in   **10**
         power system and draw the interconnection of sequence networks for the
         same.

Q 2 b)   Determine disruptive critical voltage, visual critical voltage, coronal loss in fair   **10**
         and bad weather conditions for a 3 phase line 200km long conductor diameter
         1 cm, 2.5 m delta spacing, air temperature 27°C, corresponding to an
         approximate barometric pressure of 73.15 cm operating voltage 110 kV,50Hz.

Q 3 a)   Explain the short circuit on synchronous alternator under no load with respect   **10**
         to sub transient, transient and steady state condition.

Q 3 b)   A 3Φ transmission line operating at 115kV and having resistance and   **10**
         reactance of 3.72Ω and 12.78Ω respectively, is connected to the generating
         station bus bars through a 25MVA, 12.8/115 kV step up transformer which has
         a reactance of 0.56p.u.There are two alternators connected to the bus bar of
         15MVA, 12.8kV having 0.96p.u reactance and another with 20MVA, 124.8kV
         having 0.82p.u reactance. Calculate the short circuit MVA and fault current
         between the phases occurring at the high voltage terminals of a transformer
         and at the load end of the transmission line

Q 4 a)   Explain the variation of current and voltage on an overhead transmission line   **10**
         when one end of the line is short circuited and derive the transmitted and
         reflected voltages and current.

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Q 4 b)   Discuss the factors effecting Corona.                                                    **10**

Q 5 a)   What is the effect of line length, load power and power factor on the voltage    **10**
         and power flow in transmission line.

Q 5 b)   Illustrate the working principle of lightning arrestor and explain the operation of   **10**
         any type of arrester in detail.

Q 6 a)   Describe the algorithm for the formulation of bus impedance matrix.          **10**

Q 6 b)   Explain the concept of Fortescue theorem for asymmetrical fault analysis     **10**

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Time: 3 Hours                                                                            Marks: 80

Q.1 is compulsory.

Solve ANY THREE questions out of remaining.

ASSUME SUITABLE DATA wherever necessary.

Q.1 Answer (**ANY FOUR**).                                                                  (20 Marks)

*a)* Derive condition for maximum input power for synchronous motor.

*b)* Derive the EMF equation for an alternator. State the assumptions made.

*c)* Write a short note on 'V curves'of a synchronous motor.

*d)* Explain power angle characteristics for non-cylindrical rotor synchronous machine.

*e)* List down advantages of modeling of electrical machines.

Q.2                                                                                        (20 Marks)

*a)* For a three phase winding with 3 slots per pole per phase and coil span of 8 slots calculate coil span factor and distribution factor. The flux density in the machine air-gap is observed to contain 20% third harmonic component. Calculate the percentage increase in per phase e.m.f. due to this harmonic. The fundamental flux is of 1 Wb distributed sinusoidally.

*b)* Explain armature reaction for lagging and leading power factor load.

Q.3                                                                                        (20 Marks)

*a)* Define 'regulation'and hence explain 'Magneto-motive Force method'used to calculate regulation.

*b)* Draw neat labeled phasor diagrams for salient pole synchronous motor for lagging, leading and unity power factor.

Q.4                                                                                        (20 Marks)

*a)* Explain use of synchronous motor as 'synchronous condenser'.

*b)* A 6600  kV; star connected three phase synchronous motor runs with constant excitation and voltage. The synchronous impedance is $(1.5 + j12)\ \Omega$ per phase. For an input power of 1000 kW the power factor is 0.8  leading.  Calculate new power factor for an input power of 1500 kW.

Q.5                                                                                        (20 Marks)

*a)* Explain Blondel's Two Reaction theory.

*b)* Two three phase alternators running in parallel and supplying a load impedance of $(4 + j2)\Omega$ have their per phase synchronous impedances as $(0.2 + j3.2)\Omega$ and $(0.25 + j4.5)\Omega$ respectively. Their per phase excitation e.m.f.s are 230 volts with e.m.f of alternator 1 leading e.m.f.  of alternator 2 by $10^0$. Compute their terminal voltage; load currents and power factors.

Q.6 Write short notes on (**ANY TWO**).                                                     (20 Marks)

*a)* Hunting.

*b)* Power Circle and Excitation Circle.

*c)* Basic machine relation in 'd-q'variables for an induction machine.

**66118**

**(3 Hours)** **[Total Marks: 80]**

N.B.:-
    1. Question No. 1 is compulsory
    2. Attempt any three questions out of remaining five questions.
    3. Figures on right hand indicate full marks
    4. Assume suitable data if necessary and justify the same.

**Q 1. Answer the following questions.** (5 marks each)      **20**

**a.** Draw a typical speed time curve and show there:
1.Notching up Period    2.Acceleration    3. Free-running period      4. Coasting & Braking

**b.** The distance between the lamps from the photometer heads are as follows for equal illumination on both sides of photometer screen.
(i) for standard lamp $l_1 = 0.8$ m.      (ii) for lamp under test $l_2 = 1.5$ m. The standard lamp is of 100 candle power. Find the candle power of lamp under test.

**c.** What is pinching effect? What is dependent on?
**d.** What are advantages of closed loop system over open loop system?

**Q 2** a. Compare the features of different type of traction systems      **10**
    **b.** What are different methods of approximation of speed time curves? Derive an expression for distance travelled using quadrilateral approximation method of V(t) curves.      **10**

**Q 3** a. Explain the construction and working of fluorescent tube and compare it with tungsten filament lamp?      **10**
    **b.** Explain briefly various types of lighting systems      **10**

**Q 4 a.** Draw and explain functional block diagrams of series, parallel and series-parallel HEV configurations.      **10**
    **b.** Compare all types of motors required in EV/HEV.      **10**

**Q 5 a** Compare Vapour Compression and Vapour Absorption Type System.      **10**
    **b.** Explain with neat diagram Electric Circuit of Refrigerator.      **10**

**Q 6. a.** Classify and Explain different types of Electric Welding.      **10**
    **b.** Classify and Explain different types of Induction Furnaces.      **10**

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**Time: 3 Hours**                                                                 **Marks: 80**

**Note:**

1) Question No. **1** is **compulsory**.

2) Attempt any **three** questions from remaining **five** questions.

3) Make suitable **assumption** wherever **necessary** and mention the same.

4) Use graph paper and semilog paper wherever necessary.

5) **Figures** to the **right** indicate **full** marks.

Q.1)   Attempt **any four**:

A) Explain the difference between open loop and closed loop system.          **05 Marks**

B) State an advantages of using state space analysis over classical control approaches.    **05 Marks**

C) Write a short note on transient response specifications.                  **05 Marks**

D) Explain the effect of addition of open loop poles and zeros on root locus.   **05 Marks**

E) Explain stability in polar plot.                                          **05 Marks**

Q.2)   A) Find overall transfer function C(s)/R(s) of the given system using block diagram    **10 Marks**
         reduction method.
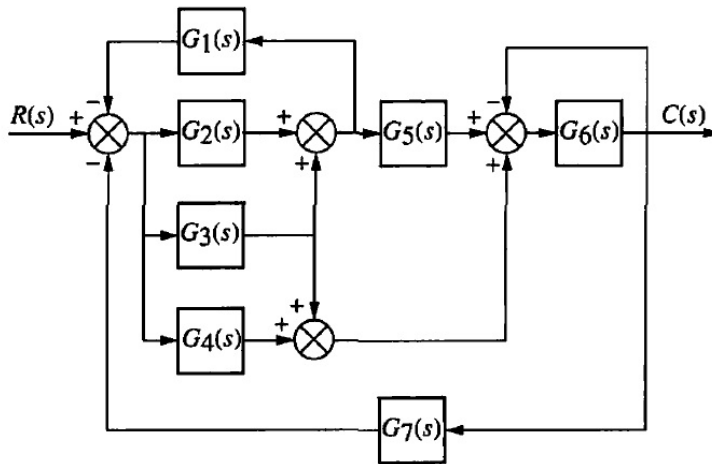


B) Find overall transfer function C(s)/R(s) for the given signal-flow graph using mason's   **10 Marks**
   gain formula.
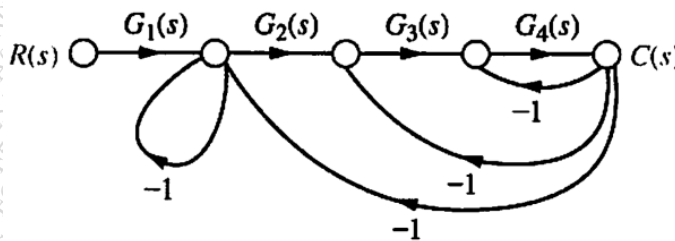
Q.3) A) For a unity negative feedback system having $G(s) = 225 / (s*(s+12))$ determine all-time **10 Marks** domain specifications for unit step input.

B) Sketch the complete root locus for the system given below. Also find the range of gain **10 Marks** K within which the system is stable. $G(s)H(s) = K / (s*(s+2)*(s+4)*(s+8))$.

Q.4) A) For the system having $C(s)/R(s) = (s+5) / (s^3+9*s^2+24*s+26)$. Obtain the phase **10 Marks** variable form of state space model. Also draw the state model.

B) Find the stable operating range of gain and the value of $K_{marg}$ by using Routh – **10 Marks** Hurwitz criterion for the unity negative feedback system having $G(s) = K / (s*(s+9)*(s+15))$.

Q.5) A) Draw the bode plot and determine gain margin and phase margin for the system **10 Marks** having $G(s)H(s) = 10000 / ((s+5)*(s+20)*(s+50))$

B) Draw the nyquist plot and comment on stability for the system having **10 Marks** $G(s)H(s) = 20 / (s*(s+4)*(s-2))$

Q.6) A) Determine the steady state error for system given below, where R(s) is the ramp **07 Marks** input of magnitude 2. If it is desired to reduce existing error by 5% find new value of gain of the system.
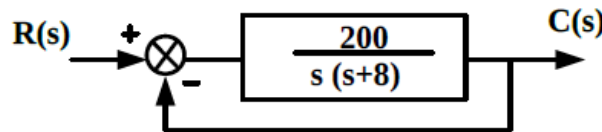


B) Explain how to calculate static error constants from Bode magnitude plot. **07 Marks**

C) Write a short note on AC servomotor. **06 Marks**

**\*\*\*\*\*\*\*\*\***

**(3 Hours)**          **[Total Marks:80]**

**N.B.**   **(1)**   Question no.1 is compulsory.

       **(2)**   Attempt any three from the rest.

       **(3)**   Make any suitable assumption wherever required.

**Q.1**        Answer any four.

    **(a)**   What do you mean by prescaling of PIC 18 timers?     5M

    **(b)**   Explain the internal bus structure of PIC18 microcontroller.     5M

    **(c)**   Explain the pipelining concept in PIC 18 Microcontroller.     5M

    **(d)**   Explain status register and BSR register of PIC18.     5M

    **(e)**   What are the different data transfer schemes?     5M

**Q.2**   **(a)**   Explain the memory organization (Program and Data Memory) of PIC18 Microcontroller.     10M

    **(b)**   Write a program in assembly language to multiply and divide two 8 bit numbers using PIC18 Microcontroller.     10M

**Q.3**   **(a)**   Explain all the instructions related to stack and subroutine with example.     10M

    **(b)**   Write a C18 program to send the message "University of Mumbai" to the serial port continuously. Assume a SW is connected to pin RB2. Monitor its status and set the baud rate as follows:     10M

        SW=0, Baud rate=9600

        SW=1, Baud rate=38400

        Assume crystal frequency=10MHz

**Q.4**   **(a)**   Explain the SPBRG, TXSTA and RCSTA registers used in serial communication.     10M

    **(b)**   Write a C18 program using Timer 0 to generate a square wave of 100Hz frequency on Port B pin RB0. Use 16 bit programming technique with 128 prescaler. The internal frequency is 10 MHz.     10M

**Q.5**   **(a)**   Draw and explain LCD interfacing with PIC 18 Microcontroller.     10M

    **(b)**   Draw the interfacing diagram and write C18 program to interface Dc Motor to monitor the status of switch connected to pin RC2 and do the following     10M

        (1) If switch = 0, the Dc Motor moves with 50% of duty cycle.

        (2) If switch =1, the Dc Motor moves with 25% of duty cycle.

**Q.6**        Write a short note on any two

    **(a)**   ADC interfacing with PIC 18 Microcontroller.     10M

    **(b)**   CCP modules of PIC 18 Microcontroller.     10M

    **(c)**   Stepper Motor interfacing with PIC 18 Microcontroller.     10M

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**[Time: Three Hours]**                                              **[Marks:80]**

Please check whether you have got the right question paper.

N.B:    1.  Question No.1 is compulsory.

2.  Answer any three from the remaining five questions.

3.  Figure to right indicate full marks.


Q.1 Attempt **any four:-**                                                                    **(20)**

a)  Explain the role of a good Project Manager.

b)  Give significance of PM software.

c)  Explain sensitivity analysis in projects.

d)  What is business plan outline?

e)  How budgets are framed in project.


Q.2    a)  Describe the activity "Resource Allocation and Resource Leveling".    **(10)**

b)  Write a note on project proposal. Give one example                            **(10)**


Q.3    a)  List different types of contracts. Explain briefly                              **(10)**

b)  Explain briefly the different methods of profitability projection              **(10)**


Q.4    a)  Explain the concept of Work Break down structure in project planning    **(10)**

b)  Explain the types of organization structure in project management in detail    **(10)**


Q.5    a)  How risk can be avoided in the projects. Explain the steps to be undertaken.    **(10)**

b)  Explain market-demand analysis in detail with one example.                    **(10)**


Q.6    a)  What do you mean by crashing process? Explain with example.            **(10)**

b)  Explain why material planning is important in project management.          **(10)**


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