[Total No. of Pages : 7 Roll No_____

1(CCM-M)4

ELECTRICAL ENGINEERING -II

[09]

Time : 3 Hours **Maximum Marks : 300**

INSTRUCTIONS

i) *Answer must be written in English.*

ii) *The number of marks carried by each question is indicated at the end of the question.*

iii) *The answer to each question or part there of should begin on a fresh page.*

iv) *Your answer should be precise and coherent.*

v) *The part/parts of the same question must be answered together and should not be interposed between answers to other questions.*

vi) ***Candidates should attempt section A and B or A and C. Question No: 1 is compulsory candidates are required to attempt one more question from section A and any three more questions from section -B or C.***

vii) *If you encounter any typographical error, please read it as it appears in the text book.*

viii) *Candidates are in their own interest advised to go through the General Instructions on the back side of the title page of the Answer Script for strict adherence.*

ix) *No continuation sheets shall be provided to any candidate under any circumstances.*

x) *Candidates shall put a cross (X) on blank pages of answer script.*

xi) *No blank page be left in between answer to various questions.*

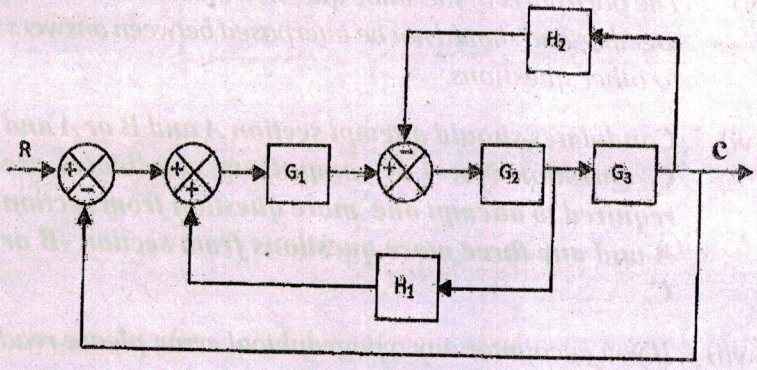
xii) *No programmable calculator is allowed.*

xiii) *No stencil (with different markings) is allowed.*

Section - A

1. Answer any **three**

a) Consider the system shown in figure. Find out the transfer function of the system.

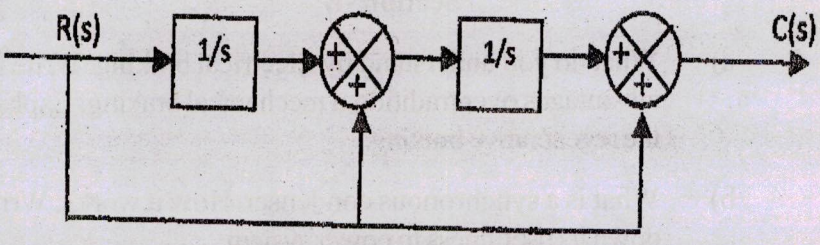


b) Draw the circuit diagram of a fully controlled single phase bridge type rectifier circuit. Draw the various wave shapes for RL type of load connected across it.

c) Routh Herwitz criterion is used for what purpose in control system. Explain its working.

d) What is a chopper circuit. For what purpose it is being used. Draw a suitable chopper circuit diagram and explain its working. **(80)**

2. a) For the block diagram shown in figure, find the transfer function C(s)/R(s) of the system.



b) Plot the root loci for the closed- loop control system with

$$G(s) = \frac{K}{s(s+1)(s^2+4s+5)}, \text{ and } H(s) = 1$$

c) Draw a Bode diagram of the following non - minimum - phase system: $\frac{C(s)}{R(s)} = 1 - Ts$

Obtain the unit - ramp response of the system and plot c(t) versus t. **(55)**

3. a) Discuss the effect of switching frequency of the chopper on the ripple content of the load current.

b) A two pulse mid point converter feeds a purely resistive load. Determine the expressions for average value of dc voltage, displacement factor, distortion factor and power factor.

c) A single phase ac voltage controller comprising a thyristor and diode supplies a purely resistive load of 2 ohms. The supply voltage of the controller is 220 V at 50 Hz. Determine the average and rms values of the thyristor and diode currents. A= 60^0, 120^0. (55)

Section -B

4. a) What do you understand by Electrical braking. Write its advantages over traditional mechanical braking. Explain the regenerative braking.

b) What is a synchronous condenser. How it works. Write down its usefulness in power system.

c) Why Induction motor draws more starting current as compared with its full load rated current? How this current could be limited. Explain one method to limit this current. (55)

5. a) The impedances at standstill of the inner and outer cages of a double -cage rotor are $(0.01+j\,0.5)\,\Omega$ and $(0.05+j\,0.1)\,\Omega$ respectively. The stator impedance may be assumed to be negligible. Calculate the ratio of the torques due to the two cages when running with a slip of 5%?

b) Show that the maximum torque in an induction motor does not depends upon the value of rotor resistance whereas slip at which it occurs depends upon the value of rotor resistance.

c) Explain the working of a single phase induction motor. Draw its equivalent circuit also. **(55)**

6. a) Explain the V curves of a 3phase synchronous motor. Point out the usefulness of the V curves. An overexcited synchronous motor will work on leading or lagging power factor?

b) A 3300 V, star connected synchronous motor is operating at constant terminal voltage and constant excitation. Its synchronous impedance is $0.8 + j5\ \Omega$ .It operates at a power factor of 0.8 leading when drawing 800 kW from the mains. Find its power factor when the input is increased to 1200kW, excitation remaining constant.

c) What do you mean by hunting in the alternators. How hunting could be reduced **(55)**

7. a) A 3 - phase, 50 Hz, 150 km long transmission line has a series impedance of 15+j 75 ohms per phase and shunt admittance of 4.5×10^{-4} mho per phase. The load is 50 MW at 110 kv with 0.8 lagging pf. Using nominal π method, calculate the following:

i) Sending end voltage

ii) Sending end current

iii) Sending end power factor

iv) Percentage regulation

b) What are the merits and demerits of static relays over electromagnetic relays?

c) Distinguish between a feeder, a distributer and service mains. **(55)**

Section -C

8. a) List the basic functions of a radio transmitter and the corresponding functions of the receiver.

b) From the expression for the instantaneous voltage of an AM wave, derive a formula for the rms value of this wave.

c) With the block diagram of a simple receiver, explain the basic superheterodyne principle. **(55)**

9. a) An elementary doublet is 10 cm long. If the 10 MHz current flowing through it is 2 A, what is the field strength 20 km away from the doublet, in a direction of maximum radiation?

b) What are waveguides? What is the fundamental difference between propagation in waveguides and propagation in transmission lines or free space?

c) Explain the operation of the reflex klystron oscillator. Why is the transit time so important in this device? **(55)**

10. a) What are the advantages and disadvantages of stipline and microstrip with respect to waveguides and coaxial

transmission lines? What are the conditions under which waveguides and coax would be preferred?

b) With the aid of the Shannon - Hartley theorem, explain why doubling the bandwidth of a channel, while keeping a constant transmitting power, will not automatically double the channel capacity.

c) What is multiplexing? Why it is needed? What are its two basic forms? **(55)**