Reg. No. : | | | | | | | | | | | | |

Question Paper Code: 1063049

B.E. / B.Tech. DEGREE EXAMINATIONS, NOV/ DEC 2024
Third Semester
Electronics and Communication Engineering
U20EC304 – ELECTRICAL ENGINEERING AND CONTROL SYSTEMS
(Regulation 2020)
(Semilog Graph sheet required & Polar Graph sheet required)

Time: Three Hours | Maximum: 100 Marks

Answer ALL questions

PART – A (10 x 2 = 20 Marks)

1. What is meant by statically induced EMF?
2. List the various methods of speed control in D.C shunt motor.
3. Define all day efficiency of a transformer.
4. Why transformer rating is expressed in KVA?
5. Compare open loop and closed loop system.
6. Recall the analogous electrical elements in force current analogy for the elements of mechanical translational system.
7. Define damping ratio.
8. Summarize the drawbacks of static coefficients.
9. Define gain cross over frequency.
10. What is meant by Nyquist stability criterion?

PART – B (5 x 16 = 80 Marks)

11.(a) i) Derive the expression for EMF equation of a DC generator. (6)
ii) Demonstrate three point starter to start the DC Shunt Motor. Also write its advantages and disadvantages. (10)

(OR)

(b) Explain Swinburne's test with the help of neat circuit diagram and derive the relations for efficiency (both for generator and motor).Also state the merits and demerits of this method. (16)

12.(a) Explain the construction and working principle of a transformer. (16)

16

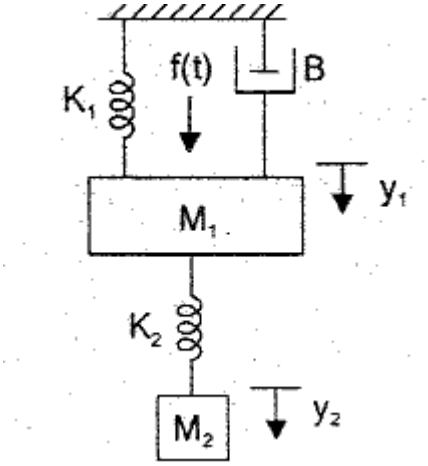
(OR)

(b) i)Outline the equivalent circuit of a single phase transformer Referred to primary. (8)

ii)A 400 kVA transformer has a primary winding resistance of 0.5Ω and a secondary winding resistance of 0.001Ω.The iron loss is 2.5 kW and the primary and secondary voltages are 5 kV and 320V respectively. If the power factor of the load is 0.85, Illustrate the efficiency of the transformer. (8)

(a) On full load, and (b) On half load.

13.(a) Build the transfer function Y2(S)/F(S) of the mechanical system shown in fig. (16)



(OR)

(b) Develop the overall gain of the system whose signal flow graph is shown in fig 1. (16)

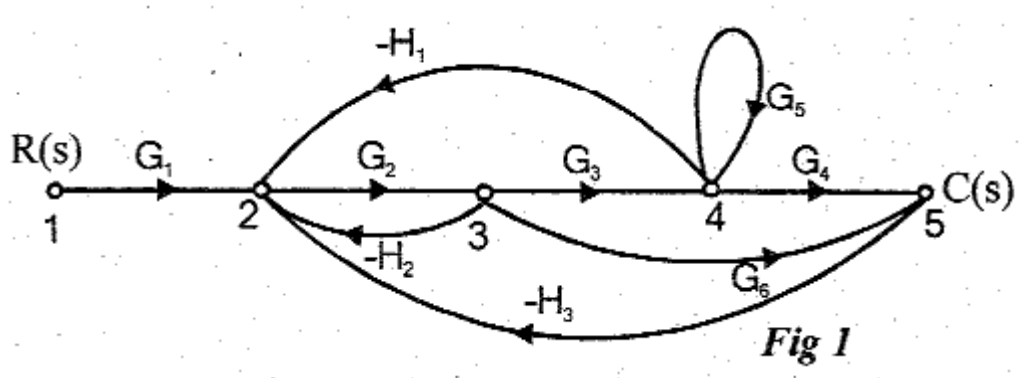


Fig 1

14.(a) The open loop transfer function of a unity feedback system is given by G(s) = K/s (sT+1), where K and T are positive constant. Identify what factor should the amplifier gain K be reduced, so that the peak overshoot of unit step response of the system is reduced from 75% to 25%. (16)

(OR)

(b) Construct Routh array and determine the stability of the system represented by the characteristics equation $S^5+S^4+2S^3+2S^2+3S+5=0$.Comment on the location of the roots of characteristic equation. (16)

15.(a) Build the Bode diagram for the following transfer function and obtain the gain k for gain cross over frequency to be 5 rad /sec G(S) = KS^2 / 1+0.2S) (1+0.02S). (16)

(OR)

(b) The open loop transfer function of a unity feedback system G(S) = 1/S(1+S)(1+2S). Model the Polar plot and determine the Gain margin and Phase margin. (16)

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