Time: 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 wherever necessary.

4)   Use of Graph paper is allowed.

5)   Figures to the right indicate full marks

1.   **Answer the following questions**.   **20**

i)   Distinguish between Line, End and Wavelength Standard.

ii)   Distinguish between open loop and closed loop control system with suitable examples.

iii)   Explain working LVDT with neat sketch.

iv)   While measuring the speed of steam turbine with stroboscope, stationary image was observed for three consecutive stroboscope settings of 3000, 4000 and 5250 flashes per minute. Calculate the rotational speed of turbine.

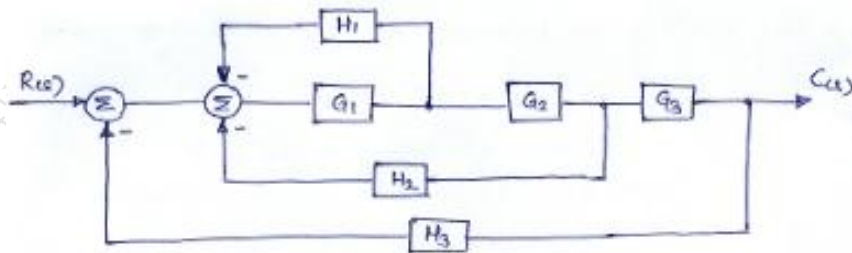2.   **(A)**   Reduce the following block diagram and find the transfer function.   **10**

Fig.1

(B)   What is Taylors principle, explains in detail? Write note on Hole Basis System and Shaft Basis System.   **10**

3.   **(A)**   For a particular unity feedback system   **10**

$$G(s) = \frac{10}{S(S+1)(S+5))}$$

Sketch the Bode Plot, Find ω_{gc}, ω_{pc}, GM and PM. Comment on stability.

(B)   b)   A unity feedback system characterized by an open loop transfer function   **10**

$$G(s) = \frac{K}{S(S+2)(S^2+4S+5))}$$

Determine the gain K. so that the system will be stable.

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4. **(A)** Explain principle of interference. How flatness can be checked with help of optical interferometer. **10**

   (B) What are desired, Modifying, Interfering input? Explain with example of each. Also suggest method to minimize the effect of Modifying & Interfering inputs. **10**

5. **(A)** Draw the Root-Locus of the system having **10**

$$G(s)H(s) = \frac{K}{S(S+5)(S+10)}$$

   (B) Draw neat labelled diagram of Taylor Hobson Talysurf and briefly explain working principle. State one major advantage and disadvantage of this instrument over Tomlinson surface meter . **10**

6. **(A)** What are the different elastic transducers used for pressure measurement? Illustrate working principle of any one transducer in detail. **10**

   (B) Write short note on **(any Two)** **10**

      i)   Parkinson's gear tester

      ii)   Two wire method

      iii)   Optical encoder