MECHANICAL ENGINEERING

1. Write critical notes on any of *Four* of the following: (4x7.5=30)

   (a) Linear vibration analysis of mechanical systems
   (b) Use of powder metallurgy
   (c) Application of Enterprise resource planning (ERP) in manufacturing.
   (d) Clapeyron Equation and its application in mechanical engineering
   (e) Discuss the advantages and disadvantages of using LPG in S.I. engines
   (f) Preventive maintenance in power plant

PART – I

2.(a) Mention three possible causes of trouble in case of a centrifugal pump if   (15)

   (i)No water is delivered, and
   (ii) Pump absorbs higher power

(b) List the various refrigeration and air-conditioning controls and their functions.   (15)

3.(a) Define and state their application in mechanical engineering: (15)

   (i)Kinematic chain
   (ii) Mechanism

(b) Distinguish between the functions of flywheel and Governor   (15)

4.(a) Classify various advantages of powered metallurgy process in terms of Economic and capability of the process and properties of the parts made.   (15)

(b) With the help of quantity cost curve, write the significance of Economic Order Quantity (EOQ)? What are the limitations of using basic EOQ model?   (15)

PART - II

5.(a) A mild steel shaft of 60 mm diameter is subjected to a bending moment of 1.5 kN-m and torque T. If the yield point of steel in tension is 210 MPa, find the maximum value of the torque without causing yielding of the shaft material according to: (15)

   (i)Maximum shear stress theory
   (ii) Maximum principal stress theory

(b) What is critical path? Why it is of high importance in large project scheduling and control? Due you see any project situation in which critical path can be changed?   (15)

6.(a) A high speed steel (HSS) tool is used for turning operation. The tool life is 1 hr. when turning is carried at 30 m/min. The tool life will be reduced to 2.0 min if the cutting speed is doubled. Find the suitable speed in RPM for turning 300 mm diameter so that tool life is 30 minute. (15)

(b) Explain the mechanism of formation of NOx in an SI engine. Discuss the effect of
(i) Compression ratio
(ii) Air-fuel-ratio (15)

7.(a) Discuss the need of governing of steam turbine. With the help of a sketch, discuss the working principal of hydro-mechanical speed governing loop. (15)

(b) Discuss factors affecting stage pressure ratio in an axial flow compressor. Draw the velocity distribution through a blade passage. (15)