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**INSTITUTE OF AERONAUTICAL ENGINEERING**

(Autonomous)

M.Tech II Semester End Examinations (Regular / Supplementary) - July, 2018

Regulation: IARE-R16

**Design of Hydraulic and pneumatic systems  
(CAD/CAM)**

Time: 3 Hours

Max Marks: 70

**Answer ONE Question from each Unit****All Questions Carry Equal Marks****All parts of the question must be answered in one place only****UNIT – I**

- (a) Explain the physical properties of fluids. List out the merits, demerits and applications. [7M]  
(b) Differentiate hydraulic and pneumatic systems and applications. [7M]
- (a) Describe the components of hydraulic systems and discuss briefly. [7M]  
(b) An oil having a density of  $0.89 \text{ g/cm}^3$  is tested using a capillary tube viscometer. The given amount of oil flowed through the capillary tube in 250 s. The calibration constant is 0.1. Find the kinematic and absolute viscosities in units of centiStokes (cS) and centiPoise (cP), respectively. [7M]

**UNIT – II**

- (a) Explain the construction and working of vane pump with a neat sketch. [7M]  
(b) A pump has displacement volume of  $100 \text{ cm}^3$ . It delivers  $0.0015 \text{ m}^3/\text{sec}$  at 1000 rpm and 70 bars. If the prime mover input torque is 120 N-m,
  - What is the overall efficiency of the pump? [7M]
  - What is the theoretical torque required to operate the pump?
- (a) Explain the construction and working of piston pump. [7M]  
(b) Describe the various mountings of hydraulic cylinder and discuss briefly. [7M]

**UNIT – III**

- (a) Design a hydraulic power pack of 25 liter capacity with a gear pump and induction motor and other required elements. [7M]  
(b) Describe the cooling system used for hydraulic power pack. [7M]
- (a) Write the design procedure for design of pressure relief valve. Explain the importance of pressure relief valve. [7M]  
(b) Explain the criteria for selection of power pack for a particular application. What the factors are taken into consideration while selecting power pack. [7M]

#### UNIT – IV

7. (a) Design a sequencing circuit used for hydraulic system used for industrial applications. [7M]  
(b) Explain the construction and working of pressure relief valve with neat sketch. [7M]
8. (a) Design a hydraulic circuit for varying speed of hydraulic cylinder. [7M]  
(b) Explain the construction and working of any one type of gas accumulator with neat sketch. [7M]

#### UNIT – V

9. (a) Explain the functions of PLC with block diagram. Write the various applications of PLC. [7M]  
(b) Describe the various recommendations for maintaining of hydraulic circuits. [7M]
10. (a) Explain PLC control of hydraulic cylinder above and describe the maintainince and trouble shooting. [7M]  
(b) Explain how micro controllers are used for automation with a circuit diagram. [7M]

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