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Question Paper Code : 50852

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017
Seventh Semester
Mechanical Engineering
ME 6021 – HYDRAULICS AND PNEUMATICS
(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

State Clearly any assumption made with justification.
Answer ALL questions.

PART – A **(10×2=20 Marks)**

1. What are the basic components required for a hydraulic system ?

2. Why hydraulic fluid should have high bulk modulus and high viscosity index ?

3. State the reason why positive displacement pumps found suitable for fluid power application.

4. How DCV ports are labelled ?

5. What is hydrostatic transmission system ?

6. Draw a graphic symbol of 'Flow divider' and highlight its use in fluid power industry.

7. What is the role of 'Chiller air dryer' in pneumatic system ?

8. What is pneumatic logic of 'NOT' circuit ?

9. What do you mean by 'scan time' in PLC ?

10. What is the use of 'relay coil' in electro-pneumatic circuits ?

PART – B (5×16=80 Marks)

11. a) i) Classify the hydraulic fluids and explain in detail the various properties required for them. (10)

ii) How the capacity of variable displacement vane pump is adjusted ? Explain with diagram. (6)

(OR)

b) i) With a neat constructional diagram write a description of how a 'Gerotor' pump works. (8)

ii) A hydraulic system requires 32 lpm of fluid at a pressure of 26 MPa. The pump to be used is variable axial piston pump having maximum displacement per revolution of 28 cm^3. The pump is driven at 1430 rpm and has an overall and volumetric efficiency of 85% and 90% respectively. Find at what percentage of maximum displacement the pump has to be set. Also find what power is needed to drive the pump ? (8)

12. a) i) Draw and develop a cross-over pressure relief valve circuit. Discuss the need of such circuit in hydraulic industry. (10)

ii) Set the expressions of various efficiency terms used to rate the performance of hydraulic motors. (6)

(OR)

b) i) A pump supplies oil at 0.0016, m^3/s to a 40mm diameter double-acting hydraulic cylinder. If the load is 5000 N (extending and retracting) and the rod diameter is 20 mm, find the

1) Piston velocity during the extending and retracting stroke.
2) Hydraulic pressure during the extending and retracting stroke.
3) Cylinder kW power during the extending and retracting stroke. (10)

ii) Using speed control valve differentiate between meter-in and meter-out circuits. (6)

13. a) i) What is fail-safe circuit ? Develop and discuss the double handed fail safe circuit used for hydraulic press application. (10)

ii) Explain the role of 'pressure intensifier' in hydraulic circuits. (6)

(OR)

b) i) What is servo valve ? Develop and discuss the mechanical hydraulic servo valve circuit. (10)

ii) Develop and discuss a circuit having 4/3 DCV regenerative neutral used to control double acting cylinder. (6)

14. a) What is Coanda effect ? Discuss how this effect useful to develop a monostable and bistable- flip-flop device.

(OR)

b) i) Develop and explain an unlimited and limited MEMORY circuits. (10)

ii) Draw the graphic symbol of FRL unit and explain the mechanism of addition of lubricant to the compressed air. (6)

15. a) i) Design a pneumatic cascade circuit for the following sequence of operation : $A^+B^+B^-C^+C^-A^-$. (12)

ii) Also develop the travel-step diagram for the above sequence of operation. (4)

(OR)

b) Draw and explain a hydraulic circuit to actuate a shaping machine ram. Incorporate the following features in the circuit.

i) Rapid tool approach.
ii) Slow cutting operation and
iii) Rapid tool retraction/return.