| USN | | | | | | | | | | | Course Code | 2 | 1 | M | E | 5 | 4 | 3 |
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Fifth Semester B.E. Degree Examinations, April/May 2024
## FLUID POWER ENGINEERING

**Duration: 3 hrs**                                                                                    **Max. Marks: 100**

*Note:*   *1. Answer any* **FIVE** *full questions choosing ONE full Question from each Module.*
          *2. Missing data, if any, may be suitably assumed*

| *Q. No* | | Question | *Marks* | *(RBTL:CO:PI)* |
|---|---|---|---|---|
| | | **Module-1** | | |
| 1. | a. | State Pascal's law. Explain with neat sketch, the basic hydraulic power system. | 08 | (1 :1 : 1.2.1) |
| | b. | Explain the desirable properties of hydraulic fluids. | 04 | (1 :1 : 1.2.1) |
| | c. | In the hydraulic press a force of 100 N is exerted on small piston. Determine the upward force of the large piston. The area of the small piston is 50 cm$^2$ and the area of large piston is 500 cm$^2$. Find the distance moved by the large piston if small piston moves 10 cm. Also find energy input and energy output. | 08 | (3 :1 : 1.2.1) |
| | | **(OR)** | | |
| 2. | a. | With the help of neat sketch, explain the structure of hydraulic system. | 08 | (2 :1 : 1.2.1) |
| | b. | Explain the different types of seals used in hydraulic system. | 06 | (1 :1 : 1.2.1) |
| | c. | With the help of suitable circuit, explain the following: (i) Suction line filtering (ii) Pressure line filtering. | 06 | (2 :1 : 1.2.1) |
| | | **Module-2** | | |
| 3. | a. | With a neat sketch, explain swash plate type piston pump and derive the expression for theoretical flow rate. | 10 | (2 :2 : 1.4.1) |
| | b. | A vane pump is to have a volumetric displacement of 82 cm$^3$. It has a rotor diameter of 5 cm, a cam ring diameter of 7.5 cm and a vane width of 4 cm. What must be the eccentricity? | 10 | (3 :2 : 1.4.1) |
| | | **(OR)** | | |
| 4. | a. | Explain the operation of a balanced vane motor with a neat sketch and derive the expression for flow rate. | 10 | (2 :2 : 1.4.1) |
| | b. | A hydraulic motor has a volumetric displacement of 0.00016 m$^3$ operating at a pressure of 310 bar and speed 2000 rpm. If the actual flow rate consumed by the motor is 0.36 m$^3$/min and the actual torque delivered by the motor is 760 N-m. Find (i) Volumetric efficiency (ii) Mechanical efficiency    (iii) Overall efficiency | 10 | (3 :2 : 1.4.1) |
| | | **Module-3** | | |
| 5. | a. | Draw the hydraulic symbol for the following hydraulic control valves (i)check valve (ii) shuttle valve (iii) solenoid operated DCV | 06 | (2 :3 : 1.3.1) |
| | b. | With a neat sketch explain the working of a spring loaded simple pressure relief valve. | 08 | (2 :3 : 1.3.1) |
| | c. | Explain with a neat sketch the working of temperature compensated flow control valve. | 06 | (2 :3 : 1.3.1) |

**Note: (RBTL - Revised Bloom's Taxonomy Level:  CO - Course Outcome: PI– Performance Indicator)**

**(OR)**

| | | | | |
|---|---|---|---|---|
| **6.** | **a.** | With circuit diagram, explain regenerative circuit. | **10** | (2 :3 : 1.3.1) |
| | **b.** | With circuit diagram, explain double pump hydraulic system used in punching operation. | **10** | (2 :3 : 1.3.1) |

## Module-4

| | | | | |
|---|---|---|---|---|
| **7.** | **a.** | What are the advantages and disadvantages of pneumatic power system? | **06** | (1 :4 : 1.3.1) |
| | **b.** | With a neat sketch, explain structure of Pneumatic control system. | **08** | (2 :4: 1.3.1) |
| | **c.** | With a neat sketch, explain FRL unit. | **06** | (2 :4 : 1.3.1) |

**(OR)**

| | | | | |
|---|---|---|---|---|
| **8.** | **a.** | With a neat sketch, explain end position cushioning. | **06** | (2 :4 : 1.3.1) |
| | **b.** | With a neat sketch, explain quick exhaust valve. | **08** | (2 :4 : 1.3.1) |
| | **c.** | With a circuit diagram, explain the use of memory valve. | **06** | (2 :4 : 1.3.1) |

## Module-5

| | | | | |
|---|---|---|---|---|
| **9.** | **a.** | With circuit diagram, explain supply air throttling and exhaust air throttling. | **10** | (2 :5 : 1.3.1) |
| | **b.** | Explain OR gate in pneumatic systems with an example. | **10** | (2 :5 : 1.3.1) |

**(OR)**

| | | | | |
|---|---|---|---|---|
| **10** | **a.** | With a neat sketch, explain pilot assisted solenoid control of DCV. | **10** | (2 :5 : 1.3.1) |
| | **b.** | With a neat sketch, explain Indirect control of double acting cylinder. | **10** | (2 :5 : 1.3.1) |

**\* \* \* \* \* \***

**Note: (RBTL - Revised Bloom's Taxonomy Level:  CO - Course Outcome: PI– Performance Indicator)**