

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-V (NEW) EXAMINATION – SUMMER 2024

Subject Code:2151903

Date:23-05-2024

Subject Name:Fluid Power Engineering

Time:02:30 PM TO 05:00 PM

Total Marks:70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

- Q.1**
- (a) State the major applications of hydro-electric power plant. **03**
 - (b) Classify hydro-electric power plants. **04**
 - (c) A jet of water strikes at the centre of a single curved vane moving in the direction of jet with velocity u so that jet velocity relative to vane is $(V-u)$. If the outgoing jet makes an angle θ with the entering jet prove that for maximum efficiency $V = 3u$. **07**
- Q.2**
- (a) Discuss the impulse-momentum principle. **03**
 - (b) Explain with neat diagram working of Francis turbine. **04**
 - (c) A jet of water having velocity of 15 m/sec strikes a curved vane which is moving with a velocity of 5 m/sec in same direction as that of jet inlet. The vane is so shaped that the jet is deflected through 135° . The diameter of jet is 10 cm. Assuming the vane to be smooth, find **07**
 - (i) Force exerted by the jet in the direction of motion
 - (ii) Power exerted on the vane and
 - (iii) Efficiency of the vane.
- OR**
- (c) How ships are propelled ? Derive an expression for propulsive work and propulsive efficiency if the water is drawn from an orifice at right angles to the motion of ship. **07**
- Q.3**
- (a) Differentiate between inward and outward flow reaction turbine. **03**
 - (b) What is NPSH ? State its importance. **04**
 - (c) What do you mean by an air vessel ? Discuss the functions of an air vessel for reciprocating pump. **07**
- OR**
- Q.3**
- (a) Define the following terms for hydraulic turbine : Hydraulic efficiency, Mechanical efficiency and Volumetric efficiency. **03**
 - (b) State the main components of centrifugal pump and state the functions of each component. **04**
 - (c) Discuss main characteristic curves for centrifugal pump. **07**
- Q.4**
- (a) State the applications of compressed air. **03**
 - (b) Discuss working of vane type compressor. **04**
 - (c) Discuss the various losses in centrifugal compressor. **07**

OR

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| Q.4 | (a) | Discuss working of reciprocating air compressor. | 03 |
| | (b) | Discuss the working of screw type compressor. | 04 |
| | (c) | Differentiate between reciprocating and centrifugal compressor. | 07 |

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| Q.5 | (a) | With neat diagram explain working of direct acting lift. | 03 |
| | (b) | Discuss working of hydraulic crane. | 04 |
| | (c) | Explain function, construction and working of hydraulic ram. | 07 |

OR

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| Q.5 | (a) | Compare fluid coupling and fluid torque converter. | 03 |
| | (b) | Explain the working of differential hydraulic accumulator. | 04 |
| | (c) | With a neat diagram, explain working principle of hydraulic press and working of actual hydraulic press. | 07 |
