Register No.: …………………………… Name: ……………………………………………………………

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FOURTH SEMESTER B.TECH DEGREE EXAMINATION (R), MAY 2023
MECHANICAL ENGINEERING
(2020 SCHEME)

Course Code : **20MET206**

Course Name: **Fluid Machinery**

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

PART A
(Answer all questions. Each question carries 3 marks)

1. Define Hydraulic Efficiency along with its mathematical expression.
2. Distinguish between impulse and reaction turbines.
3. Explain the function of surge tanks in hydro-electric power plants.
4. What is cavitation in hydraulic machines?
5. Define slip, percentage slip and negative slip of a reciprocating pump.
6. What is a positive displacement pump?
7. Describe the function of intercooler in compressors.
8. Express mathematically, the term clearance ratio of a compressor.
9. Draw the T-S diagram of an open cycle gas turbine.
10. Compare Gas Turbines and Internal Combustion engines.

PART B
(Answer one full question from each module, each question carries 14 marks)

MODULE I

11. Explain with a neat sketch, the major parts and constructional features of a Pelton Wheel. (14)

OR

12. a) Explain with a neat sketch the major parts and constructional features of a Kaplan Turbine. (7)
    b) Derive an expression for the efficiency of a jet striking on a series of flat plates mounted radially on the periphery of a wheel. (7)

MODULE II

13. a) What is governing of hydraulic turbines? Explain its significance. (7)
    b) Explain the functions of a draft tube in turbines. List the different types of draft tubes (7)

OR

14. a) Explain the various efficiencies of a centrifugal pump along with (8)

corresponding mathematical expressions.

b) Describe the important types of characteristic curves of a hydraulic pump. (6)

MODULE III

15. a) Explain the working principle of a gear pump with a diagram. (6)

b) What is indicator diagram in reciprocating pumps? Draw an indicator diagram, considering the effect of acceleration and friction in suction and delivery pipes. (8)

OR

16. a) Explain with diagram, the working principle of a hydraulic accumulator. (8)

b) Discuss why air vessels are used in reciprocating pumps. (6)

MODULE IV

17. a) With neat sketch, explain the construction and working of a centrifugal compressor. (7)

b) Derive an expression for work done per cycle in a single stage reciprocating compressor. Neglect the clearance volume when the compression is polytropic. (7)

OR

18. a) With a neat sketch, explain the construction and working of a Roots blower. (7)

b) A reciprocating compressor has two stages with inlet air going into LP stage at 1 bar, 16°C and at the rate of 12 m³/min. Air is finally delivered at 7 bar and there is perfect intercooling at optimum pressure between the stages. The index for compression is 1.25 and compressor runs at 600 rpm. Determine intermediate pressure and total volume of each cylinder. (Neglect clearance volume) (7)

MODULE V

19. a) Explain the following methods of performance improvement in Gas turbines (i) Intercooling, (ii) Reheating and (iii) Regeneration. (9)

b) Differentiate between open cycle gas turbine and closed cycle gas turbine. (5)

OR

20. With a neat sketch, explain the working of a closed cycle, constant pressure gas turbine system. Draw the T-S diagram of an ideal Brayton gas turbine cycle and derive the expression for its air standard efficiency. (14)

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