



B.E DEGREE EXAMINATIONS: NOV/DEC 2022

(Regulation 2018)

Fifth Semester

MECHANICAL ENGINEERING

U18MET5004 Turbo Machines

COURSE OUTCOMES

- CO1: Apply the principles of turbomachines
 CO2: Design and estimate different parameters for centrifugal fans
 CO3: Design and analyze flow parameters in blowers
 CO4: Solve problems on centrifugal compressors
 CO5: Design simple stage problems in axial flow compressors
 CO6: Calculate and analyze flow parameters in radial flow gas turbines

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

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|--|-----|-------------------|
| 1. What do you mean by turbomachines? | CO1 | [K ₁] |
| 2. How energy transfer takes place in turbomachines? | CO1 | [K ₂] |
| 3. What is centrifugal fan used for? | CO2 | [K ₁] |
| 4. What is the difference between centrifugal fan and axial fan? | CO2 | [K ₂] |
| 5. What are the 3 components of a centrifugal compressor? | CO3 | [K ₁] |
| 6. What is the capacity of centrifugal compressor? | CO4 | [K ₁] |
| 7. Name two advantages of an axial flow compressor. | CO5 | [K ₁] |
| 8. Distinguish between an axial and centrifugal flow compressor. | CO5 | [K ₂] |
| 9. How many stages are there in gas turbine? | CO6 | [K ₁] |
| 10. What is impulse momentum turbine? | CO6 | [K ₁] |

Answer any FIVE Questions:-

PART B (5 x 16 = 80 Marks)

(Answer not more than 400 words)

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|---|----|-----|-------------------|
| 11. Derive the Bernoulli's equation from Euler's Equation. | 16 | CO1 | [K ₁] |
| 12. What is an air vessel? Describe the function of the air vessel for reciprocating pump with neat sketch. | 16 | CO3 | [K ₁] |

13. Draw and discuss the characteristic curves of centrifugal pumps. 16 CO2 [K₂]
14. An IFR turbine impulse stage with cantilever blades has a flow coefficient of 0.4 and develops 100kW with total-to-total efficiency of 90% at 12000rpm. If the flow rate of air is 1 kg/s at an entry temperature of 400K, determine the rotor diameters and air angles at the entry and exit, the nozzle exit air angle and the stagnation pressure ratio across the stage. Take $d_3=0.8d_2$, zero exit swirl and constant meridional velocity 16 CO6 [K₂]
15. With neat sketch explain the construction and working of Axial flow Compressor. 16 CO5 [K₂]
16. Explain the characteristics features of Centrifugal Compressors with neat sketch. 16 CO4 [K₂]
