

This question paper contains 3 printed pages.

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Your Roll No.

MEM

J

Paper— ME.602

TURBOMACHINERY – II

Time : 3 hours

Maximum Marks : 100

*(Write your Roll No. on the top immediately
on receipt of this question paper.)*

Attempt any five questions.

Use of steam tables and Mollier diagram is permitted.

Assume suitable missing data, if any.

1. (a) Draw the velocity diagram for a two stage velocity compounded impulse turbine at the entry and exit stages for maximum utilization factor. 8
- (b) Explain why Reaction stages are preferred to Impulse stages, even though reaction turbines occupy more space and run slower. 12
2. (a) Why and when does cooling of gas turbine blades become necessary? Justify your comment. 10
- (b) In case of aeroengines air cooling is preferred as compared to liquid cooling. Why? 10
3. (a) Describe briefly various methods employed to

Turn over

- recover the heat of exhaust gases for further use in a steam cycle from a gas turbine plant. 10
- (b) A regenerative steam cycle operates between the limits of 100 bar 527°C and 0.07 bar. If only one extraction point occurs from the turbine at 10 bar with 90% effectiveness, determine the percentage of total flow to be extracted. 10
4. (a) Discuss the effect of blade friction on the performance of turbine. 7
- (b) What is reheat factor and why is it greater than unity? Justify whether lower value or higher value of reheat factor is desirable. 7
- (c) Why is thermal efficiency of gas turbine high at very high altitude? 6
5. (a) List the various tripping devices used in power plant. Discuss each of them in brief. 12
- (b) Discuss about the various types of casings generally used in a gas turbine plant. 8
6. What is meant by equilibrium running of a gas generator? Explain briefly the method to achieve the equilibrium running of a gas generator and free power turbine. Also draw the equilibrium lines. 20
7. (a) Discuss the various losses occurring in an Inward flow radial turbine. 6

- (b) In a gas turbine plant air at 20°C and 1 bar is compressed to 6 bar with a compression efficiency of 85%. The air is heated in the regenerator and combustion chamber till its temperature reaches 723°C and during the process pressure falls in regenerator by 0.2 bar and in combustion chamber by 0.3 bar. The air is then expanded in turbine and passes through regenerator which has 80% effectiveness. If isentropic efficiency of the turbine is 85%, determine the thermal efficiency of the plant. 14
8. (a) Why is supersonic flow in a turbine stage avoided? Explain. 6
- (b) Why is thermal efficiency of a gas turbine less, even though the turbine develops greater power. 7
- (c) What are various causes of vibrations of turbine blades and its possible remedial measures? Discuss. 7