

SUBJECT CODE NO:- P-346
FACULTY OF ENGINEERING AND TECHNOLOGY
S.E.(Mech/Prod) Examination MAY/JUNE-2016
Thermodynamics-II
(Revised)

[Time: Three Hours]

[Max Marks:80]

“Please check whether you have got the right question paper.”

N.B

- 1) Question 1 in section A and question 6 in section B are compulsory.
- 2) Solve any three questions from section A and any three questions from section including compulsory questions.
- 3) Figures to the right indicate full marks.’
- 4) Use of non- programmable calculator and heat transfer data book is permitted in the examination.

Section A

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|-----|---|----------------|
| Q.1 | Solve <u>any five</u> | 10 |
| | <ol style="list-style-type: none"> a) What is IBR? b) List the boiler mountings and accessories. c) What are high pressure boilers? d) What is boiler efficiency? e) What do mean by water tube boiler? f) What is equivalent evaporation? g) What are types of nozzle? | |
| Q.2 | <ol style="list-style-type: none"> a) What is the definition of boiler according to IBR? b) Explain the construction and working of Locomotive boiler with the help of neat sketch. c) Explain the working of supercharged boiler | 05
05
05 |
| Q.3 | <ol style="list-style-type: none"> a) A boiler uses 16 kg of air per kg of fuel, when the fuel consumption is at the rate of 1800 kg/h. Actual draught required is 20mm of water when all losses are considered. The surrounding air temperature is 27°C and fuel gas temperature is 277°C. Determine the chimney height and its diameter if actual velocity of the flue gases is 0.35 times the theoretical velocity due to roughness of interior surfaces of the chimney. b) Compare natural and artificial draughts. | 09
06 |
| Q.4 | <ol style="list-style-type: none"> a) Calculate the equivalent from and at 100°C for a boiler, which receives water at 60°C and produces steam at 1.5 Mpa and 300°C. Steam generation rate is 16000kg/h. Coal is burnt at the rate of 1800 kg/h. The calorific value of coal is 34750 kj/kg. Also calculate the thermal efficiency of the boiler. If the thermal efficiency of the boiler increases by 5% due to use of an economizer, find the saving in coal consumption per hour. b) What is boiler draught and how it is produced by a chimney? | 09
06 |
| Q.5 | <ol style="list-style-type: none"> a) What is the function of a steam nozzle? b) Derive an equation for discharge through the nozzle. c) Define critical velocity pressure ratio. | 04
07
04 |

Section-B

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|-----|--|----|
| Q.6 | Solve <u>any five</u> | 10 |
| | <ol style="list-style-type: none"> a) Define rotary compressor. b) What is blade efficiency? c) What is impulse turbine? d) What is Jet condenser? e) What is condenser efficiency? f) What is free air delivery? g) Explain slip factor. | |

Q.7	a) Explain the function and application of the condenser.	06
	b) A surface condenser is designed to handle 13000kg of steam per hour. The steam enters at 8 kPa, 0.8 dry. The condensate leaves the condenser at the corresponding saturation temperature. Calculate the rate of cooling water, if cooling water temperature rise is limited to 14°C.	09
Q.8	a) What is regeneration? Draw schematic and T-s diagram for an ideal regenerative cycle	05
	b) Why Carnot cycle is not practical for a steam power plant?	05
	c) Draw the schematic for an ideal Rankine cycle. Draw p-v, T-s and h-s diagrams for this cycle.	05
Q.9	a) What is reheating? What the advantages are of reheat Rankine cycle?	06
	b) A steam power plant operates on an ideal Rankine cycle between a boiler pressure of 42 bar, 300°C and a condenser pressure of 0.035 bar. Calculate cycle efficiency , work ratio and specific steam consumption for	09
	1) Ideal Rankine cycle and	
	2) For Rankine cycle, when expansion process has an isentropic efficiency of 80%.	
Q.10	a) Write the uses of compressed air.	05
	b) Differentiate between single-acting and double –acting compressors.	05
	c) Explain the construction and working of a Vane type compressor.	05