

C 57525

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Name.....

Reg. No.....

COMBINED FIRST AND SECOND SEMESTER B.TECH (ENGINEERING)  
DEGREE EXAMINATION, JUNE 2009  
EE 04 108—MECHANICAL ENGINEERING—I

(2004 admissions)

Maximum : 100 Marks

Time : Three Hours

Answer all questions.

Part A

1. Explain Zeroth law of thermodynamics.
2. What do you mean by open and closed systems ?
3. Explain the classification of IC Engines.
4. What do you mean by Entropy ?
5. What do you understand by entropy principle ?
6. What is binary vapour cycle ?
7. What do you mean by plant capacity factor in power plants ?
8. List out the desirable properties of materials used for control rods in nuclear power plants.

(8 × 5 = 40 marks)

Part B

1. A piston and cylinder machine contains a fluid system which passes through a complete cycle of four processes during a cycle the sum of all the heat transfers is - 170 kJ. The system completes 100 cycles per min. Complete the following table showing the method for each item and compute the net rate of work output in kW.

Process	$Q$ (kJ/min)	$W$ (kJ/min)	$(\Delta E$ kJ/min)
a - b	0	2.170	—
b - c	21.000	0	—
c - d	- 2.100	—	- 36, 600
d - a	—	—	—

Or

Turn over

2. Air flows steadily at the rate of 0.5 kg/s through air compressor, entering at 7 m/s velocity, 100 kPa pressure,  $0.95 \text{ kg/m}^3$ . Volume and learning at 5 m/s, 700 kPa and  $0.19 \text{ m}^3/\text{kg}$ . Internal energy of air leaving is 90 kJ/kg. greater than that of air entering. Cooling water in compressor absorbs heat from air at the rate of 58 kW. Determine work out put to compressor.

(15 marks)

3. A cyclic heat engine operates between a source of temperature of  $800^\circ \text{C}$  and a sink temperature of  $30^\circ \text{C}$ . What is the least rate of heat rejection per kW. net output of engine.

Or

4. Explain with a neat sketch working of 2 - stroke engine.

(15 marks)

5. A diesel engine has a compression ratio of 14 and cut-off takes place at 6% of the stroke. Find the air standard efficiency.

Or

6. Explain the working of Brayton cycle with simple diagram.

(15 marks)

7. Describe the advantages and disadvantages of underground power houses.

Or

8. Write short notes on various parts of a nuclear reactor.

(15 marks)

[4 × 15 = 60 marks]