

2E2306	Roll No. _____	Total No of Pages: 3
	2E2306 B. Tech. II Sem. (Main) Exam., May – 2018 ME -102 Basic Mechanical Engineering	
Time: 3 Hours	Maximum Marks: 80 Min. Passing Marks: 28	

Instructions to Candidates:

- Attempt any five questions including Question No. 1, which is Compulsory.
- All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.
- Units of quantities used/calculated must be stated clearly.
- Use of following supporting material is permitted during examination.
(Mentioned in form No.205)

1. NIL

2. NIL

Q.1 Compulsory

[8×2=16]

Answers for each sub-question be given 50 words- (each question carry 2 marks)

- (a) Describe different modern tools used in mechanical engineering.
- (b) Describe law of thermodynamics.
- (c) Describe different fields of manufacturing technology.
- (d) Differentiate between water tube boiler and fire tube boiler.
- (e) Differentiate between impulse and reaction turbine.
- (f) Write a short note on different types of power plant.
- (g) What is industrial engineering & its scope?
- (h) Define steam boiler & write different types of boiler.

- Q.2 (a) Differentiate between 2 stroke & 4 stroke engine. [4]
- (b) Describe ideal Otto cycle & derive formula for its efficiency. [4]
- (c) Diesel cycle with compression ratio of $CR=20 : 1$ and cut-off ratio $\alpha=2$. The air is at $100 \text{ kPa}=1 \text{ bar}$, 20°C (293K), and the volume of the chamber is 500 cm^3 prior to the compression stroke.
- (i) Specific heat capacity at constant pressure of air at atmospheric pressure and room temperature: $C_p = 1.01 \text{ kJ/kgK}$
- (ii) Specific heat capacity at constant volume of air at atmospheric pressure and room temperature: $C_v = 0.718 \text{ kJ/kgK}$.
- (iii) $K = C_p/C_v = 1.4$

Calculate: The mass of intake air, the temperature T_2 , the pressure P_2 , the temperature T_3 , the amount of heat added by burning of fuel-air mixture, the thermal efficiency of this cycle. [8]

- Q.3 (a) What is meant by refrigeration system? Describe vapor compression refrigeration system. [8]
- (b) What is air conditioning? Draw and describe different components used in it. [4]
- (c) Ice is formed at 0°C from water at 20°C , the temperature of refrigerant is 10°C .

Find the ice formed per KWH, assume latent heat of ice is 334 kJ/kg . Assume working in perfect Carnot cycle. [4]

- Q.4 (a) What is gear transmission? Describe different types of gear. [8]
- (b) Describe with figure different types of belt drive. [4]

- (c) Two spur gear have velocity ratio $1/3$, driven gear has 72 teeth of 8 module & rotate at 300 rpm, calculate no. of teeth & speed of driver, also calculate pitch line velocity. Given:

$$T_2=72, VR=1/3, N_2=300 \text{ rpm}, m=8\text{mm}$$

$$VR=N_2/N_1=T_1/T_2=1/3.$$

[4]

Q.5 (a) Write a short note on-

[6]

- (i) Extrusion
- (ii) Rolling
- (iii) Drawing

(b) What is metal casting? Describe different methods of metal casting.

[5]

(c) Write a brief note on Lathe machine.

[5]

Q.6 (a) Describe hardening and tempering of steel.

[8]

(b) Describe the following terms-

[8]

- (i) Case hardening
- (ii) Carburizing
- (iii) Nitriding
- (iv) Cyaniding
- (v) Carbonitriding

Q.7 (a) What is Computer Added Design (CAD)? Describe its working.

[8]

(b) What is MEMS? Write an essay on it.

[8]