B.Tech. sem-II All Branch.

B.Tech. SEM -II (Chemical/ Civil/ Electrical/ Mechanical/ Production/ Computer/ Info. Tech./ Electronics / Bio Medical / E & TC) 2014 Course (CBCS) : SUMMER - 2019

SUBJECT: FUNDAMENTALS OF MECHANICAL ENGINEERING

Day: Monday
Date: 27/05/2019

S-2019-2536

Time: 10.00 AM TO 01.00 PM
Max. Marks: 60

N.B:

1) All questions are **COMPULSORY.**
2) Figures to the right indicate **FULL** marks.
3) Use of non-programmable **CALCULATOR** is allowed.
4) Assume suitable data **WHEREVER** necessary.
5) Neat diagram must be drawn **WHEREVER** necessary.

Q.1 **a)** Derive the steady flow energy equation on energy basis. **(05)**

b) The compressed air in a closed cylinder has an internal energy of 520 kJ/kg and 350 kJ/kg before and after a certain process respectively. If the work done by the air in the cylinder is 80 kJ/kg. Calculate heat transfer during the process. **(05)**

OR

Q.1 **a)** Differentiate between heat and work by citing similarities and dissimilarities and by taking an example. **(05)**

b) A water turbine is supplied water from a dam whose water height is 1500m above the centre of the turbine. The water from the turbine is discharged 3m below the centre of the turbine. The velocity of water at the discharge point is 10m/sec. Find the power developed by the turbine if the water flow rate is 200 m^3/sec. **(05)**

Q.2 **a)** Draw and explain working of two stroke spark ignition engine. **(05)**

b) Explain working of vapor absorption refrigeration system. **(05)**

OR

Q.2 **a)** Explain with a neat sketch working of an impulse water turbine. **(05)**

b) How double acting reciprocating pump works? **(05)**

Q.3 **a)** State and explain Fourier's law of heat conduction with assumptions made. **(05)**

b) Write a short note on geothermal energy. **(05)**

OR

Q.3 **a)** A plane wall is 150mm thick and its wall area is 5m^2. If its conductivity is 9.35 W/m^0C and surface temperatures are steady at 150^{0}C and 50^{0}C. Determine. **(05)**

i) Heat flow across the plane wall
ii) Temperature gradient in the flow direction

b) Draw a neat sketch of nuclear power plant and name it's various parts. **(05)**

P.T.O.

Q.4 a) Define the following: (05)
i) Compressibility ii) Vapor pressure

b) A flat plate of area 1.5×10^6 mm^2 is pulled with a speed of 0.4m/sec relative to another plate located at a distance of 0.15mm from it. Find the force and power required to maintain this speed, if the fluid separating them is having viscosity as 1 Poise. (05)

OR

Q.4 a) Derive an expression of surface tension on hollow bubble and liquid jet. (05)

b) The capillary rise in the glass tube is not to exceed 0.2mm of water. Determine its minimum size, given that surface tension for water in contact with air = 0.0725N/m. (05)

Q.5 a) Classify couplings. State and explain with the block diagram coupling used for eccentric shafts. (05)

b) Write a short note on bush bearing. (05)

OR

Q.5 a) Draw a neat sketch of single plate clutch and explain its working. (05)

b) Differentiate between spur and helical gear. (05)

Q.6 a) Draw a block diagram of lathe machine and name its various important parts. (05)

b) Write a short note on Soldering and Brazing (05)

OR

Q.6 a) Draw a block diagram of CNC machine and explain its working. (05)

b) Explain piercing and blanking operations using neat sketches. (05)

* * * * *