HI-Tech Institute of Engineering and Technology, Ghaziabad

B.Tech (I/II Sem.)

Model Question Paper -2

Fundamentals of Mechanical Engineering (BME 101/201)

Time: 3 HOUR **Total Marks: 70**

CO 1	Understand the concept of stress and strain, factor of safety, beams.
CO 2	Understand the basic component and working of internal combustion engines, electric and hybrid vehicles, refrigerator and heat pump, air conditioning.
CO 3	Understand fluid properties, conservation laws, hydraulic machinery used in real life.
CO 4	Understand the working principle of different measuring instrument with the knowledge of accuracy, error and calibration, limit, fit, tolerance and control system.
CO 5	Understand concept of mechatronics with their advantages, scope and Industrial application, the different types of mechanical actuation system, the different types of hydraulic and pneumatic systems.

SECTION-A

Q.1	Attempt all parts	(7×2=14)

a.	Define Hooke's law & Poisson's ratio.	CO1
b.	Define scavenging process.	CO2
c.	Find the relationship between COP of heat pump, COP of refrigerator & efficiency of heat engine.	CO3
d.	Draw shear stress vs velocity gradient for Newtonian & non Newtonian fluid.	CO4
e.	Define dynamic & kinematic viscosity.	CO4
f.	Define the term accuracy, precision & resolution.	CO5
g.	Define autotronics, bionics & avionics.	CO5

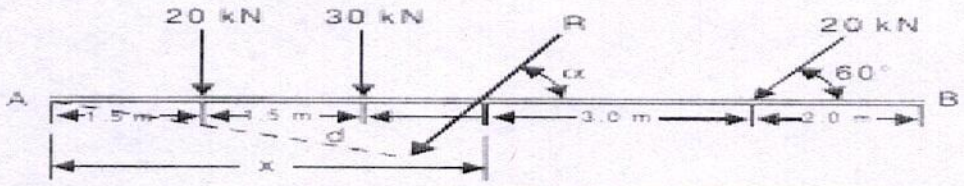
SECTION-B

Q.2	Attempt any three parts	(3×7=21)

a.	Explain the terms (i) Types of supports (ii) Types of loads (iii) Free body diagram	CO1
b.	Differentiate between SI & CI engine and two stroke & four stroke engine.	CO2
c.	Explain the terms (i) Human comfort condition (ii) Specific Humidity & Relative humidity (iii) WBT and DPT	CO3
d.	A plate, 0.025mm distance from a fixed plate, moves at 60cm/s and requires a force of 1N to maintain this speed. Plates are having oil between them &the area of the upper plate is 2 m^2. Determine the viscosity of oil in poise between the plates.	CO4
e.	Explain Mechatronics with advantages, disadvantages, evolution & industrial applications.	CO5

SECTION-C

Q.3	Attempt any one part	(1×7=7)

a.	Determine the resultant with inclination .  	CO1
b.	Draw stress-strain diagram for ductile & brittle material & explain each point.	CO1

Q.4	Attempt any one part	(1×7=7)

a.	Explain the working of four stroke CI engine with sketch.	CO2
b.	Explain Electric vehicles with block diagram. Also explain its components.	CO2

Q.5	Attempt any one part	(1×7=7)

a.	Explain the constructional detail & working of Window air conditioner.	CO3
b.	Explain the constructional detail & working of Domestic refrigerator.	CO3

Q.6	Attempt any one part	(1×7=7)

a.	Explain hydraulic turbine. Classify hydraulic turbines with examples.	CO4
b.	A 30cm diameter pipe, conveying water, branches into two pipes of diameter 20cm & 15 cm respectively. If the velocity in 30cm diameter pipe is 2.5m/s find the discharge in this pipe. Also determine the velocity in 15cm pipe if the velocity in 20cm diameter pipe is 2m/s.	CO4

Q.7	Attempt any one part	(1×7=7)

a.	Explain venturimeter , U tube manometer and optical pyrometer.	CO5
b.	What are sensors & transducers? Enumerate various types of sensors & transducers. Explain any one in detail.	CO5
c.	What is error in measurement? Explain various types of error.	CO5