USN

NMAM INSTITUTE OF TECHNOLOGY, NITTE

(An Autonomous Institution affiliated to VTU, Belagavi)

II Sem B.E. (Credit System) Mid Semester Examinations – II, March 2017

16ME104 – ELEMENTS OF MECHANICAL ENGINEERING

Duration: 1 Hour | Max. Marks: 20

*Note: Answer **Two full** questions choosing **One full** question from **each Unit.***

			Marks	BT*
		Unit – I		
1.	a)	Mention the function of the following I.C. engine parts: (i) Carburetor (ii) Flywheel (iii) Transfer port (iv) Piston rings	4	L*1
	b)	Following observations were made during a trial on a 4 stroke diesel engine: Swept volume = 19634.95 cm^3 ; Crank shaft speed = 250 RPM Break load = 700 N ; Brake drum diameter = 200 mm MEP = 6 bar ; Diesel consumption = 0.1 m^3 /min Specific gravity of diesel = 0.78 ; Calorific value of diesel = 43.9 MJ/kg Find B.P., I.P., Brake thermal efficiency and Indicated thermal efficiency.	6	L5
2.	a)	Describe the following in reference with the artificial cooling technology. 1) Function of an air compressor 2) Latent heat property of a refrigerant 3) Throttling 4) Two functions of an air-conditioning system	4	L4
	b)	How the centrifugal force can be utilized for suction and delivery of liquid? Describe.	6	L4
		Unit – II		
3.	a)	You are to select a suitable drive for power transmission for an industrial fan. As a design engineer, you select a belt-drive system over gear drive or a chain and sprocket drive. Justify your selection of a belt drive. (Parameters: Cost, Speed, Maintenance, Flexibility, Distance between driving and driven shaft, Noise and Vibration).	3	L5
	b)	A speed reducing belt drive in which the belt runs at a speed of 4.19m/s, speed is reduced to $1/4^{th}$ and pulleys rotates in opposite direction to each other. One of the pulley diameters is 40 cm. The angle of lap is 185^{o} and the coefficient of friction between the belt material & pulley is 0.25. Find the power transmitted if the initial tension is not to exceed 15 kN. Also calculate length of the belt if the centre distance of the pulleys is 1meter, speed of driven pulley.	7	L5
4.	a)	Mention the uniqueness following drives. i) Worm and worm wheel ii) Rack and pinion iii) Crossed belt drive iv) Gear drive over belt drive	4	L2
	b)	A compound gear train is formed by 4 gears P, Q, R and S. Gear P meshes with gear Q and gear R meshes with gear S. Gears Q and R are compounded. P is connected to driving shaft and S connected to the driven shaft. Represent the gear arrangement schematically. If the gear S were to rotate at 60 rpm in clockwise direction. Calculate the speed and direction of P and intermediate gears. Also determine the speed ratio. The details of the gear are, T_P=30, T_Q = 60, T_R = 40 and T_S =80.	6	L5

BT* Bloom's Taxonomy, L* Level

****

USN

NMAM INSTITUTE OF TECHNOLOGY, NITTE

(An Autonomous Institution affiliated to VTU, Belagavi)

II Sem B.E. (Credit System) Mid Semester Examinations - I, February 2017

16ME104 – ELEMENTS OF MECHANICAL ENGINEERING

tion: 1 Hour — Max. Marks: 20

*Note: Answer any **One** full question from **each Unit.***

		Marks	BT*
	Unit – I		
a)	Compare the Principle and functioning of a Fire tube boiler with water tube boiler.	4	L*2
b)	Write a short note on the following, i) Quality of steam ii) Enthalpy of superheat iii) Disadvantages of using a superheated steam	6	L1
a)	Steam with 10% water content in it and at 200°C is generated at constant pressure from water at 20°C. Assume C_{pw} = 4.18kJ/kgK & C_{ps} = 2.25 kJ/kg°C. Considering h_f= 852.4kJ/kg, h_{fg} = 1941 kJ/kg, Determine, a. The change in enthalpy or additional enthalpy required to get steam with 90% quality. b. Heat required to convert steam into saturated steam. c. Volume of boiler vessel to contain 2kg dry steam. d. What is the degree of superheat on addition of 0.3 MJ of energy to dry steam?	8	L5
b)	Why reaction turbine is preferred over impulse turbine?	2	L2
	Unit – II		
3. a)	Compare the features of thermal power plant and hydro electric plant with respect to following aspects, i) Primary source of energy and Mode of energy ii) Media of energy conversion and mode of energy conversion	4	L4
b)	Write the functioning of the following in relevance with prime movers, i) Nozzle ii) Buckets iii) Guide vane	6	L1
4. a)	Explain with sketch, the working of high head and medium head hydraulic turbine.	8	L4
b)	Distinguish between the closed cycle and open cycle Gas turbines.	2	L2

T* Bloom's Taxonomy, L* Level

****

USN | | | | | | | | | | |

NMAM INSTITUTE OF TECHNOLOGY, NITTE

(An Autonomous Institution affiliated to VTU, Belagavi)

I Sem B.E. (Credit System) Mid Semester Examinations - II, October 2017

17ME104 – ELEMENTS OF MECHANICAL ENGINEERING

Duration: 1 Hour | Max. Marks: 20

*Note: Answer **Two full** questions choosing **One full** question from **each Unit.***

			Marks	BT*
		Unit – I		
1.	a)	A two stroke petrol engine has a piston diameter of 20cm and a stroke length of 300mm. It has mean effective pressure of 2.8 bar and speed of 400rpm. The diameter of the brake drum is 1 meter and effective brake load of 628N. Find Indicated power, Brake power, Mechanical efficiency and average piston speed.	04	L*5
	b)	How the centrifugal force can be utilized for suction and delivery of liquid? Describe the principle with schematic representation.	06	L4
2.	a)	Describe the following in reference with the refrigeration system. i) Function of a compressor ii) Latent heat property of a good refrigerant iii) Throttling iv) Suction and compression in vapor absorption refrigeration system v) Maintenance cost of vapor absorption refrigeration system	10	L3
		Unit – II		
3.	a)	Compare the open belt and crossed belt drive system with respect to following aspects with proper justification. i) Direction of rotation in driver and driven pulley ii) Wear and tear iii) Slip iv) Power transmission	04	L3
	b)	In a belt drive, if the angle of contact between belt and pulley is 2.8 radian, 100mm diameter pulley rotating at 400 rpm shows the coefficient of friction 0.28. If the width of the belt is 200 mm and the maximum tension in the belt is not to exceed 50N/mm of width, find the initial tension in the belt and power transmitted by the drive.	06	L4
4.	a)	What are the uniqueness of following gear drives? i) Rack and pinion ii) Worm and worm wheel iii) Helical gear iv) Bevel gear	04	L3
	b)	What is the need for lubrication? What are the desirable properties a lubricant? Briefly explain.	06	L2

BT* Bloom's Taxonomy, L* Level

****