DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Supplementary Summer Examination – 2023

Course: B. Tech. **Branch :Mechanical Engineering** **Semester : V**

Subject Code & Name: BTMC 501 & Heat Transfer

Max Marks: 60 **Date: 07/08/2023** **Duration: 3 Hr.**

Instructions to the Students:

1. *All the questions are compulsory.*
2. *The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.*
3. *Use of non-programmable scientific calculators is allowed.*
4. *Assume suitable data wherever necessary and mention it clearly.*

		(Level/CO)	Marks
Q. 1	**Solve Any Two of the following.**		**12**
A)	Write a note on thermal conductivity. Give some examples of heat transfer in engineering.	**(L1/CO1)**	**6**
B)	The inner surface of furnace wall is at 200 ºC and outer surface is at 50 ºC. Calculate the heat loss per m^2 area of the wall. If the thermal conductivity of the brick is 0.5 W/m ºC and wall thickness is 200 mm.	**(L3/CO1)**	**6**
C)	What is the law of heat conduction? State the assumptions on which this law is based?	**(L1/CO1)**	**6**
Q.2	**Solve Any Two of the following.**		**12**
A)	Derive general heat conduction equation in Cartesian co-ordinate system.	**(L2/CO2)**	**6**
B)	Define Nusselt number, Prandtl number and Grashoff number.	**(L2/CO2)**	**6**
C)	Write a short note on critical radius of insulation.	**(L1/CO2)**	**6**
Q. 3	**Solve Any Two of the following.**		**12**
A)	Consider the flow of a gas with density 1 kg/m^3, viscosity 1.5×10^{-5} kg/(m.s), specific heat C_p = 846 J/(kg.K) and thermal conductivity k = 0.01665 W/(m.K), in a pipe of diameter D = 0.01 m and length L = 1 m, and assume the viscosity does not change with temperature. The Nusselt number for a pipe with (L/D) ratio greater than 10 and Reynolds number greater than 20000 is given by "$Nu = 0.026\ Re^{0.8}\ Pr^{1/3}$". While the Nusselt number for a laminar flow for Reynolds number less than 2100 and (Re Pr D/L) < 10 is "$Nu = 1.86\ [Re\ Pr\ (D/L)]^{1/3}$". If the gas flows through the pipe with an average velocity of 0.1 m/s, the heat transfer coefficient is?	**(L1/CO3)**	**6**
B)	What is convective heat transfer? Distinguish between free and forced Convection	**(L2/CO4)**	**6**

C)	Explain the concept of hydrodynamic and thermal boundary layers with reference to flow over a flat heated plate.	**(L3/CO5)**	**6**

Q.4	**Solve Any Two of the following.**		**12**
A)	What is heat exchanger and types of heat exchanger (any 05)?	**(L2/CO5)**	**6**
B)	Derive the expression for LMTD method for an analysis of counter flow heat exchanger.	**(L3/CO2)**	**6**
C)	Water enters a parallel flow double-pipe heat exchanger at 15 ^{o}C, flowing at the rate of 1200 kg/hr. It is heated by oil (Cp =2000 J/kg.K), flowing at the rate of 500 kg/hr from an inlet temperature of 90 ^{o}C. For an area of 1 m^2 and an overall heat transfer coefficient of 1,200 W/m^2.K determine the total heat transfer and the outlet temperatures of water and oil.	**(L3/CO3)**	**6**

Q. 5	**Solve Any Two of the following.**		**12**
A)	Define shape factor. Explain relations/theorems of shape factor.	**(L2/CO5)**	**6**
B)	What is Stefan Boltzmann Law? Explain the concept of total emissive power of a surface.	**(L1/CO6)**	**6**
C)	Two very large parallel plates with emissivity 0.5 exchange heat. Determine the percentage reduction in the heat transfer rate if a polished aluminium radiation shield of emissivity = 0.25 is placed in between the plates.	**(L3/CO6)**	**6**

***** End *****

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Supplementary Summer Examination – 2023

Course: B. Tech. **Branch: Mechanical Engineering**

Semester: V

Subject Code & Name: BTMEC502 & Applied Thermodynamics I

Max Marks: 60 **Date:09/08/2023** **Duration: 3 Hr.**

Instructions to the Students:

1. *All the questions are compulsory.*
2. *The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.*
3. *Use of non-programmable scientific calculators is allowed.*
4. *Assume suitable data wherever necessary and mention it clearly.*

		(Level)	Marks
Q. 1	**Solve Any Two of the following.**		**12**
A)	Explain the requirements of good fuel	**BL_1**	**6**
B)	What is meant by term fuel? Classify fuels in detail	**BL_2**	**6**
C)	The volumetric analysis of a gas is given below as, CO_2 = 14%, CO = 1%, O_2 = 5%, N_2 = 80% Obtain the percentage analysis by mass.	**BL_4**	**6**
Q.2	**Solve Any Two of the following.**		**12**
A)	Describe with neat diagram, the construction and working of a low-pressure boiler with its specifications	**BL_4**	**6**
B)	Compare the water tube boiler with fire tube boiler. Also explain the boiler mountings and accessories.	**BL_3**	**6**
C)	Explain the Indian Boiler Regulation Act	**BL_3**	**6**
Q. 3	**Solve Any Two of the following.**		**12**
A)	Explain the Rankine vapour cycle in detail with P-V and T-S graph	**BL_4**	**6**
B)	A turbine is supplied with steam at a pressure of 32 bar and a temperature of 410 °C. The steam then expands isentropically to a pressure of 0.08 bar. Find the dryness fraction at the end of expansion **Note**: Use mollier chart and represent it with neat sketch	**BL_5**	**6**
C)	Consider an air standard cycle in which the air enters the compressor at 1.0 bar and 20°C. The pressure of air leaving the compressor is 3.5 bar and the temperature at turbine inlet is 600°C. Determine per kg of air: (i) Efficiency of the cycle, (ii) Heat supplied to air, (iii) Work available at the shaft, (iv) Heat rejected in the cooler, and	**BL_5**	**6**

(v) Temperature of air leaving the turbine.

For air $\gamma = 1.4$ and cp= 1.005 kJ/kg K.

Q.4	**Solve Any Two of the following.**		**12**
A)	Explain the term compounding of steam turbine. Also draw a sketch of velocity compounding and labelled it.	**BL_3**	**6**
B)	A single stage impulse turbine motor has a diameter of 1.2 m running at 3000 rpm. The nozzle angle is 180, blade speed ratio is 0.42. The ratio of relative velocity at outlet to relative velocity at inlet is 0.9. The outlet blade angle is 30 small than inlet blade angle. The steam flow rate is 5 Kg/sec. Draw a velocity diagram.	**BL_5**	**6**
C)	**Explain the terms** 1. Vacuum Efficiency 2. Condenser efficiency	**BL_3**	**6**

Q. 5	**Solve Any Two of the following.**		**12**
A)	Classify air compressors. Also state the applications of compressed Air	**BL_3**	**6**
B)	Explain the working of single stage reciprocating compressor with indicator (P-V) diagram	**BL_4**	**6**
C)	A single acting single stage reciprocating compressor of bore 300 mm and stoke 400 mm is required to compress air from 1 bar to 5 bar. Find the power required to drive the compressor, if it runs at 200 r.p.m. and compression is, Isothermal Adiabatic with index = 1.4 Polytropic with index = 1.3	**BL_6**	**6**

***** End *****

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Supplementary Summer Examination – 2023

Course: B. Tech. Branch : Mechanical Engineering Semester : Fifth

Subject Code & Name: BTMC503 Theory of Machines- II

Max Marks: 60 Date:11/08/2023 Duration: 3.00 Hrs.

Instructions to the Students:

1. *All the questions are compulsory.*
2. *The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in front of the question.*
3. *Use of non-programmable scientific calculators is allowed.*
4. *Assume suitable data wherever necessary and mention it clearly.*

		(Level/CO)	Marks
Q. 1	**Solve Any Two of the following.**		
A)	Explain with neat sketch the phenomena of 'slip' and 'creep' in a belt drive.	Understand/ CO1	**06**
B)	Deduce an expression for the length of belt in an open belt drive.	Analyzing / CO1	**06**
C)	A pulley is driven by a flat belt, the angle of lap being 120°. The belt is 100 mm wide by 6 mm thick and density1000 kg/m^3. If the coefficient of friction is 0.3 and the maximum stress in the belt is not to exceed 2 MPa, find the greatest power which the belt can transmit and the corresponding speed of the belt.	Evaluating / CO1	**06**
Q.2	**Solve Any Two of the following.**		
A)	Define the terms (*i*) Module (*ii*) Pressure angle (*iii*) Addendum (iv) Dedendum (v) Pitch Circle (vi) Pitch Circle diameter	Remember / CO2	**06**
B)	Classify gears on the basis of various shaft positions. Also name the application of each. Provide neat diagram wherever possible.	Apply / CO2	**06**
C)	A pinion having 30 teeth drives a gear having 80 teeth. The profile of the gears is involute with 20° pressure angle, 12 mm module and 10 mm addendum. Find the length of path of contact, arc of contact and the contact ratio.	Evaluating / CO2	**06**
Q. 3	**Solve Any Two of the following.**		
A)	Explain in short types of gear trains with line diagram. Also state the formula to find velocity ratio in each case.	Understand / CO2	**06**

B)	Describe various types of the torques in an epicyclic gear train and their relationship with neat sketch.	Remember / CO2	**06**
C)	In an epicyclic gear train, an arm carries two gears A and B having 36 and 45 teeth respectively. If the arm rotates at 150 rpm. in the anticlockwise direction about the centre of the gear A which is fixed, determine the speed of gear B. If the gear A instead of being fixed, makes 300 rpm. in the clockwise direction, what will be the speed of gear B?	Evaluating / CO2	**06**

Q.4 Solve Any Two of the following.

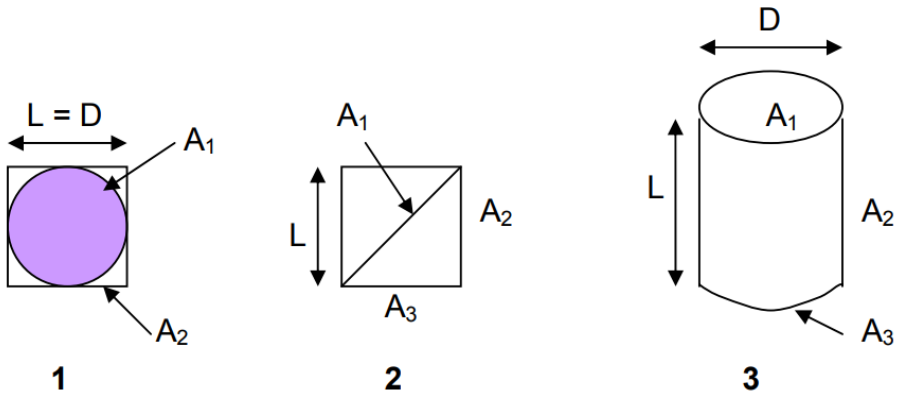
A)	Define the following terms relating to governors : (1) Stability (2) Sensitiveness (3) Isochronism (4) Hunting (5) Effort of Governor (6) Power of Governor	Remember / CO3	**06**
B)	Explain the turning moment diagram of a four stroke cycle internal combustion engine. Also explain the role of flywheel in IC Engine.	Understand / CO4	**06**
C)	The turbine rotor of a ship has a mass of 3500 kg. It has a radius of gyration of 0.45 m and a speed of 3000 rpm clockwise when looking from stern. Determine the gyroscopic couple and its effect upon the ship: 1. When the ship is steering to the left on a curve of 100 m radius at a speed of 36 km/h. 2. When the ship is pitching in a simple harmonic motion, the bow falling with its maximum velocity. The period of pitching is 40 seconds and the total angular displacement between the two extreme positions of pitching is 12 degrees.	Applying / CO5	**06**

Q. 5 Solve Any Two of the following.

A)	Discuss briefly with neat sketch the longitudinal, transverse and torsional free vibration.	Remember / CO6	**06**
B)	Derive an expression for prediction of natural frequency of vibration for single spring mass system.	Understand / CO6	**06**
C)	Explain and Derive expression for critical or whirling speed of shaft**.**	Analyzing / CO6	**06**

***** End *****

	DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE **Winter Examination – 2022** **Course: B. Tech. Branch :Mechanical Engineering Semester : V** **Subject Code & Name: BTMC 501 & Heat Transfer** **Max Marks: 60 Date: 28/01/2023 Duration: 3 Hr.**		
	Instructions to the Students: *1. All the questions are compulsory.* *2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.* *3. Use of non-programmable scientific calculators is allowed.* *4. Assume suitable data wherever necessary and mention it clearly.*		
		(Level/CO)	Marks
Q. 1	**Solve Any Two of the following.**		**12**
A)	Air at 20 °C blows over a 50 cm x 75 cm hot plate at 250 °C. The film heat transfer coefficient is 25 W/m^2 .K. 300 W is lost from the plate surface by radiation. Calculate heat transfer rate and other side plate temperature. Thermal conductivity of the plate material is 43 W/m .K. The plate is 2 cm thick.	**(L3/CO1)**	**6**
B)	What is thermal conductivity? List the factors affecting the thermal conductivity.	**(L1/CO2)**	**6**
C)	An insulating powder is densely packed in the annular space between two concentric spheres with radii 75 mm and 50 mm. The inner sphere is uniformly heated with electric power input of 30 W. Steady state temp attained by the inner sphere is 120 °C and that by outer surface is 30 °C. Neglecting the thermal resistance offered by the spheres: a) Draw analogous electrical cct diagram b) Calculate thermal conductivity of the powder	**(L3/CO1)**	**6**
Q.2	**Solve Any Two of the following.**		**12**
A)	Derive an equation to find heat dissipation from an infinitely long-fin.	**(L2/CO3)**	**6**
B)	Explain in brief, initial and boundary conditions.	**(L1/CO2)**	**6**
C)	Derive general heat conduction equation for Cartesian coordinate system.	**(L1/CO1)**	**6**
Q. 3	**Solve Any Two of the following.**		**12**
A)	Write a note on a) Forced Convection b) Free Convection c) Radiation.	**(L1/CO1)**	**6**
B)	A hot rectangular plate 5 cm X 3 cm maintained at 200 °C is exposed to still air at 30 °C. Calculate percentage increase in convective heat transfer rate if smaller side of the plate is held vertical than the bigger side. Neglect ITG of the thickness. Use Correlation $Nu=0.59\ (Gr.Pr)^{0.25}$	**(L3/CO4)**	**6**

	Air properties at 115 °C: density = 0.91 kg/m^3; C_p=1.009 kJ/kg K; μ=22.65x10^{-6} N s/m^2; k=0.0331 W/m K.		
C)	Water flows at 360 kg/hr. through a metallic tube of 10 mm diameter and 3 m length. It enters the tube at 25 °C. Outer surface of the tube is maintained at a constant temp of 100 °C. Calculate the exit temp of the water. Properties of water: μ=5.62x10^{-4} kg/m s; C_p=4174 J/kg K; k=0.664W/m K. Use the following correlation: N_u =0.023$Re^{0.8}$ $Pr^{0.4}$ for turbulent flow N_u =3.66 for laminar flow	**(L3/CO4)**	**6**
Q.4	**Solve Any Two of the following.**		**12**
A)	Derive the expression for LMTD method for an analysis of parallel flow heat exchanger.	**(L2/CO5)**	**6**
B)	Write a short note on Overall Heat Transfer Coefficient for plate heat exchanger.	**(L1/CO5)**	**6**
C)	A double pipe parallel flow heat exchanger use oil (C_p = 1.88 kJ/kg.K) at an initial temperature of 205°C to heat water, flowing at 225 kg/hr. from 16°C to 44°C. The oil flow rate is 270 kg/hr. a) What is the heat transfer area required for an overall heat transfer coefficient of 340 W/m^2.K. b) Determine the number of transfer unit (NTU). c) Calculate the effectiveness of the heat exchanger.	**(L3/CO5)**	**6**
Q. 5	**Solve Any Two of the following.**		**12**
A)	Determine the view factors F12 and F21 for the following geometries:  1) Sphere of diameter D inside a cubical box of length L = D. 2) Diagonal partition within a long square duct. 3) End and side of a circular	**(L3/CO6)**	**6**

	tube of equal length and diameter, L = D.		
B)	State various shape factor relations (algebra) in radiation heat transfer.	**(L1/CO6)**	**6**
C)	Find out heat transfer rate due to radiation between two infinitely long parallel planes. One plane has emissivity of 0.4 and is maintained at 200 °C. Other plane has emissivity of 0.2 and is maintained at 30 °C. If a radiation shield (ε=0.5) is introduced between the two planes, find percentage reduction in heat transfer rate and steady state temp of the shield.	**(L2/CO6)**	**6**
	***** End *****		

The grid and the borders of the table will be hidden before final printing.

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Winter Examination – 2022

Course: B. Tech. **Branch : Mechanical Engineering** **Semester : V**

Subject Code & Name: BTMC 502 Machine Design - I

Max Marks: 60 **Date: 31/01/23** **Duration: 3 Hr.**

Instructions to the Students:

1. *All the questions are compulsory.*
2. *The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.*
3. *Use of non-programmable scientific calculators is allowed.*
4. *Assume suitable data wherever necessary and mention it clearly.*

		(Level/CO)	Marks
Q. 1	**Solve Any Two of the following.**		**12**
A)	Write answers of following multiple choice questions.	**1/2**	**6**

1) Components made of brittle materials fails because of……

(A) Sudden fracture (B) Yielding (C) Elastic deflection (D) All of the above

2) The following item(s) is (are) produced by the craft evolution process..

(A) Rowing boat (B) Musical instruments

(C) Bullock cart (D) All of the above

3) Ergonomics means….

(A) External appearance (B) Natural laws of work

(C) Streamline shape (D) All of the above

4) A sunk key fits in the keyway of the …..

(A) Hub only (B) Sleeve only

(C) Both hub and sleeve (D) Neither hub nor sleeve.

5) Woodruff key permits ……. movement between shaft and the hub.

(A) Axial (B) Radial (C) Eccentric (D) None of the listed

6) A tension member of 40 mm diameter is to be replaced by a square of same material; side of square will be…..

(A) 40 mm (B) 36 mm (C) 60 mm (D) 25 mm

B)	1) Distinguish between design synthesis and design analysis. 2) What is standardization? Explain its importance in design.	**1/2**	**6**
C)	Write short note on :- 1) Aesthetic considerations in design. 2) Factor of safety and its selection	**1/2**	**6**
Q.2	**Solve Any Two of the following.**		**12**
A)	Explain the construction and working principal of cotter joint with the help of neat diagram.	**2/2**	**6**
B)	The stress induced at a critical point in a machine component made of 45C8 (S_{yt} = 380 N/mm^2) are as follows, σ_x = 100 N/mm^2 σ_y = 40 N/mm^2 τ = 80 N/mm^2 Calculate factor of safety by 1) Maximum normal stress theory 2) Maximum shear stress theory 3) The distortion energy theory	**2/3**	**6**

C) A wall bracket with a rectangular cross section is as shown in the Figure 1, the depth of the cross section is twice that of the width. The force P is acting on the bracket at 60 degree to the vertical is 6 KN. The material is made of Gray cast iron FG 250 and the factor of safety is 3. Determine the dimensions of the cross section of the bracket. Assume maximum normal stress theory of failure. **2/4** **6**

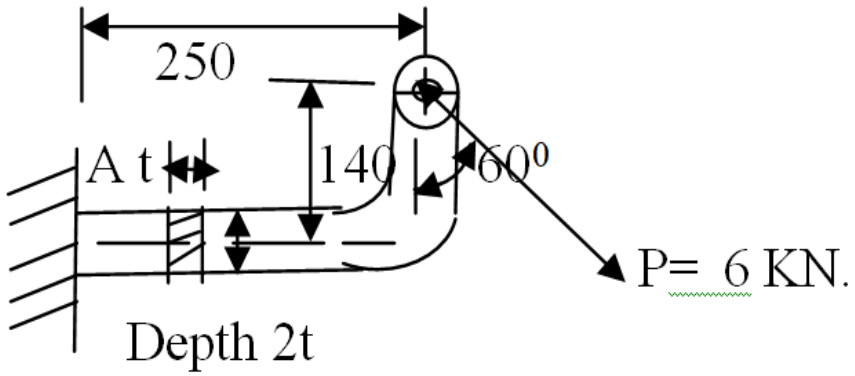


Figure 1. (All dimensions are in mm)

Q. 3 **Solve Any Two of the following.** **12**

A) 1) What is the stress concentration? Explain the various methods of reducing stress concentration. **1/2** **6**

2) What is fluctuating stress? Draw a stress – time curve for fluctuating stress.

3) Explain the terms fatigue failure & fatigue life?

B) A plate made of steel 20C8 (S_{ut} = 400 N/mm^2) in hot rolled and normalized condition is as shown in the Figure 2. It is subjected to completely reversed axial load of 30 KN. The notch sensitivity factor can be taken as 0.8 and the expected reliability is 0.85. The factor of safety is 2. Determine the plate thickness for infinite life. Use the below data if required **2/5** **6**

K_a = 0.67, K_b = 0.85, K_c = 0.897, K_t = 2.51

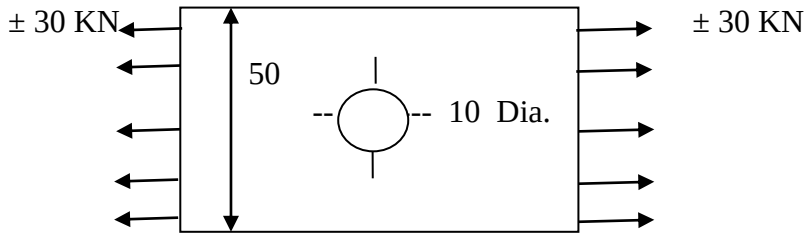


Figure 2. (All dimensions are in mm)

C) A transmission shaft of cold drawn steel 27Mn2 (S_{ut} = 500 N/mm^2 and S_{yt} = 300 N/mm^2) is subjected to a fluctuating torque which varies from -100 N-m to + 400 N-m. If Factor of safety is 2 and expected reliability is 90 %. Neglecting the effect of stress concentration, determine the diameter of shaft assuming distortion theory of failure. Use the below data if required K_a = 0.79, K_b = 0.85, K_c = 0.897 **2/5** **6**

Q.4 Solve Any Two of the following. **12**

A) What is the function of keys? Explain the different types of keys along with their neat sketches. **1/2** **6**

B) A shaft made of plain carbon steel 40C8 (S_{yt} = 380 N/mm^2) is mounted with pulley 1000 mm in diameter overhang the left hand bearing by 250 mm. The belts mounted on it transmit the power to machine shaft below the pulley. Tension on tight side and slack side are 3 KN and 1 KN respectively. The weight of pulley is 500 N. The angle of wrap is 180 degree. If factor of safety is 3, determine the diameter of the shaft. **3/6** **6**

C) A flexible coupling is used to transmit 15 KW at 100 rpm. There are 6 pins at pitch circle diameter (PCD) 200 mm. the effective length of the bush is 35 mm. the gap is 5 mm and pin length is 23 mm. The permissible shear and bending stress for the pin are 35 N/mm^2 & 152 N /mm^2 respectively. Calculate the pin diameter under shear and bending consideration. **2/6** **6**

Q. 5 Solve Any Two of the following. **12**

A) 1) What is the cause of residual stresses in welded joint? How are they relieved? **1/2** **6**

2) Explain the surge phenomena in spring and methods to avoid the same.

B) A helical compression spring made of circular wire is subjected to an axial force which varies from 2.5 KN to 3.5 KN. Over this range of force, the deflection of the spring is 5 mm .the spring index can be taken as 5. The spring has square and ground ends. The spring is made of cold drawn steel wire with ultimate tensile strength of 1050 N/mm^2 and modulus of rigidity of 81370 N/mm^2. The permissible shear strength for the spring wire should be taken as 50 % of the ultimate tensile strength. **3/6** **6**

Design the spring and calculate

a) Wire diameter,

b) Mean coil diameter,

c) Number of active coils,

d) Total number of coils.

e) Solid length of the spring,

f) Free length of the spring.

C) A single start square threaded screw is used in a screw press to exert a force of 75 KN. The screw is made of plain carbon steel 10C4 having ultimate strength = 350 N/mm^2 and factor of safety of 4. The permissible compressive stress is equal to permissible tensile stress and permissible shear stress is 50% of permissible tensile stress. The nut is made of grey cast iron FG200 and permissible bearing pressure between contacting surfaces of screw and nut is 17 MPa. A low friction thrust ball bearing is used in the mechanism and collar friction can be neglected. The coefficient of friction at the thread surface between steel screw and cast iron nut can be taken as 0.15. Determine the size **3/6** **6**

of screw and length of nut. The axial length of threads in the nut should be between 1- 1.5 times the nominal diameter of the screw. (Use the below data)

Sr. No	Nominal diameter, d (mm)	Pitch, p (mm)
1	30,32, 36	6
2	40 , 44	7

***** End *****

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Winter Examination – 2022

Course: B. Tech. **Branch : Mechanical Engineering** **Semester : V**

Subject Code & Name: BTMC503 Theory of Machines- II

Max Marks: 60 **Date:02/02/2023** **Duration: 3.00 Hrs.**

Instructions to the Students:

1. *All the questions are compulsory.*
2. *The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in front of the question.*
3. *Use of non-programmable scientific calculators is allowed.*
4. *Assume suitable data wherever necessary and mention it clearly.*

		(Level/CO)	Marks
Q. 1	**Solve any two of the following.**		**12**
A)	Explain with Figure types of Flat belt drives.	Understand	**4**
	Compare flat and V-Belt drive.	/CO1	**2**
B)	Derive the formula for Ratio of Driving tensions in Flat belt drive.	Evaluate/ CO1	**6**
C)	The power is transmitted from pulley 1.5m diameter running at 210 RPM to a pulley 2.25 m diameter by means of belt. Find the speed lost by driven pulley as a result of creep, if the stress on tight and slack side of belt is 1.5Mpa and 0.5 Mpa respectively the young's modulus for belt material is 100Mpa.	Evaluate/ CO1	**6**
Q.2	**Solve any two of the following.**		**12**
A)	Explain terminology of helical gear with diagram.	Understand / CO2	**6**
B)	A pinion having 35 teeth drives gear having 80 teeth. The profile of gears is involute with 20° pressure angle, 12mm module and 10mm addendum Find the length of path of contact, arc of contact and contact ratio.	Evaluate/ CO2	**6**
C)	State and prove law of gearing.	Evaluate/ CO2	**6**
Q. 3	**Solve any two of the following.**		**12**
A)	Explain types of gear trains with neat sketch.	Understand / CO2	**6**

B)	In an Epicyclic gear train an arm carries two gears A and B having 36 to 45 teeth respectively if the arm rotates at 150 rpm in anticlockwise direction about centre of gear A which is fixed, determine the speed of gear B. If the gear A instead of being fixed makes 300 rpm in clockwise direction, what will be speed of gear B?	Evaluate/ CO2	**6**
C)	Explain differential gear box and draw table of motion for it.	Understand /CO2	**6**
Q.4	**Solve Any Two of the following.**		**12**
A)	Give detailed classification of governors.	Understand /CO3	**6**
B)	Explain coefficient of fluctuation of Energy and speed in case of flywheel.	Understand /CO4	**6**
C)	Explain the effect of Gyroscopic couple on Naval ship during Steering, Pitching and rolling.	Understand /CO5	**6**
Q. 5	**Solve any two of the following.**		**12**
A)	Explain the terms longitudinal vibrations, transverse vibrations and torsional vibrations with neat sketch and application of each.	Understand /CO6	**6**
B)	Compare natural (free) vibration with forced vibration. Also provide two examples for each.	Apply/ CO6	**6**
C)	A cantilever shaft 50 mm diameter and 300 mm long has a disc of mass 100 kg at its free end. The Young's modulus for the shaft material is 200 GN/m. Determine the frequency of longitudinal and transverse vibrations of the shaft.	Evaluate/ CO6	**6**

***** End *****

	DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE **Winter Examination – 2022** **Course: B. Tech. Branch : Mechanical Engineering Semester : V** **Subject Code & Name: Applied Thermodynamics (BTMC506)** **Max Marks: 60 Date: Duration: 3 Hr.**		
	Instructions to the Students: *1. All the questions are compulsory.* *2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.* *3. Use of non-programmable scientific calculators is allowed.* *4. Use of steam table and Mollier diagram is allowed* *5. Assume suitable data wherever necessary and mention it clearly.*		
		(Level/CO)	Marks
Q. 1	**Solve Any Two of the following.**		**12**
A)	How flue gas analysis is done by using Orsat apparatus, Explain by using a neat sketch.	(Understand/ CO1)	6
B)	% composition of liquid fuel by mass is C = 84.8 % , H_2 = 15.2 % . Calculate i) minimum air required ii) composition of product of combustion if 15 % excess air is supplied.	(Apply /CO1)	**6**
C)	% volumetric analysis of a sample of flue gases of a coal fired boiler gave CO_2 = 10.4 %, CO = 0.2 % , O_2 = 7.8% and N_2 = 81.6%. Gravimetric analysis of coal was C = 78 % , H_2 = 6 %, O_2 =3 % and incombustible = 13 %. Estimate i) Minimum amount of air required ii) Air fuel ratio	(Apply /CO1)	**6**
Q.2	**Solve Any Two of the following.**		**12**
A)	Distinguish between induced draught and forced draught	(Understand/ CO3)	**6**
B)	A Lancashire boiler generates 2400 kg of dry saturated steam per hour at a pressure of 11 bar. The grate area is 3 m^2 and 100 kg of coal is burnt per m^2 of grate area per hour. Calorific value of coal is 32000 kJ/kg and the temperature of feed water is 25^0 C . Determine i) factor of evaporation ii) equivalent evaporation iii) boiler efficiency.	(Apply /CO3)	**6**
C)	A boiler is equipped with a chimney of 30 meter height. The flue gases which pass through the chimney are at a temperature of 288 ^{0}C, whereas the atmospheric temperature is 18^0C. If the air flow through the chamber is 18 kg / kg of fuel, find i) theoretical draught in mm of water ii) velocity of flue gases passing through chimney , if 50 % draught is lost in friction.	(Apply /CO3)	**6**

Q. 3	**Solve Any Two of the following.**		**12**
A)	Represent the ideal Reheat cycle on the P-V & T-S diagram and derive the equation for its thermal efficiency.	(Understand/ CO2)	**6**
B)	A steam power plant is supplied with dry saturated steam at a pressure of 12 bar and exhausts into a condenser at 0.1 bar. Calculate i) turbine work per kg of steam ii) pump work per kg of steam iii) Rankine efficiency.	(Apply /CO2)	**6**
C)	Dry saturated steam at a pressure of 10 bar enters in a nozzle and with initial velocity of 90 m/s. The outlet pressure is 6 bar and outlet velocity is 435 m/s. The heat loss from the nozzle is 9 kJ/kg of steam flow. calculate the dryness fraction of steam and area at exit if inlet area is 1256 mm^2 .	(Apply /CO4)	**6**
Q.4	**Solve Any Two of the following.**		**12**
A)	What are the sources of air leakage in steam condensers ? What is the effect of air leakage on condenser performance and how to eliminate air leakage in condensers ?	(Understand/ CO4)	**6**
B)	In a surface condenser, the vacuum maintained is 700 mm of Hg. The barometer reads 754 mm of Hg, if the temperature of condensate is 18 ^{0}C, determine i) mass of air per kg of steam ii) vacuum efficiency.	(Apply /CO4)	**6**
C)	Write short note on compounding of steam turbines	(Understand/ CO3)	**6**
Q. 5	**Solve Any two of the following.**		**12**
A)	Derive expression for word done per cycle for the reciprocating air compressor without clearance.	(Understand/ CO5)	**6**
B)	A single stage , single acting reciprocal compressor has a bore of 200 mm and stroke of 300 mm. It receives air at 1 bar and 20 ^{0}C, delivers it at 5.5 bar. If the compression follows law $PV^{1.3}$=C and clearance is 5 % of stroke , determine , i) mean effective pressure ii) power required to drive the compressor if it runs at 500 rpm.	(Apply /CO5)	**6**
C)	Differentiate between rotary compressor and reciprocating compressor	(Understand/ CO5)	**6**
	***** End *****		

	DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE **Supplementary Examination – Summer 2022** **Course: B. Tech. Branch : Mechanical Engineering Semester : V** **Subject Code & Name: BTMEC501 & Heat Transfer** **Max Marks: 60 Date: Duration: 3 Hr.**		
	Instructions to the Students: *1. All the questions are compulsory.* *2. Use of Heat Transfer data book is allowed.* *3. Use of non-programmable scientific calculators is allowed.* *4. Assume suitable data wherever necessary and mention it clearly.*		
		(Level/CO)	Marks
Q. 1	**Solve Any Two of the following.**		
A)	**A gas filled tube has 2 mm inside diameter and 25 cm length. The gas is heated by an electrical wire of diameter 50 microns(0.05 mm) located along the axis of the tube. Current and voltage drop across the heating element are 0.5 amps and 4 volts, respectively. If the measured wire and inside tube wall temperatures are 175 ^oC and 150 ^oC respectively, find the thermal conductivity of the gas filling the tube.**	**L3/CO1**	**06**
B)	**Derive an equation for heat conduction through composite cylinder with neat sketch.**	**L1/CO1**	**06**
C)	**An electric hot plate is maintained at a temperature of 350 ^oC, and is used to keep a solution boiling at 95 ^oC. The solution is contained in a cast-iron vessel of wall thickness 25 mm, which is enamelled inside to a thickness of 0.8 mm. The heat transfer coefficient for the boiling solution is 5.5 kW/m^{2}K, and the thermal conductivities of the cast iron and enamel are 50 and 1.05 W/mK, respectively. Calculate:** **(i) The overall heat transfer coefficient.** **(ii) The rate of heat transfer per unit area.**	**L1/CO1**	**06**
Q.2	**Solve Any Two of the following.**		
A)	**Write the assumptions made for the analysis of heat flow through fin. Derive an equation to find heat dissipation from a fin insulated at the tip.**	**L1/CO3**	**06**
B)	**Derive an equation to find critical thickness of insulation for sphere.**	**L1/CO2**	**06**
C)	**What is meant by transient heat conduction? Explain the significance of Heisler charts in solving transient conduction problems.**	**L2/CO2**	**06**
Q. 3	**Solve Any Two of the following.**		

A)	**What are the assumptions for momentum equation for hydrodynamic boundary layer over a flat plate, derive an expression for the same.**	**L1/CO4**	**06**
B)	**Air at 20 ^oC is flowing over a flat plate which is 200 mm wide and 500 mm long. The plate is maintained at 100 ^oC. Find the heat loss per hour from the plate if the air is flowing parallel to 500 mm side with 2 m/s velocity. What will be the effect on heat transfer if the flow is parallel to 200 mm side. The properties of air at (100+20)/2=60 ^oC are k= 0.025 W/m ^oC and Pr=0.7, ν=18.97 *10^{-6} m^2/s.**	**L3/CO4**	**06**
C)	**Calculate the heat transfer from a 60 W incandescent bulb at 115 ^oC to ambient air at 25 ^oC. Assume the bulb as sphere of 50 mm diameter. Also, find the percentage of power lost by free convection. The correlation is given by: $Nu= 0.60 (Gr*Pr)^{1/4}$**	**L3/CO4**	**06**
Q.4	**Solve Any Two of the following.**		
A)	**Explain briefly the various regimes of saturated pool boiling with neat sketch.**	**L1/CO5**	**06**
B)	**Derive an equation to determine LMTD for parallel flow heat exchanger.**	**L1/CO5**	**06**
C)	**An oil cooler for a lubrication system has to cool 1000 kg/h of oil (Cp=2.09 kJ/kg ^oC from 80^oC to 40^oC by using a cooling water flow of 1000 kg/h at 30^oC. Give your choice for parallel flow or counter flow heat exchanger, with reasons. Calculate the surface area of the heat exchanger, if the overall heat transfer coefficient is 24 $W/m^{2o}C$. Take Cp of water =4.18 kJ/kg ^oC.**	**L3/CO5**	**06**
Q. 5	**Solve Any Two of the following.**		
A)	**For a hemispherical furnace, the flat floor is at 700K and has emissivity of 0.5. The hemispherical roof is at 1000K and has emissivity of 0.25. Find the net radiative heat transfer from roof to floor.**	**L3/CO6**	**06**
B)	**State and prove reciprocity theorem with neat sketch.**	**L1/CO6**	**06**
C)	**Two large parallel plates with ε =0.5 each, are maintained at different temperatures and are exchanging heat only by radiation. Two equally large radiation shields with surface emissivity 0.05 are introduced in parallel to the plates. Find the percentage reduction in net radiative heat transfer.**	**L3/CO6**	**06**
	***** End *****		

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Supplementary Examination – Summer 2022

Course: T.Y. B. Tech. Branch : Mechanical Engineering Semester : V

Subject Code & Name: Applied Thermodynamics-I & BTMEC502

Max Marks: 60 Date: Duration: 3 Hr.

Instructions to the Students:

1. *All the questions are compulsory.*
2. *Use of non-programmable scientific calculators and steam table is allowed.*
3. *Assume suitable data wherever necessary and mention it clearly.*

Q. 1 Solve Any Two of the following. (6 x 2) 12 M

A) Derive the combustion equation for hydrocarbon (solid) fuels

B) Explain the working of La-Mont Boiler giving its principle and schematic sketch.

C) Define Calorific value and distinguish between gross calorific value and net calorific value.

Q.2 Solve Any Two of the following. (6 x 2) 12 M

A) List any two Accessories and Mountings. Explain Economizer in details with the help of neat sketch.

B) Describe with a neat diagram, the construction and working of a Babcock and Wilcox water tube boiler.

C) Give the detailed classification of draught. Also explain with neat sketch Induced mechanical draught.

Q. 3 Solve Any Two of the following. (6 x 2) 12 M

A) Explain ideal Rankine cycle on P-V, T-S & h-s diagram also derive the expression for thermal efficiency of cycle.

B) Classify steam turbine. Differentiate between impulse and reaction steam turbines

C) Define steam condenser. Explain surface condenser in detail.

Q.4 Solve Any Two of the following. (6 x 2) 12 M

A) What is use of cooling tower used in steam power plant? Explain Induced draught cooling tower with neat sketch.

B) Define nozzle; Also derive expression for condition for maximum discharge through the steam nozzle.

C) A single acting reciprocating air compressor has cylinder diameter and stroke of 200 mm and 300 mm respectively. The compressor sucks air at 1 bar and 27^0 C and delivers at 8 bars while running at 100 r.p.m. Find: a. Indicated power of compressor; b. Mass of air delivered by the compressor per minute; c. Temperature of the air delivered by the compressor.

Q. 5 Solve Any Two of the following. **(6 x 2)** **12 M**

A) Draw and explain in short P-V diagram of single stage Reciprocating compressor with and without clearance

B) The following observations were made on a boiler plant during one hour test:
Steam pressure = 20 bar; Steam temperature = 260^0 C; Steam generated = 37500 kg; Temperature of water entering the economizer = 15^0 C; Temperature of water leaving the economizer = 90^0 C; Fuel used = 4400 kg; Energy of combustion of fuel = 30 000 kJ/kg. Calculate:

a. The equivalent evaporation per kg;

b. The thermal efficiency of the plant;

c. The percentage heat energy of the fuel energy utilized by the economizer.

C) With the help of neat sketch explain the working of centrifugal compressor. Also write down the formula to calculate the work done by centrifugal compressor for different processes.

***** End *****

	DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE **Supplementary Examination – Summer 2022** **Course: T.Y. B. Tech. Branch: Mechanical Semester: V** **Subject Code & Name: BTMEC503 (Machine Design I)** **Max Marks: 60 Date: Duration: 3 Hr.**		
	Instructions to the Students: *1. All the questions are compulsory.* *2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.* *3. Use of non-programmable scientific calculators is allowed.* *4. Assume suitable data wherever necessary and mention it clearly.*		
		(Level/CO)	Marks
Q. 1	**Solve Any Two of the following.**		
A)	Define and explain Fatigue failure, Endurance limit, Notch sensitivity	**CO2**	**6**
B)	Explain the Rankin's theory of failure	**CO2**	**6**
C)	Explain Maximum shear stress theory	**CO3**	**6**
Q.2	**Solve Any Two of the following.**		
A)	Assume the data of the transmission shaft given in Example 9.5. For this shaft, the permissible angle of twist is 3°/meter length. The modulus of rigidity of the shaft material is 79300 N/mm² . Calculate: (i) the permissible angle of twist; and (ii) the shaft diameter on the basis of torsional rigidity.	**CO2**	**6**
B)	A solid shaft is transmitting 1 MW at 240 rpm. Determine the diameter of the shaft if the maximum torque transmitted exceeds the mean torque by 20%. Take the maximum allowable shear stress as 60 MPa	**CO1**	**6**
C)	Explain Aesthetic and ergonomic consideration in design	**CO3**	**6**
Q. 3	**Solve Any One of the following.**		
A)	Explain with diagram design procedure of knuckle joint	**CO3**	**12**
B)	What are the different types of springs? Explain with neat sketch.	**CO2**	**12**
C)	Explain Design procedure for Muff Coupling.	**CO2**	**12**
Q.4	**Solve Any Two of the following.**		
A)	Illustrate design procedure for square key	**CO1**	**6**
B)	What is a butt weld joint? Discuss design of butt weld .joint under tension.	**CO2**	**6**
C)	Write note on Creep.	**CO1**	**6**

Q. 5	**Solve Any One of the following.**		
A)	It is required to design a helical compression spring subjected to amax. Force of 7.5 kN. The mean coil diameter should be 150 mm from space consideration. The spring rate is 75N/mm. The spring is made up of oil hardened and tempered steel with ultimate tensile strength of 1250 N/mm². The permissible shear stress for the spring wire is 30% of the ultimate tensile strength (G = 81370N/mm²) Calculate: (1) Wire Diameter (2) No. of active coil.	**CO3**	**12**
B)	A rigid Coupling is used to transmit 50 kw power at 300 rpm. There are 6 bolts. The outer diameter of the flanges is 200 mm, while the recess diameter is 150 mm. The bolts are made of steel 45C8(Syt = 380N/mm²) and the factor of safety is 3.Determine the diameter of the bolts. Assume the bolts are fitted in large clearance hole.	**CO2**	**12**
	***** End *****		

The grid and the borders of the table will be hidden before final printing.

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE – RAIGAD -402 103

End Semester Examination: Supplementary – 2022-23

Branch: Mechanical Engg. (Third Year B.Tech.) **Sem.:- V**
Subject with Subject Code:- Theory of Machines -II **(BTMEC504)**
Marks: 60
Date:- January 2023 **Time:- 3 Hrs.**

==========

Instructions:-

1. Figures to the right indicate full marks.
2. Clearly mention the main question number along with the sub questions.
3. Assume suitable data, if necessary.
4. All questions are compulsory.

Q.No.	Question	Marks	CO
1	Solve **Any Two**:		
	a) A belt drive transmits 8 kW of power from a shaft rotating at 240 rpm to another shaft rotating at 160 rpm. The belt is 8 mm thick. The diameter of smaller pulley is 600 mm & the two shafts are 5 m apart. The coefficient of friction is 0.25. If the maximum stress in the belt is limited to 3 N/mm^2, find the width of the belt for i. An open belt drive, and ii. A crossed belt drive	**06**	**CO1**
	b) What are the different types of pulleys? Explain briefly.	**06**	**CO1**
	c) Derive the relation for ratio of belt tensions in a flat belt drive	**06**	**CO1**
2	Solve **Any Two**:		
	a) State & derive law of gearing with neat sketch.	**06**	**CO2**
	b) Make a comparison of Cycloidal & Involute tooth forms.	**06**	**CO2**
	c) A pair of spur gears consists of a 20 teeth pinion meshing with a 120 teeth gear. The module is 4 mm. Calculate (i) the centre distance; (ii) the pitch circle diameters of the pinion and the gear; (iii) the addendum and dedendum; (iv) the tooth thickness; (v) the gear ratio.	**06**	**CO2**
3	Solve **Any Two**:		
	a) What is a gear train? What are its main types (with sketches)?	**06**	**CO2**
	b) Sketch a automotive differential gear box & explain its working.	**06**	**CO2**
	c) An epicyclic gear train is shown in Fig.1. The number of teeth on A & B are 80 & 200. Determine the speed of the arm *a.* (i) If A rotates 100 rpm clockwise & B at 50 rpm counter-clockwise. (ii) If A rotates 100 rpm clockwise & B is stationary.	**06**	**CO2**

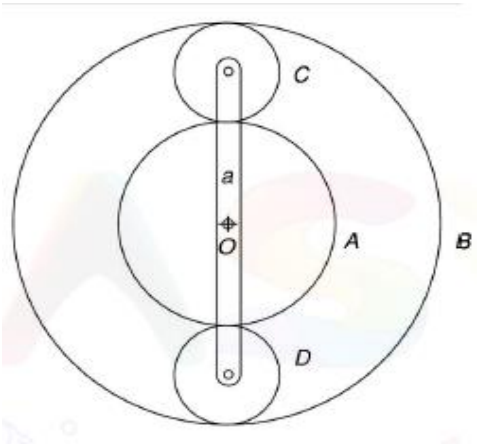


Fig.1

4 Solve **Any Two**:

a) The turning moment diagram of a multi-cylinder engine is drawn with a scale of (1 mm = 1°) on the abscissa and (1 mm = 250 N-m) on the ordinate. The intercepted areas between the torque developed by the engine and the mean resisting torque of the machine, taken in order from one end are – 350, + 800, – 600, + 900, – 550, + 450 and –650 mm^2. The engine is running at a mean speed of 750 rpm and the coefficient of speed fluctuations is limited to 0.02. A rimmed flywheel made of grey cast iron FG 200 (ρ = 7100 kg/m3) is provided. The spokes, hub and shaft are assumed to contribute 10% of the required moment of inertia. The rim has rectangular cross-section and the ratio of width to thickness is 1.5.Determine the dimensions of the rim. **06** **CO4**

b) Explain the terms sensitiveness, hunting, stability, isochronisms & effort of governor relating to the governors. **06** **CO3**

c) Sketch a Hartnell governor. Describe its function & deduce a relation to find the stiffness of the spring. **06** **CO3**

5 Solve **Any Two**:

a) A ship is propelled by turbine rotor having a mass of 6 tonnes & a speed of 2400 rpm. The direction of rotation of the rotor is clockwise when viewed from stern. The radius of gyration of the rotor is 450 mm. Determine the gyroscopic couple & its effect when **06** **CO5**

i. The ship steers to the left in a curve of 60 m radius at a speed of 18 knots (1 knot = 1860 m/h)

ii. The ship pitches 7.5 degrees above & 7.5 degrees below the normal position & the bow is descending with its maximum velocity; the pitching motion is simple harmonic with a periodic time of 18 seconds.

iii. The ship rolls & at the instant, its angular velocity is 0.035 rad/s counter clockwise when viewed from stern

iv. Also find the maximum angular acceleration during pitching

b) Explain in what way the gyroscopic couple affects the motion an aircraft & naval ship? **06** **CO5**

c) How do the effects of gyroscopic couple & of centrifugal force make the rider of a two wheeler tilt on one side? Derive a relation for angle of heel. **06** **CO5**

6 Solve **Any Two**:

a) Explain the whirling of vertical shaft carrying a single rotor without damping & derive the equation for deflection of the shaft. **06** **CO6**

b) Determine the natural frequency of the system shown in Fig.2. **06** **CO6**

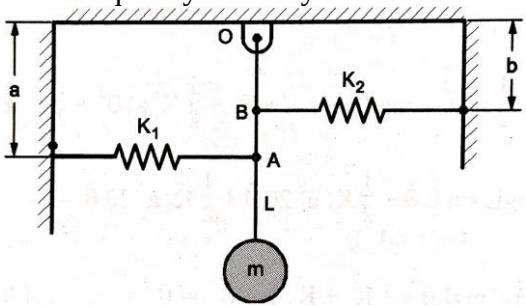


Fig.2.

c) In a forced vibratory system a body having 2 kg mass vibrates in a viscous fluid. The harmonic exciting force of 20 N acting on the mass result in a resonance amplitude of 15 mm with a period of 0.15 sec. Determine the damping coefficient of viscous fluid. **06** **CO6**

If the system is excited by the same harmonic force but at a frequency of 5 cycles /sec. what will be the amplitudes of forced vibration with & without damper?

****

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Supplementary Examination – Summer 2022

Course: T.Y. B. Tech. **Branch: Mechanical Engineering** **Semester: V**

Subject Code & Name: BTMEC505 & Metrology and Quality Control

Max Marks: 60 **Date:** **Duration: 3 Hr.**

Instructions to the Students:

1. *All the questions are compulsory.*
2. *The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.*
3. *Use of non-programmable scientific calculators is allowed.*
4. *Assume suitable data wherever necessary and mention it clearly.*

		(Level/CO)	Marks
Q. 1	**Solve Any Two of the following.**		
A)	Difference between line measurement and end measurement	CO1	06
B)	Explain the need of measurement, possible error in measurement and precautions to be taken to eliminate errors.	CO1	06
C)	Define/Explain following terms, i) Accuracy and Precision ii) Measurement and Calibration iii) Standard and Limit	CO1	06
Q.2	**Solve Any Two of the following.**		
A)	Draw a neat sketch of sigma comparator and explain its working	CO2	06
B)	What are various angle measurement methods. Explain any one with the help of neat sketch	CO2	06
C)	Explain the working of pneumatic comparators with a neat sketch state its advantages and limitations	CO2	06
Q. 3	**Solve Any Two of the following.**		
A)	State the principle of interferometer and explain how it is used in checking flatness and angle	CO2	06
B)	Define surface roughness and explain CLA method for measurement of surface roughness	CO2	06
C)	Sketch different types of texture and direction of lay obtained during measuring operation	CO3	06
Q.4	**Solve Any Two of the following.**		
A)	What are different methods for measurement of pitch diameter. Explain two wire method with neat sketch	CO4	06
B)	What are the different methods for the measurement for the measurement of effective diameter of screw thread	CO4	06
C)	Different errors in screw threads	CO4	06
Q. 5	**Solve Any Two of the following.**		
A)	Difference between quality control and quality assurance	CO5	06
B)	Explain the concept of balance between cost of quality and value of quality	CO6	06

C)	Explain Seven QC Tool	CO6	06

***** End *****

	DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE **Winter Examination – 2022** **Course: B. Tech. Branch: Mechanical Engineering Semester:VI** **Subject Code & Name: BTMOE505B Renewable Energy Sources** **Max Marks: 60 Date:14/02/2023 Duration: 3 Hr.**		
	Instructions to the Students: *1. All the questions are compulsory.* *2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.* *3. Use of non-programmable scientific calculators is allowed.* *4. Assume suitable data wherever necessary and mention it clearly.*		
		(CO)	Marks
Q. 1	**Solve Any Two of the following.**		**12**
A)	Explain renewable energy sources.	**CO1**	**6**
B)	Explain about fossil fuel & nuclear power.	**CO1**	**6**
C)	Explain Nuclear Fission and Fusion.	**CO1**	**6**
Q.2	**Solve Any Two of the following.**		**12**
A)	Explain concept of solar energy with their applications.	**CO2**	**6**
B)	Explain with neat sketch construction & working of sun shine recorder.	**CO2**	**6**
C)	Explain solar Geometry With neat sketch.	**CO2**	**6**
Q. 3	**Solve Any Two of the following.**		**12**
A)	Explain difference between Non-Concentrating and Concentrating type Solar Collectors.	**CO2**	**6**
B)	Explain with neat sketch construction of flat plate collectors & list out its limitation.	**CO2**	**6**
C)	Explain with neat sketch Heliostat concentrators & list out its advantages.	**CO2**	**6**
Q.4	**Solve Any Two of the following.**		**12**
A)	Explain with neat sketch natural circulation water heating system	**CO3**	**6**
B)	Explain construction working of photo voltaic cell.	**CO3**	**6**
C)	Explain Solar draying system with advantages & disadvantages.	**CO3**	**6**
Q. 5	**Solve Any Two of the following.**		**12**

A)	What is wind energy? Give classification of types of wind mills.	**CO4**	**6**
B)	What is biomass energy? Explain with neat sketch floating drum type biogas plant.	**CO4**	**6**
C)	Write a short note on Geothermal energy & OTEC system	**CO4**	**6**
	***** End *****		

The grid and the borders of the table will be hidden before final printing.

	DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE **Winter Examination – 2022** **Course: B. Tech. Branch: Mechanical Engineering Semester:VI** **Subject Code & Name: BTMOE505B Renewable Energy Sources** **Max Marks: 60 Date:14/02/2023 Duration: 3 Hr.**		
	Instructions to the Students: *1. All the questions are compulsory.* *2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.* *3. Use of non-programmable scientific calculators is allowed.* *4. Assume suitable data wherever necessary and mention it clearly.*		
		(CO)	Marks
Q. 1	**Solve Any Two of the following.**		**12**
A)	Explain renewable energy sources.	**CO1**	**6**
B)	Explain about fossil fuel & nuclear power.	**CO1**	**6**
C)	Explain Nuclear Fission and Fusion.	**CO1**	**6**
Q.2	**Solve Any Two of the following.**		**12**
A)	Explain concept of solar energy with their applications.	**CO2**	**6**
B)	Explain with neat sketch construction & working of sun shine recorder.	**CO2**	**6**
C)	Explain solar Geometry With neat sketch.	**CO2**	**6**
Q. 3	**Solve Any Two of the following.**		**12**
A)	Explain difference between Non-Concentrating and Concentrating type Solar Collectors.	**CO2**	**6**
B)	Explain with neat sketch construction of flat plate collectors & list out its limitation.	**CO2**	**6**
C)	Explain with neat sketch Heliostat concentrators & list out its advantages.	**CO2**	**6**
Q.4	**Solve Any Two of the following.**		**12**
A)	Explain with neat sketch natural circulation water heating system	**CO3**	**6**
B)	Explain construction working of photo voltaic cell.	**CO3**	**6**
C)	Explain Solar draying system with advantages & disadvantages.	**CO3**	**6**
Q. 5	**Solve Any Two of the following.**		**12**

A)	What is wind energy? Give classification of types of wind mills.	**CO4**	**6**
B)	What is biomass energy? Explain with neat sketch floating drum type biogas plant.	**CO4**	**6**
C)	Write a short note on Geothermal energy & OTEC system	**CO4**	**6**
	***** End *****		

The grid and the borders of the table will be hidden before final printing.