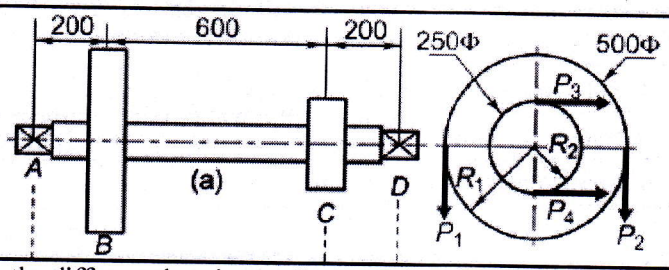
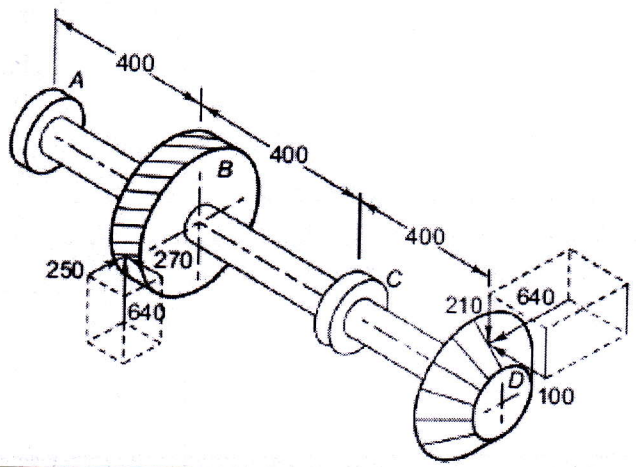
SHRI SHANKARACHARYA INSTITUTE OF PROFESSIONAL MANAGEMENT AND TECHNOLOGY		
DEPARTMENT OF MECHANICAL ENGINEERING		
Class Test – II	Session- Jan June-2023	Month- June
Sem- 6th	Subject- Design of Machine Elements	
Code – C037611(037)	Time Allowed: 2Hrs	Max Marks: 40

Note: - Note: - Attempt all question. Parts (a) are compulsory of each question. Solve any two parts from (b), (c) and (d) of each question.

Q. No	Questions	Marks	Levels of Bloom's taxonomy	CO
	Unit – I			
1.A	What is key coupling? Analyze and write different type of key and coupling.	**4**	Analyzing	CO1
1.B	It is required to design a knuckle joint to connect two circular rods subjected to an axial tensile force of 50 kN. The rods are co-axial and a small amount of angular movement between their axes is permissible. Design the joint and specify the dimensions of its components. Select suitable materials for the parts.	**8**	Creating	CO2
1.C	It is required to design a rigid type of flange coupling to connect two shafts. The input shaft transmits 37.5 kW power at 180 rpm to the output shaft through the coupling. The service factor for the application is 1.5, i.e., the design torque is 1.5 times of the rated torque. Select suitable materials for various parts of the coupling, design the coupling and specify the dimensions of its components.	**8**	Creating	CO2
1.D	It is required to design a cotter joint to connect two steel rods of equal diameter. Each rod is subjected to an axial tensile force of 50 kN. Design the joint and specify its main dimensions.	**8**	Creating	CO2
	Unit – II			
2.A	Analyze and explain the difference between shaft and axle. Also enlist type of clutch.	**4**	Analyzing	CO1
2.B	The layout of a transmission shaft carrying two pulleys B and C and supported on bearings A and D is shown in Figure. Power is supplied to the shaft by means of a vertical belt on the pulley B, which is then transmitted to the pulley C carrying a horizontal belt. The maximum tension in the belt on the pulley B is 2.5 kN. The angle of wrap for both the pulleys is 180° and the coefficient of friction is 0.24. The shaft is made of plain carbon steel 30C8 (Syt = 400 N/mm^2) and the factor of safety is 3. Determine the shaft diameter on strength basis.	**8**	Creating	CO2

				
2.C	What are the different theories applied to friction plate clutch? Which theory is usually applied for design of friction clutch? An oil immersed multi-disk clutch with cork sheet as the friction material is used on a scooter engine. The torque transmitted by the clutch is 10 N-m. The coefficient of friction between the cork sheet and the steel plate in the wet condition is 0.2. The permissible pressure on the cork sheet is 0.1 N/mm2. The inner and outer diameters of the friction lining are 65 and 95 mm respectively. There are radial slots, on the friction surface for the circulation of the coolant, which reduces the effective friction area. To account for these slots, the number of contacting surfaces can be increased by 5%. Assuming uniform-wear theory, calculate the required number of contacting surfaces.	**8**	Creating	CO2
2.D	A transmission shaft supporting a helical gear B and an overhung bevel gear D is shown in Figure. The shaft is mounted on two bearings, A and C. The pitch circle diameter of the helical gear is 450 mm and the diameter of the bevel gear at the forces is 450 mm. Power is transmitted from the helical gear to the bevel gear. The gears are keyed to the shaft. The material of the shaft is steel 45C8 (S_{ut} = 600 and S_{yt} = 380 N/mm2). The factors k_b and k_t of ASME code are 2.0 and 1.5 respectively. Determine the shaft diameter using the ASME code. 	**8**	Creating	CO2

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SHRI SHANKARACHARYA INSTITUTE OF PROFESSIONAL MANAGEMENT AND TECHNOLOGY		
DEPARTMENT OF MECHANICAL ENGINEERING		
Class Test – II	Session- 2022-23	Month- june
Sem- 6	Subject- MT	
Code – C037612	Time Allowed: 2 hrs	Max Marks: 40
Note: -		

Q. No	Questions	Marks	Levels of Bloom's taxonomy	CO
	Unit – I			
1.A	What is hot and cold working?	4	Remembering	CO3
1.B	What are the allowances that are normally provided in forging?	8	Remembering	CO3
1.C	Enlist the defects commonly found in forged components with causes?	8	Remembering	CO3
1.D	Explain forward and backward extrusion method briefly?	8	Remembering	CO3
	Unit – II			
2.A	What is rolling operation?	4	Remembering	CO4
2.B	Describe the method of tube rolling?	8	Remembering	CO4
2.C	Explain in detail surface and structural defects in rolling process?	8	Remembering	CO4
2.D	Explain principle of wire drawing?	8	Remembering	CO4

SHRI SHANKARACHARYA INSTITUTE OF PROFESSIONAL MANAGEMENT AND TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING

Class Test – II	Session- Jan – June 2023	Month- June
Sem- 6th	Subject- Power Plant Engineering	
Code - C037632(037)	Time Allowed: 2 hrs	Max Marks: 40

Note: - 1. Students are Required to focus on question and marks columns only.
2. In Unit I & II, Question A is compulsory and attempt any two from B, C & D.

Q. No	Questions	Marks	Levels of Bloom's taxonomy	CO
	Unit – I			
1.A	Define Cavitation.	**4**	Remembering	3
1.B	Explain the Layout of Diesel Power Plant and main Components with neat sketch	**8**	Understanding	3
1.C	from the data given below, calculate indicated power, brake power and draw heat balance sheet for a two-stroke diesel engine run for 20 minutes at full load: r.p.m. = 350 m.e.p. = 3.1 bar Net brake load = 640 N Fuel consumption = 1.52 kg Cooling water = 162 kg Water inlet temperature = 30^0C Water outlet temperature = 55^0C Air used/kg of fuel = 32 kg Room temperature = 25^0C Exhaust temperature = 305^0C Cylinder bore = 200mm Cylinder stroke = 280mm Brake diameter = 1 metre Calorific value of fuel = 43900 kJ/kg Steam formed per kg of fuel in the exhaust = 1.4 kg Specific heat of steam in exhaust = 2.09 kJ/kgK Specific heat of dry exhaust gases = 1.0 kJ/kgK	**8**	Applying	3
1.D	Write the Characteristics features of Hydro Power Plant and Compare between Hydro power plant and Steam power plant.	**8**	Understanding	3

Unit – II				
2.A	Explain Nuclear Fusion and Nuclear Fission	4	Remembering	4
2.B	Write the Comparison between Diesel Power Plant and Nuclear Power Plant.	8	Understanding	4
2.C	Explain the Working and Components of Nuclear Reactor with neat sketch.	8	Remembering	4
2.D	Explain Breeder Nuclear Reactor with neat sketch. Also write Merits and Demetris of Breeder Reactor.	8	Remembering	

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SHRI SHANKARACHARYA INSTITUTE OF PROFESSIONAL MANAGEMENT AND TECHNOLOGY		
DEPARTMENT OF MECHANICAL ENGINEERING		
Class Test – II	**Session- Jan-June, 2023**	**Month- June, 2023**
Semester - 6th	**Subject- Principles of Management**	
Code – C000635(037)	**Time Allowed: 2 Hours**	**Max Marks: 40**

Note: - Part A(MCQ) of questions 1 and 2 is compulsory, from other parts B, C and D of questions 1 and 2, attempt any two parts. Ignore the columns of Level of Bloom's taxonomy and CO.

Q. No	Questions	Marks	Levels of Bloom's taxonomy	CO
	Question – 1			
1.A	Define Method Study .Why it is Important? Explain in brief.	4	U	3
1.B	Explain the various steps involved in Method Study.	8	U	3
1.C	Describe Therbligs symbols in details.	8	A	3
1.D	A job has been sub-divided into five elements. The time for each element and respective rating are given below : Element Number / Observed Time / Rating Factor % 1 / 0.7 / 80 2 / 0.8 / 100 3 / 1.3 / 120 4 / 0.5 / 90 5 / 1.2 / 100 Calculate the normal time and standard time for each element and for the job if the allowance is 15%.	8	A	3
	Question – 2			
2.A	What are the components of time series analysis?	4	U	2
2.B	Estimate the sales forecast for the year 2000, usingexponential smoothing forecast.Take $\alpha = 0.5$ and the forecast for the year 1995 as 160 unit. Compare the forecast with least square method. Year 1995 1996 1997 1998 1999 Sales 180 168 159 170 188	8	U	2
2.C	What do you mean by Financial management? Explain the functions of financial management.	8	A	2
2.D	Describe the scope and functions of inventory control. Also Explain ABC Analysis in brief.	8	A	2

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DEPARTMENT OF MECHANICAL ENGINEERING		
Class Test – II	Session- Jan-June, 2023	Month- June, 2023
Sem- 6th	Subject- HMT	
Subject Code – C037613(037)	Time Allowed: 2hr.	Max Marks: 40

Note: - 1. first Question (A) from both parts are compulsory.
2. Solve any two from B, C, D of each part.

Q. No	Questions	Marks	Levels of Bloom's taxonomy	CO
	Part – I			
1.A	Explain The Fin efficiency and Fin effectiveness.	**4**	R	2
1.B	A plate fin of 10 mm thickness and 80 mm length is dissipating heat from a surface at 190°C. The fin is exposed to air at 25°C with a convection coefficient of 22 W/m2-deg. If thermal conductivity of the fin material is 200 W/m-deg, determine the heat dissipation. Consider the 1 m width of fin. (b) To increase the heat dissipation, the following two alternatives have been suggested with the same material volume. (i) Split the fin into two fins 5 mm thick each. (ii) Single fin 5 mm thick and 160 mm long. Which will be the better choice? The fins may be considered short with tip insulated.	**8**	Ap	2
1.C	During a heat treatment process, alloy steel spherical balls of 12 mm diameter are initially heated to 800°C in a furnace. Subsequently these are cooled to 100°C by keeping them immersed in an oil bath at 35°C with convection coefficient 20 W/m²-deg. Determine the time required for the cooling process. Proceed to calculate the value of convection coefficient if it is desired to complete the cooling process in a period of 10 minutes. The thermo-physical properties of steel balls are: Density 7750 kg/m³; specific heat 520 J/kg K and conductivity 50 W/m-deg.	**8**	Ap	2

1.D	Prove that the Heat transfer rate for infinite long fin is $Q_{fin} = \sqrt{PhkA_c}(t_o - t_a)$	8	U	2

Part– II				
2.A	Define Irradiation and Radiosity.	4	R	5
2.B	A counter-flow heat exchanger, through which passes 12.5 kg/s of air to be cooled from 540°C to 146°C, contains 4200 tubes, each having a diameter of 30 mm. The inlet and outlet temperatures of cooling water are 25°C and 75°C respectively. If the water side resistance to flow is negligible, calculate the tube length required for this duty. For turbulent flow inside tubes: Nu=0.023 $Re^{0.8}Pr^{0.4}$ Properties of the air at the average temperature are as follows: p = 1.009 kg/m³; c = 1.0082 kJ/kg° C; μ = 2.075 x 10^{-5} kg/ms (Ns/m²) and k= 3.003 x 10^{-2} W/m°C.	8	Ap	5
2.C	Three hollow thin-walled cylinders having diameters of 10 cm, 20 cm and 30cm are arranged concentrically. The temperatures of the innermost and outermost cylindrical surfaces are 100 K and 300 K respectively. Assuming vacuum between the annular spaces, find the steady state temperature attained by the cylindrical surface having diameter of 20 cm. Take $\epsilon_1 = \epsilon 2 = \epsilon 3 = 0.05$.	8	Ap	5
2.D	Prove that the intensity of normal radiation is the $\frac{1}{\pi}$ times of emissive power E_b.	8	U	5

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