

SHRI SHANKARACHARYA INSTITUTE OF PROFESSIONAL MANAGEMENT AND TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING

Class Test – II

Session- 2021-22

Month- June 2022

Sem- 6

Subject- MT

Code – C037612

Time Allowed: 2 hrs.

Max Marks: 40

Note: -

Part A from each question is compulsory and attempt any 2 parts from B, C, D of each question

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 to June, 2022	Month – June
Sem- 6 th	Subject – Principles of Management	
Code-C000636(37)	Time Allowed: 2 hrs	Max Marks: 40

Note – part (A) of each question is compulsory, attempt any two from (B) (C) & (D).

Q. No	Questions	Marks	Levels of Bloom's taxonomy	CO
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Unit – I

A	Write down the functions of production planning and control?	4	Remembering	CO3																																
B	Seven jobs are to be processed through 3 machines M1, M2 and M3 in the order M1, M2, M3. The processing time are given in hrs to process each one of the 3 jobs through all the machines find the optimal sequence of the jobs. Also find the minimum total elapsed time idle time on M2 and M3.	8	Apply	CO4																																
	<table border="1"> <thead> <tr> <th>Jobs</th> <th>M1</th> <th>M2</th> <th>M3</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>3</td> <td>4</td> <td>6</td> </tr> <tr> <td>B</td> <td>8</td> <td>3</td> <td>7</td> </tr> <tr> <td>C</td> <td>7</td> <td>2</td> <td>5</td> </tr> <tr> <td>D</td> <td>4</td> <td>5</td> <td>11</td> </tr> <tr> <td>E</td> <td>9</td> <td>1</td> <td>5</td> </tr> <tr> <td>F</td> <td>8</td> <td>4</td> <td>6</td> </tr> <tr> <td>G</td> <td>7</td> <td>3</td> <td>12</td> </tr> </tbody> </table>				Jobs	M1	M2	M3	A	3	4	6	B	8	3	7	C	7	2	5	D	4	5	11	E	9	1	5	F	8	4	6	G	7	3	12
	Jobs				M1	M2	M3																													
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C	Explain the forward and backward scheduling with neat sketch?	8	Understanding	CO3																																
D	Explain basic function of management and it's objective in detail?	8	Understanding	CO4																																

Unit – II																
A.	What are the components of time series analysis?	4	Remembering	CO2												
B	<p>Estimate the sales forecast for the year 2000, using exponential smoothing forecast. Take $\alpha = 0.5$ and the forecast for the year 1995 as 160 unit. Compare the forecast with least square method.</p> <table border="1"> <thead> <tr> <th>Year</th> <th>1995</th> <th>1996</th> <th>1997</th> <th>1998</th> <th>1999</th> </tr> </thead> <tbody> <tr> <td>Sales</td> <td>180</td> <td>168</td> <td>159</td> <td>170</td> <td>188</td> </tr> </tbody> </table>	Year	1995	1996	1997	1998	1999	Sales	180	168	159	170	188	8	Apply	CO2
Year	1995	1996	1997	1998	1999											
Sales	180	168	159	170	188											
C	<p>ABC company produces a cable at the rate of 5000m/hr. .The cable is used at the rate of 2500m/hr. The cost of cable is rs 5/meter .The inventory carrying cost is 25% and set up cost is rs 4050/setup .Determine the optimal no of cycle required in a year for the manufacturing of this cable.</p>	8	Apply	CO2												
D	<p>A survey revealed that demand for coolers in town has given the following data:</p> <table border="1"> <thead> <tr> <th>Population (10^6)</th> <th>5</th> <th>7</th> <th>8</th> <th>11</th> <th>14(X)</th> </tr> </thead> <tbody> <tr> <td>No. of coolers (Y)</td> <td>45</td> <td>65</td> <td>55</td> <td>75</td> <td>95 demanded</td> </tr> </tbody> </table> <p>Fit a linear regression of Y on X and estimate the demand for coolers for a town whose population is 20×10^6.</p>	Population (10^6)	5	7	8	11	14(X)	No. of coolers (Y)	45	65	55	75	95 demanded	8	Apply	CO2
Population (10^6)	5	7	8	11	14(X)											
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SHRI SHANKARACHARYA INSTITUTE OF PROFESSIONAL MANAGEMENT AND TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING

Class Test – II

Session- Jan-June, 2022

Month- June, 2022

Semester 6th

Subject- Powerplant Engineering

Code – C037632(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	Draw the layout of Hydro-electric power plant. Also, explain the principle of Hydel power plant.	4	R	2
1.B	Derive the expression of Air Standard Efficiency and Mean Effective pressure for Diesel Cycle with P-V and T-S diagrams.	8	A	2
1.C	Explain the auxiliary equipment of Diesel power plant with neat sketch.	8	u	2
1.D	In a trial of a single cylinder oil engine working on dual cycle, the following observation were made: Compression ratio = 15 Oil consumption = 10.2kg/h Calorific value of fuel = 43890 kJ/kg Air consumption = 3.8 kg/min Speed = 1900 r.p.m. Torque on the brake drum = 186 N-m Quantity of cooling water used = 15.5 kg/min Temperature rise = 36°C Exhaust gas temperature = 410°C Room temperature = 20°C C _p for exhaust gas = 1.17 kJ/kgK Calculate: (i) Brake power, (ii) Brake specific fuel consumption, and (iii) Brake thermal efficiency. Draw heat balance sheet on minute basis.	8	u	2

Question – 2

2.A	<i>Explain Binding energy, Radioactivity and Nuclear fission.</i>	4	R	1
2.B	<i>Explain the Sodium-Graphite Reactor with neat diagram. Also, enlist the advantages and disadvantages of the same.</i>	8	U	1
2.C	<i>During a 10-hour run from one station to another, a railway develops an average power of 1200 kW. If the engine is driven by an atomic power plant of 20% efficiency, how much U^{235} would be consumed on the run? Each U-235 atom on fission releases 180MeV of energy.</i>	8	U	1
2.D	<i>Explain the working of Gas Cooled Reactor with neat diagram. Also, enlist the advantages and disadvantages of the same.</i>	8	U	2

point

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SHRI SHANKARACHARYA INSTITUTE OF PROFESSIONAL MANAGEMENT AND TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING

Class Test – II	Session- Jan-June 2022	Month- June
Sem- 6 th	Subject- Heat and Mass Transfer	
Code - C037613(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
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Unit – I

1.A	Define Efficiency and Effectiveness of Fins.	4	Remember	2
1.B	Derive the Heat Dissipation equation from an infinitely long fin ($l = \infty$)	8	Understanding	2
1.C	<p>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 1 m width of fin.</p> <p>(b) To increase the heat dissipation, the following two alternatives have been suggested with the same material volume.</p> <p>(i) Split the fin into two fins of 5 mm thickness each</p> <p>(ii) Single fin 5 mm thick and 160 mm long.</p> <p>Which will be better choice?</p> <p>The fins may be considered short with tip insulated.</p>	8	Applying	2
1.D	<p>Prove that the temperature of a body at any time 'τ' during Newtonian heating and cooling is given by the relation.</p> $\frac{t - t_a}{t_i - t_a} = \exp(-B_i \cdot F_o)$	8	Understanding	2

Unit – II

2.A	Explain the effectiveness of heat exchanger of NTU method.	4	Remember	5
2.B	Derive Logarithmic Mean Temperature For (LMTD) for counter flow heat exchanger.	8	Understanding	5
2.C	An egg with mean diameter of 40 mm and initially at 20°C is placed in a boiling water pan for 4 minutes and found to be boiled to the consumer's taste. For how long a similar egg for same consumer should be boiled when taken from a refrigerator at 5°C. Take the following properties for egg: k= 10 W/m°C, p= 1200 kg/m³, c = 2 kJ/kg°C and h (heat transfer coefficient) = 100 W/m² C. Use lump theory.	8	Applying	2
2.D	A single pass shell and tube heat exchanger, consisting of a bundle of 100 tubes (inner diameter = 25 mm and outer diameter = 29 mm) is used for heating 500 kg/min of water from 30°C to 70°C with the help of steam condensing at atmospheric pressure on the shell side. Calculate the overall heat transfer coefficient based on the inner area and length of the tube bundle if the condensing side heat transfer coefficient is $5000 \frac{W}{m^2C}$. Take the fouling factor on the water side to be $0.0002 \frac{m^2C}{W}$ per tube. Neglect the effect of fouling on the shell side and thermal resistance of the tube wall. Take the following properties of water at the mean temperature of 50°C: p = 988.1 kg/m³; C = 4174 J/kg°C; k = 0.6474 W/m°C; μ = 550 x 10 ⁻⁶ kg/ms; ν = 0.555 x 10 ⁻⁶ $\frac{m^2}{s}$, Pr = 3.54.	8	Applying	5

15/06/22

Shift - 1

SHRI SHANKARACHARYA INSTITUTE OF PROFESSIONAL MANAGEMENT AND TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING

Class Test – II	Session- Jan June-2022	Month- June
Sem- 6 th	Subject- Design of Machine Elements	
Code – C037611(037)	Time Allowed: 2Hrs	Max Marks: 40

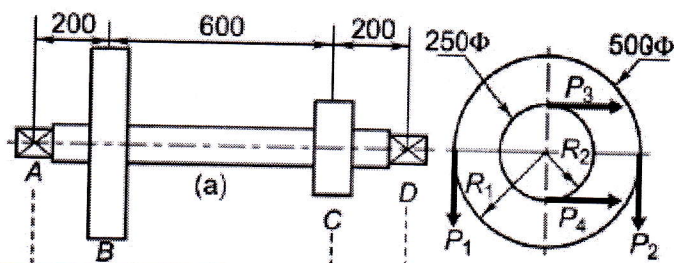
Note: - Note: - Attempt all question. Parts (a) are compulsory of each question. Solve any two parts from (b), (c) and (d) of each question.

Q. No	Questions	Marks	Levels of Bloom's taxonomy	CO
Unit – I				
1.A	What is coupling? Write different type of coupling.	4	Remembering	CO1
1.B	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.C	It is required to design a bushed pin type flexible coupling to connect the output shaft of an electric motor to the shaft of a centrifugal pump. The motor delivers 20 kW power at 720 rpm. The starting torque of the motor can be assumed to be 150% of the rated torque. Design the coupling and specify the dimensions of its components.	8	Understanding	CO1
1.D	It is required to design a split muff coupling to transmit 50 kW power at 120 rpm. The shafts, key and clamping bolts are made of plain carbon steel 30C8 ($S_{yt} = 400 \text{ N/mm}^2$). The yield strength in compression is 150% of the tensile yield strength. The factor of safety for shafts, key and bolts is 5. The number of clamping bolts is 8. The coefficient of friction between sleeve halves and the shaft is 0.3. (i) Calculate the diameter of the input and output shafts. (ii) Specify the length and outer diameter of the sleeve halves. (iii) Find out the diameter of clamping bolts assuming that the power is transmitted by friction. (iv) Specify bolt diameter using standard empirical relations. (v) Specify the size of key and check the dimensions for shear and compression criteria.	8	Analyzing	CO2

Unit – II

2.A	Define a shaft and axle.	4	Remembering	CO2
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 ($S_{yt} = 400 \text{ N/mm}^2$) and the factor of safety is 3.	8	Analyzing	CO1

Determine the shaft diameter on strength basis.



What are the different theories applied to friction plate clutch? Which theory is usually applied for design of friction clutch?

A multi-disk clutch consists of five steel plates and four bronze plates. The inner and outer diameters of the friction disks are 75 and 150 mm respectively. The coefficient of friction is 0.1 and the intensity of pressure on friction lining is limited to 0.3 N/mm². Assuming uniform wear theory, calculate:

- (i) the required force to engage the clutch; and
- (ii) Power transmitting capacity at 750 rpm.

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.

