

SPPU In-Sem Offline Examination – April 2022

Fourth Year Mechanical Engineering

Semester: II

Subject: Energy Engineering

Subject Code: 402047

Maximum Marks: 30

Duration: 60 Minutes

Date: 04/04/2022

Instructions:

- (i) Answer **Q.1 or Q.2, Q.3 or Q.4 and Q. 5 or Q.6**
- (ii) Draw a neat diagram wherever necessary
- (iii) Figure to the right indicates full marks.
- (iv) Use of calculator is allowed.
- (v) Use steam table for steam properties
- (vi) Assume suitable data if necessary.

Q. No.	Question/Description	Marks
1	a) Write a short note on Carbon Credits.	4
	b) A Steam power station uses the following : Steam at boiler outlet =150 bar, 555 C Reheat at 40 bar and 550 C Condenser pressure 0.1 bar Using steam table and assuming ideal processes, find: <ul style="list-style-type: none">i) Quality at turbine exhaustii) Pump workiii) Shaft workiv) Heat suppliedv) Cycle efficiencyvi) Steam rate	6
2	a) Draw ideal reheat process on TS and HS diagram. Also state advantages of reheating.	4
	b) In a cogeneration plant steam is generated at 50 bars and 500 C expanded through as isentropic turbine to a condenser pressure of 0.05 bars. The heating load is supplied by extracting steam from turbine at 3 bar which is condensed in a process heater to saturated liquid at 3 bar and then pumped back to boiler. The power load on the system is 6MW and the heating load is 1.2MW. Show the process on TS diagram and find <ul style="list-style-type: none">i) Steam generation capacity of boiler in TPHii) Heat transfer to water in boiler in kW	6

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	iii) Rate of cooling water flow across the condenser if the temperature rise of water is 5 C.	
3	<p>a) Explain terms:</p> <ol style="list-style-type: none"> 1. Daltons law of partial pressure for condenser 2. Vacuum efficiency 3. Condenser efficiency 	6
	<p>b) The following observations were recorded during a test on surface condenser</p> <p>Condenser vacuum = 70cm of Hg</p> <p>Barometer reading = 76.5 cm of Hg</p> <p>Mean condenser temperature = 35°C</p> <p>Hot Well temperature = 28°C</p> <p>Calculate</p> <ol style="list-style-type: none"> (i) Vacuum efficiency (ii) Condenser efficiency 	4
4	<p>a) What are the different pollutants from steam power plant? Explain control methods for any two pollutants.</p>	6
	<p>b) The following observations were recorded during a test on surface condenser</p> <p>Condenser vacuum = 72cm of Hg</p> <p>Barometer reading = 76.5 cm of Hg</p> <p>Mean condenser temperature = 30°C</p> <p>Hot Well temperature = 26°C</p> <p>Calculate</p> <ol style="list-style-type: none"> (i) Corrected Vacuum (iii) Vacuum efficiency (iv) Condenser efficiency 	4
5	a) Discuss the advantages and disadvantages of hydro power plant	5
	b) Explain "The Pressurized water reactor" with neat sketches.	5
6	<p>a) Explain following terms</p> <ol style="list-style-type: none"> i) Moderator ii) Control rod ii) Coolants 	5
	b) Write the points to be considered for site selection of Hydroelectric power plant. Also explain team Surge tank.	5

SPPU In-Semester Offline Examination – April 2022

Final Year Mechanical Engineering

Subject: Mechanical System Design

Maximum Marks: 30

Duration: 1 Hrs. 30min

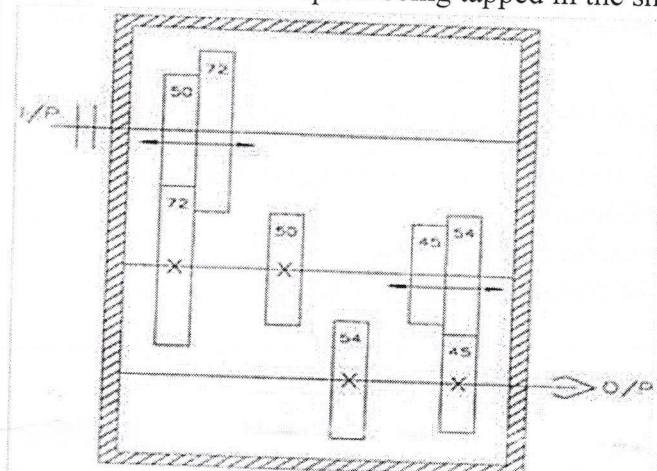
Semester: II

Subject Code: 402048

Date: 05/04/2022

Instructions:

- (i) Answer **Q.1** or **Q.2, Q.3** or **Q.4 and Q.5** or **Q.6**
- (ii) Neat diagrams must be drawn wherever necessary
- (iii) Assume suitable data if necessary.
- (iv) Use of calculator is allowed.

Q. No.	Question/Description	Marks															
1	a) Explain the terms: i. Range ratio ii. Structural formulae	04															
	b) Draw Structure Diagrams for following structure formulae. 2(2) 2(1) 3(4) 2(3) 3(1) 2(6) 2(1) 2(2) 3(4)	06															
OR																	
2	<p>Figure shows gearing diagram of a multispeed gearbox with number of teeth on each gear as specified. Speed of input shaft is rotating at 120 RPM. Determine</p> <p>a) The speeds available on the output shaft. b) Geometric progression ratio. c) Identify the structure diagram. d) Determine the speed being tapped in the shown layout.</p> 	10															
3	a) Explain design tolerance and natural tolerance.	04															
	<p>b) A particular type of rolling contact bearing has a normally distributed time to failure with a mean of 10,000 hrs and a standard deviation of 750 hrs. If there are 100 such bearings fitted at a time, how many may be expected to fail within the first 11000hrs?</p> <table><tr><td>Z</td><td>1.0</td><td>1.1</td><td>1.2</td><td>1.3</td><td>1.4</td><td>1.5</td><td>1.6</td></tr><tr><td>Area</td><td>0.3413</td><td>0.3643</td><td>0.3849</td><td>0.4032</td><td>0.4192</td><td>0.4332</td><td>0.4452</td></tr></table>	Z	1.0	1.1	1.2	1.3	1.4	1.5	1.6	Area	0.3413	0.3643	0.3849	0.4032	0.4192	0.4332	0.4452
Z	1.0	1.1	1.2	1.3	1.4	1.5	1.6										
Area	0.3413	0.3643	0.3849	0.4032	0.4192	0.4332	0.4452										
OR																	
4	<p>The recommended class of fit between the recess and the spigot of a rigid coupling is 60 H₆-j₅. The dimensions of the two components are normally distributed and the specified tolerance is equal to the natural tolerance. Determine the probability of interference fit between the two components. The tolerances in micron are as follows:</p>	10															

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		<table><tr><td>Diameter, mm</td><td colspan="2">H₆</td><td colspan="2">j_s</td></tr><tr><td></td><td>e_s</td><td>e_i</td><td>e_s</td><td>e_i</td></tr><tr><td>60</td><td>+19</td><td>0</td><td>+06</td><td>-07</td></tr></table>				Diameter, mm	H ₆		j _s			e _s	e _i	e _s	e _i	60	+19	0	+06	-07	
Diameter, mm	H ₆		j _s																		
	e _s	e _i	e _s	e _i																	
60	+19	0	+06	-07																	
	Refer below table for the standard normal distribution curve.																				
	<table><tr><td>Z</td><td>2.0</td><td>2.2</td><td>2.4</td><td>2.6</td><td>2.8</td></tr><tr><td>Area</td><td>0.4772</td><td>0.4861</td><td>0.4918</td><td>0.4953</td><td>0.4974</td></tr></table>	Z	2.0	2.2	2.4	2.6	2.8	Area	0.4772	0.4861	0.4918	0.4953	0.4974								
Z	2.0	2.2	2.4	2.6	2.8																
Area	0.4772	0.4861	0.4918	0.4953	0.4974																
5	a) State different types of take-up devices used in belt conveyors and explain any one.					04															
	b) A horizontal belt conveyor is used for transporting the bulk material having mass density of 1200 kg/m ³ . The surcharge factor 'C' for the flat belt is 0.1 while the belt width is 650mm. if the belt speed is 1.75 m/s, determine the capacity of conveyor.					06															
OR																					
6	A triple ply belt conveyor is required to transport 2 ton of iron ore per hour through a distance of 1000 m on ground and height of 300m. The permissible belt speed is 90 m/min. If the mass density of iron ore is 2.5 ton per cubic metre. Estimate i. The belt width; ii. The diameter of drive pulley iii. Determine the reduction ratio of gear reducer, if electric motor speed is 1440rpm Use following data: Flowability factor 'k'																				
	<table><tr><td>Belt Inclination 'α'</td><td>10° -15°</td><td>16° -20°</td><td>21° -25°</td><td>26° -30°</td><td>31° -35°</td></tr><tr><td>Flowability factor 'k'</td><td>2.65x10⁻⁴</td><td>2.5x10⁻⁴</td><td>2.35x10⁻⁴</td><td>2.20x10⁻⁴</td><td>2.05x10⁻⁴</td></tr></table> <ul style="list-style-type: none">Standard belt widths: 400, 450, 500, 600, 750, 800, 900, 1000, 1200, 1400, 1600, 1800, 2000mmMaterial factor for plies for capron belt: K₁ = 2Belt tension and arc of contact factor: K₂ = 80	Belt Inclination 'α'	10° -15°	16° -20°	21° -25°	26° -30°	31° -35°	Flowability factor 'k'	2.65x10 ⁻⁴	2.5x10 ⁻⁴	2.35x10 ⁻⁴	2.20x10 ⁻⁴	2.05x10 ⁻⁴					10			
Belt Inclination 'α'	10° -15°	16° -20°	21° -25°	26° -30°	31° -35°																
Flowability factor 'k'	2.65x10 ⁻⁴	2.5x10 ⁻⁴	2.35x10 ⁻⁴	2.20x10 ⁻⁴	2.05x10 ⁻⁴																

SPPU In-Sem Offline Examination – April 2022

Fourth Year Mechanical Engineering

Semester: II

Subject: Energy Engineering

Subject Code: 402047

Maximum Marks: 30

Duration: 60 Minutes

Date: 04/04/2022

Instructions:

- (i) Answer **Q.1** or **Q.2**, **Q.3** or **Q.4** and **Q. 5** or **Q.6**
- (ii) Draw a neat diagram wherever necessary
- (iii) Figure to the right indicates full marks.
- (iv) Use of calculator is allowed.
- (v) Use steam table for steam properties
- (vi) Assume suitable data if necessary.

Q. No.	Question/Description	Marks
1	a) Write a short note on Energy Scenario of India and explain sector wise energy consumption in India	4
	b) The steam at 70 bar and 500°C is supplied to the steam turbine. Steam is expanded in high pressure turbine isentropically till it is dry saturated. The steam is reheated to 400°C passing to reheater. Expansion after reheating is carried to condenser pressure up to 0.2 bar. Flow of steam is 10 kg/s. Consider pump work. Represent cycle on T-S diagram. Find i) Reheating Pressure ii) Dryness fraction of steam at low pressure turbine outlet. iii) Thermal efficiency of cycle	6
2	a) Explain Electrostatic Dust Collector with schematic sketch.	4
	b) In a cogeneration plant, 25 kg/s steam enters turbine at 40 bar and 400°C. 20 % of steam is withdrawn for process heating at 3 bar and remaining continues to expand in turbine up to condenser pressure of 0.08 bar. Neglect pump work. Represent cycle on T-S diagram find i) Thermal efficiency of cycle ii) Capacity of power plant in MW iii) Effectiveness of cogeneration	6
3	a) What are the advantages of condenser of steam power plant? Explain evaporative condenser with schematic sketch.	6

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	<p>b)The following observations were recorded during a test on surface condenser</p> <p>Condenser vacuum = 68cm of Hg</p> <p>Barometer reading = 76 cm of Hg</p> <p>Mean condenser temperature = 33 °C</p> <p>Hot Well temperature = 26 °C</p> <p>Calculate</p> <p>(i) Vacuum efficiency</p> <p>(ii) Condenser efficiency</p>	4
4	<p>a) What are the different pollutants from steam power plant? Explain the causes of pollutants and effect on human health</p>	6
	<p>b)The following observations were recorded during a test on surface condenser</p> <p>Condenser vacuum = 71cm of Hg</p> <p>Barometer reading = 76.5 cm of Hg</p> <p>Mean condenser temperature = 34°C</p> <p>Hot Well temperature = 27°C</p> <p>Calculate</p> <p>(i) Corrected Vacuum</p> <p>(ii) Vacuum efficiency</p> <p>(iii) Condenser efficiency</p>	4
5	<p>a) Explain Gas Cooled Reactor with schematic sketch.</p>	5
	<p>b)Explain different type of Spillways of dam</p>	5
6	<p>a) Explain Hydrographs with diagrams and also write the information provided by hydrographs.</p>	5
	<p>b)Write the points to be considered for site selection of Nuclear Power Plant and also write a short note on Nuclear Waste Disposal</p>	5

SPPU In-Semester Offline Examination – April 2022

Final Year Mechanical Engineering

Subject: Mechanical System Design

Maximum Marks: 30

Duration: 1 Hrs. 30min

Semester: II

Subject Code: 402048

Date: 05/04/2022

Instructions:

- (i) Answer **Q.1** or **Q.2, Q.3** or **Q.4 and Q.5** or **Q.6**
- (ii) Neat diagrams must be drawn wherever necessary
- (iii) Assume suitable data if necessary.
- (iv) Use of calculator is allowed.

Q. No.	Question/Description	Marks																												
1	a) State the law of geometric progression used in machine tool gearbox design. Discuss advantages and disadvantages.	04																												
	b) Draw the structure diagram and identify the optimum structural formula out of them. i) 2(1) 3(2) ii) 2(3) 3(1) iii) 3(2) 2(1)	06																												
OR																														
2	A six speed gear box is to be designed for a machine tool drive. The spindle speeds range between 150 rpm to 1000 rpm. If the gear box is driven by 5 KW, 1000 rpm electric motor through the belt drives: i. Identify Optimum structure diagram ii. Draw the gearing diagram iii. Draw the Speed diagram iv. Select the dia. of pulleys for the belt drive. The standard pulley diameters are: 80, 90, 100, 112, 125, 140, 160, 180, 200, 224, 250, 280, 290, 300, 310, 355, 375, 400, 450 and 500mm.	10																												
3	a) Give the comparison between Normal distribution and Standard Normal distribution curves.	04																												
	b) The mean tensile strength and the standard deviation of 250 nuts are 310N/mm ² and 35N/mm ² respectively. Determine the number of nuts expected to have a strength less than 270 N/mm ² Refer Table ‘A’ for area under standard normal distribution curve	06																												
OR																														
4	A shaft dia. Ø50 ± 0.3mm having standard deviation of 0.1mm and bearing bore Ø50.5 ± 0.3mm having standard deviation of 0.1mm. Identify and Determine the percentage of assemblies with: i. Clearance less than 0.3mm; ii. Clearance between 0.3 to 0.4mm Areas under standardized normal distribution curve from -∞ to z are as below <table><tr><td>Z</td><td>-1.8</td><td>-1.6</td><td>-1.4</td><td>-1.2</td><td>-1</td><td>-0.5</td></tr><tr><td>Area</td><td>0.0359</td><td>0.0548</td><td>0.0808</td><td>0.1151</td><td>0.1587</td><td>0.3085</td></tr><tr><td>Z</td><td>1.8</td><td>1.6</td><td>1.4</td><td>1.2</td><td>1</td><td>0.5</td></tr><tr><td>Area</td><td>0.9641</td><td>0.9452</td><td>0.9192</td><td>0.8849</td><td>0.8413</td><td>0.6915</td></tr></table> Assume linear interpolation for values in between	Z	-1.8	-1.6	-1.4	-1.2	-1	-0.5	Area	0.0359	0.0548	0.0808	0.1151	0.1587	0.3085	Z	1.8	1.6	1.4	1.2	1	0.5	Area	0.9641	0.9452	0.9192	0.8849	0.8413	0.6915	10
Z	-1.8	-1.6	-1.4	-1.2	-1	-0.5																								
Area	0.0359	0.0548	0.0808	0.1151	0.1587	0.3085																								
Z	1.8	1.6	1.4	1.2	1	0.5																								
Area	0.9641	0.9452	0.9192	0.8849	0.8413	0.6915																								
5	a) Explain the following terms: i. Containerization ii. Bulk load	04																												
	b) A horizontal triple ply belt conveyor is to be used to transfer powdered material with a density 2 tons/m ³ at the rate of 1.33 ton/hr. If surcharge factor is 2.35x10 ⁻⁴ and belt speed is 1.75 m/s. Assume material factor for the	06																												

10

Table A

[illegible]

SPPU In-Semester Offline Examination-April 2022

Class: B.E (2015) Branch Mechanical Semester-II

Subject: Tribology Elective-III (Code: 402049A)

Maximum Marks: 30

Duration: 60 Minutes

Date: 07/04/2022 (Thursday)

Instructions to the candidates:

- 1) Solve Q1 or Q2, Q3 or Q4, Q5 or Q6.
- 2) Neat diagrams must be drawn whenever necessary.
- 3) Use of electronic pocket calculator is allowed.
- 4) Assume suitable data, if necessary.

Q. No.	Question / Description	Marks
1	a) Define Tribology. Explain any five tribological adverse effects generally arises in industry.	06
	b) State importance of recycling of used oil. What are the practical difficulties in recycling of used oil?	04
	OR	
2	a) What are the different parameters which affect the viscosity of lubricating oil? Explain.	06
	b) What are the desirable properties of bearing materials? Explain any one property in detail.	04
3	a) What is the difference between static and kinetic coefficients of friction and what is the practical significance of these two terms?	06
	b) Explain the theory of abrasive wear.	04
	OR	
4	a) Explain the Stick slip phenomenon. Write at least two examples.	04
	b) List the different factors affecting the wear rates. Also explain Adhesive wear.	06

5	<p>a) Explain different regimes of hydrodynamic lubrication with the help of Stribeck curve.</p> <p>b) What do understand by infinitely short journal bearing and infinitely long journal bearing? Comment on load carrying capacity in both cases.</p>	<p>06</p> <p>04</p>
	OR	
6	<p>a) Write the two dimensional Reynold's equation with assumptions for hydrodynamic lubrication with usual notations. State the meaning of each term in equation.</p> <p>b) State the significance of following design variables in hydrodynamic journal bearings.</p> <ol style="list-style-type: none"> 1) length to diameter ratio (l/d) 2) unit bearing pressure (p_b) 3) radial clearance (c) 	<p>04</p> <p>06</p>

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SPPU In-Semester Offline Examination-April 2022

Class: B.E (2015) Branch Mechanical Semester-II

Subject: Tribology Elective-III (Code: 402049A)

Maximum Marks: 30

Duration: 60 Minutes

Date: 07/04/2022(Thursday)

Instructions to the candidates:

- 1) Solve Q1 or Q2, Q3 or Q4, Q5 or Q6.
- 2) Neat diagrams must be drawn whenever necessary.
- 3) Use of electronic pocket calculator is allowed.
- 4) Assume suitable data, if necessary.

Q. No.	Question / Description	Marks
1	a) Define Tribology. Explain its importance of tribology in the design of machine elements.	06
	b) Explain the following terms in short: i) Extreme Pressure Additives ii) Recycling of used oil	04
OR		
2	a) How does a solid lubricant help in reducing friction and what are their specific advantages as compared to liquid lubricants?	06
	b) What are the desirable properties of bearing materials? Explain any one property in detail.	04
3	a) What is Friction? What are the causes of friction? State its desirable and undesirable effects.	06
	b) List the different factors affecting the wear rates	04
OR		
4	a) Explain any two friction measuring methods	04
	b) Define wear. What are the parameters which govern the wear?	06

5	<p>a) The following data is given for a 360° hydrodynamic bearing: (Refer Table1)</p> <table> <tr> <td>Radial load</td> <td>= 3.2 kN</td> </tr> <tr> <td>Journal diameter</td> <td>= 50 mm</td> </tr> <tr> <td>Bearing length</td> <td>= 50mm</td> </tr> <tr> <td>Journal speed</td> <td>= 1490 r.p.m.</td> </tr> <tr> <td>Radial clearance</td> <td>= 50 microns</td> </tr> <tr> <td>Viscosity of lubricant</td> <td>= 25cP</td> </tr> <tr> <td>Density of lubricant</td> <td>= 860kg/m³</td> </tr> </table> <p>Calculate:</p> <ol style="list-style-type: none"> the minimum oil film thickness; the coefficient of friction; the power lost in friction. 	Radial load	= 3.2 kN	Journal diameter	= 50 mm	Bearing length	= 50mm	Journal speed	= 1490 r.p.m.	Radial clearance	= 50 microns	Viscosity of lubricant	= 25cP	Density of lubricant	= 860kg/m ³	06
Radial load	= 3.2 kN															
Journal diameter	= 50 mm															
Bearing length	= 50mm															
Journal speed	= 1490 r.p.m.															
Radial clearance	= 50 microns															
Viscosity of lubricant	= 25cP															
Density of lubricant	= 860kg/m ³															
	<p>b) What do understand by infinitely short journal bearing and infinitely long journal bearing? Comment on load carrying capacity in both cases.</p>	04														
OR																
6	<p>a) Explain different regimes of hydrodynamic lubrication.</p>	06														
	<p>b) What is tilting pad thrust bearing? Why tilting-pad bearings are preferred over fixed pad bearings?</p>	04														

Table:1

$\frac{l}{d}$	$\frac{h_0}{c}$	ϵ	S	$\left(\frac{r}{c}\right)f$	$\frac{Q}{rcn_s l}$	$\frac{Q_s}{Q}$	$\frac{P_{max}}{P}$
1.0000	0.0000	1.0000	0.0000	0.0000	0.0000	1.0000	0.0000
	0.0300	0.9700	0.00474	0.5140	4.8200	0.973	6.579
	0.1000	0.9000	0.0188	1.0500	4.7400	0.919	4.048
	0.2000	0.8000	0.0466	1.7000	4.6200	0.842	3.195
	0.4000	0.6000	0.1210	3.2200	4.3300	0.680	2.409
	0.6000	0.4000	0.2640	5.7900	3.9900	0.497	2.066
	0.8000	0.2000	0.6310	12.8000	3.5900	0.280	1.890
	0.9000	0.1000	1.3300	26.4000	3.3700	0.150	1.852
	1.0000	0.0000	∞	∞	3.1420	0.0000	0.0000

SPPU In-Sem Offline Examination-April 2022 SET A

Class: BE

Branch: Mechanical

Semester: VIII

Subject: Product Design and Development (Elective - IV)

Code: (402050C)

Time : 1 Hour

Max. Marks: 30

Date: 08/04/2022 Friday

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Assume suitable data if necessary.

Course Outcomes

Course Outcome	Blooms Taxonomy Level	After successful completion of course, student will be able to	PO Mapping
402050C-1	2	Understand essential factors for product design	1,2,5,6,7,8
402050C-2	2	Understand Processes and concepts during product development	1,2,4,5,6,7,9,10
402050C-3	2	Understand methods and processes of Forward and Reverse engineering	1,2,3,4,5,9,10

Ques. No	Sub	Question	Marks	CO	BL
1	a	What is meant by Product design explain various phases of Product design.	6	CO 1	2
	b	What are the essential factors of Product Design. Explain any four with example?	4	CO 1	2
Or					
2	a	Explain any two Modern Approaches in Product Design & Development with diagram	6	CO 1	2
	b	With Suitable Example Explain the difference between Product Verification and Validation	4	CO 1	2
3	a	Explain Basic method of mission statement and technical questioning in product development process with template and state its advantages.	6	CO 2	2
	b	Explain different types of customer needs with relevant example	4	CO 2	2
Or					

4	a	Explain the various phases of S-Curve used in technology forecasting	6	CO 2	2
	b	Explain the concept of market segmentation and how it is useful in Product design.	4	CO 2	2
5		Create a pughs matrix for Mobile Handset by considering four variants and five factors	10	CO 3	5
<i>Or</i>					
6		Create a function tree of standard coffee making machine using subtract and operate procedure	10	CO 3	5

_____ All the Best _____

SPPU In-Semester Examination – April 2022

Final Year Mechanical Engineering

Semester: VIII

Subject: Advanced Manufacturing Process

Subject Code: 402050 – A

Maximum Marks: 30

Duration: 60 Minutes

Date: 08/04/2022

Instructions:

- (i) Answer **Q.1** or **Q.2, Q.3** or **Q.4, Q.5** or **Q.6**
- (ii) Draw a neat diagram wherever necessary
- (iii) Use of calculator is allowed.
- (iv) Assume suitable data if necessary.

Q. No.	Question/Description				Marks	
1	A.	Select the characteristics and/or application given on right hand side with appropriate advanced manufacturing processes given on left hand side				6
	Advanced Manufacturing Processes		Process Characteristics and/or applications			
	I	Electromagnetic Forming	A	Only female die is needed		
	II	Flow Forming	B	Magnetic pulse forming		
	III	Electro Hydro forming	C	Flower design		
	IV	Roll forming	D	Capacitor banks		
	V	Shear spinning	E	Hemispherical, hemi ellipsoidal profile forming		
	vi	High energy rate forming	F	Rollers with automated controlled movements		
B.	Explain the principal of Explosive forming with process parameters				4	
OR						
2	A.	Illustrate principle of metal spinning process and explain any one type of metal spinning in detail				6
	B.	Explain and classify incremental sheet metal forming process				4
3	A.	Illustrate the different metallurgical zones in friction stir welding				6
	B.	Describe the process of underwater welding.				4
OR						
4	A.	Illustrate classification of welding methods available for plastics				6
	B.	Summarize applications of adhesive bonding.				4

P.T.O.

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SPPU In-Semester Examination – April 2022

Q. No.		Question/Description	Marks
5	A.	Illustrate working principle of Shaped Tube Electrolytic Machining	6
	B.	Explain the process electro chemical grinding	4
OR			
6	A.	Illustrate with sketch working principle of Abrasive Water Jet machining with the process parameter.	6
	B.	Explain mechanism if electrolytic In-Process dressing	4

SPPU In-Sem Offline Examination- April 2022

Class : BE

Branch : Mechanical

Semester -8

Subject : Elective -III (Industrial Engineering)

Code : 402049-B

Maximum Marks : 30

Duration : 60 Minutes

Date :07/04/2022

Instructions:

- (i) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6
- (ii) Draw a neat diagram wherever necessary
- (iii) Figure to the right indicates full marks.
- (iv) Use of calculator is allowed.
- (v) Assume suitable data if necessary.

Q. No	Question/Description	Marks
1 A	Explain term productivity and name factors affecting productivity.	4
1 B	Classify various organization structure and Illustrate Matrix Organization in detail.	6
OR		
2A	Explain the contribution of Taylor & Gilbreth to Industrial Engineering	4
2B	A company produces 1500 kg of tablets by consuming a 2000 kg mix of raw material for a particular period. For the next period, the output is 3200 kg by consuming 4265 kg of the raw material and for the third period, the output increased to 3500 kg by consuming 4200 kg of raw material. Comment on increase or decrease of productivity for second and third period	6
3A	Describe Method Study with its objectives .	4
3B	Draw Two handed process chart with suitable example	6
OR		
4A	Describe travel chart with suitable example	4
4B	Draw and explain method study symbols for recording the facts.	6
5A	What do you understand by work measurement? What are the objectives of work measurement in an industry?	4
5B	An industrial operation consists of the following elements shown in the table . Assuming rest & personal allowance 15% and Contingency allowance 2% of normal time . Compute standard time per piece	6

	<table><tr><th>Element</th><th>Observed time (Minutes)</th><th>Performance rating (%)</th></tr><tr><td>A</td><td>0.20</td><td>85</td></tr><tr><td>B</td><td>0.08</td><td>80</td></tr><tr><td>C</td><td>0.50</td><td>90</td></tr><tr><td>B</td><td>0.12</td><td>85</td></tr><tr><td>E</td><td>0.10</td><td>80</td></tr></table>	Element	Observed time (Minutes)	Performance rating (%)	A	0.20	85	B	0.08	80	C	0.50	90	B	0.12	85	E	0.10	80			
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B	0.12	85																				
E	0.10	80																				
OR																						
6A	State various work measurement techniques. Explain any one of them	4																				
6B	<p>The two steps in preparation of a job are molding and packaging. Allowances are set as 12% . Performance rating of molding operator is rated at 90% and packaging operator is rated at 110% . Observed time given in table. Compute normal and standard time for both tasks.</p> <table><tr><td></td><td colspan="4">Observed Time in Minutes</td></tr><tr><td>Task</td><td>A</td><td>B</td><td>C</td><td>D</td></tr><tr><td>Molding</td><td>26</td><td>30</td><td>29</td><td>31</td></tr><tr><td>Packaging</td><td>45</td><td>50</td><td>35</td><td>30</td></tr></table>		Observed Time in Minutes				Task	A	B	C	D	Molding	26	30	29	31	Packaging	45	50	35	30	6
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SPPU In-Semester Examination – April 2022

Final Year Mechanical Engineering

Semester: VIII

Subject: Advanced Manufacturing Process

Subject Code: 402050 – A

Maximum Marks: 30

Duration: 60 Minutes

Date: 08/04/2022

Instructions:

- (i) Answer **Q.1** or **Q.2**, **Q.3** or **Q.4**, **Q.5** or **Q.6**
- (ii) Draw a neat diagram wherever necessary
- (iii) Use of calculator is allowed.
- (iv) Assume suitable data if necessary.

Q. No.	Question/Description				Marks																											
1	A.	Illustrate with a schematic principle and important features of HERF process			6																											
	B.	Differentiate between Stand-off Technique of explosive forming & Contact Technique of explosive forming			4																											
OR																																
2	A.	Select the characteristics and/or application given on right hand side with appropriate advanced manufacturing processes given on left hand side			6																											
	<table><tr><th colspan="2">Advanced Manufacturing Processes</th><th colspan="2">Process Characteristics and/or applications</th></tr><tr><td>I</td><td>Electromagnetic Forming</td><td>A</td><td>Only female die is needed</td></tr><tr><td>II</td><td>Flow Forming</td><td>B</td><td>Magnetic pulse forming</td></tr><tr><td>III</td><td>Electro Hydro forming</td><td>C</td><td>Flower design</td></tr><tr><td>IV</td><td>Roll forming</td><td>D</td><td>Capacitor banks</td></tr><tr><td>V</td><td>Shear spinning</td><td>E</td><td>Hemispherical, hemi ellipsoidal profile forming</td></tr><tr><td>vi</td><td>High energy rate forming</td><td>F</td><td>Rollers with automated controlled movements</td></tr></table>					Advanced Manufacturing Processes		Process Characteristics and/or applications		I	Electromagnetic Forming	A	Only female die is needed	II	Flow Forming	B	Magnetic pulse forming	III	Electro Hydro forming	C	Flower design	IV	Roll forming	D	Capacitor banks	V	Shear spinning	E	Hemispherical, hemi ellipsoidal profile forming	vi	High energy rate forming	F
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B.	Explain magnetic pulse forming with neat diagram			4																												
OR																																
3	A.	Illustrate the friction stir welding with different metallurgical zones			6																											
	B.	Describe explosive welding process with advantages and disadvantages			4																											
OR																																

P.T.O.

SPPU In-Semester Examination – April 2022

Q. No.		Question/Description	Marks
4	A.	Illustrate the construction and working of Ultrasonic welding.	6
	B.	Describe on welding processes used for plastics and composites.	4
5	A.	Illustrate working principle of Shaped Tube Electrolytic Machining	6
	B.	Explain the process electro chemical deburring	4
OR			
6	A.	Illustrate working principle of Abrasive Water Jet machining with the process parameter.	6
	B.	Explain mechanism of electro jet machining process	4

SPPU In-Sem Offline Examination-April 2022 SET B

Class: BE

Branch: Mechanical

Semester: VIII

Subject: Product Design and Development (Elective - IV)**Code:** (402050C)**Time :** 1 Hour**Max. Marks:** 30**Date:** 08/04/2022 Friday**Instructions to the candidates:**

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Assume suitable data if necessary.

Course Outcomes

Course Outcome	Blooms Taxonomy Level	After successful completion of course, student will be able to	PO Mapping
402050C-1	2	Understand essential factors for product design	1,2,5,6,7,8
402050C-2	2	Understand Processes and concepts during product development	1,2,4,5,6,7,9,10
402050C-3	2	Understand methods and processes of Forward and Reverse engineering	1,2,3,4,5,9,10

Ques. No	Sub	Question	Marks	CO	BL
1	a	Which are the three "S" of product design and what are their advantages in product development process.	6	CO 1	2
	b	Explain various phases of Product design.	4	CO 1	2
Or					
2	a	What is House of Quality, explain how it is used in the Product development process	6	CO 1	2
	b	Differentiate between product design and product development	4	CO 1	2
3	a	Explain Morphological Analysis of Product Design	6	CO 2	2
	b	Explain different types of customer needs with relevant example	4	CO 2	2
Or					

4	a	Explain the various phases of S-Curve used in technology forecasting	6	CO 2	2
	b	Explain estimation of technical feasibility.	4	CO 2	2
5		Create a pughs matrix for Mobile Handset by considering four variants and five factors	10	CO 3	5
<i>Or</i>					
6		What is mean by Concept Embodiment explain with suitable example	10	CO 3	5

-----All the Best-----

SPPU In-Sem offline Examination- April 2022

Class : BE

Branch : Mechanical

Semester -8

Subject : Elective -III (Industrial Engineering)

Code : 402049-B

Maximum Marks : 30

Duration : 60 Minutes

Date :07/04/2022

Instructions:

- (i) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6p
- (ii) Draw a neat diagram wherever necessary
- (iii) Figure to the right indicates full marks.
- (iv) Use of calculator is allowed.
- (v) Assume suitable data if necessary.

Q.No	Question/Description	Marks
1 A	Describe the role of Industrial Engineer	4
1 B	Illustrate the Productivity models (any two) in Industrial engineering	6
	OR	
2A	Discuss various Functions of Management	4
2B	Determine multiple factor productivity & Total productivity for combined input of the labour and the machine time using the following :Input :Labour :1000, Material: 520 , Overheads:2000. Production is 1760 Units.	6
3A	Differentiate between value analysis and value engineering	4
3B	Describe Flow Process chart with suitable example	6
	OR	
4A	Illustrate any 4 therbligs with symbols	4
4B	Describe Multiple activity chart with suitable example	6
5A	Differentiate between method study and work measurements	4

5B	<p>The two steps in preparation of a job are molding and packaging . Allowances are set as 12% . Performance rating of Molding operator is rated at 90% and packaging operator is rated at 110% . observed time given in table . Calculate normal and standard time for both task .</p> <table><tr><td></td><td colspan="4">Observed Time in Minutes</td></tr><tr><td>Task</td><td>A</td><td>B</td><td>C</td><td>D</td></tr><tr><td>Modeling</td><td>26</td><td>30</td><td>29</td><td>31</td></tr><tr><td>Packaging</td><td>45</td><td>50</td><td>35</td><td>30</td></tr></table>		Observed Time in Minutes				Task	A	B	C	D	Modeling	26	30	29	31	Packaging	45	50	35	30	6				
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6A	Classify the allowances considered in time study	4																								
6B	<p>A worker operating on a machine performs the following elements shown in the table . Calculate standard time .</p> <table><tr><td>Element</td><td>Observed time (Minutes)</td><td>Performance rating (%)</td><td>Allowance 10%</td></tr><tr><td>A</td><td>0.25</td><td>80</td><td>10</td></tr><tr><td>B</td><td>0.09</td><td>100</td><td>11</td></tr><tr><td>C</td><td>2.8</td><td>90</td><td>12</td></tr><tr><td>B</td><td>0.05</td><td>80</td><td>10</td></tr><tr><td>E</td><td>0.15</td><td>110</td><td>11</td></tr></table>	Element	Observed time (Minutes)	Performance rating (%)	Allowance 10%	A	0.25	80	10	B	0.09	100	11	C	2.8	90	12	B	0.05	80	10	E	0.15	110	11	6
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