

	Sanjay Ghodawat University, Kolhapur Established as State Private University under Govt. of Maharashtra. Act No XL, 2017	2018-19 EXM/P/09/01
Year and Program: FY B. Tech	School: Technology	Department: Mechanical Engg.
Course Code: FYT 105	Course Title: Elements of Mechanical Engineering (Old)	Semester: I & II
Day and Date: <u>Wednesday</u> <u>29/05/2019</u>	End Semester Examination (ESE)	Time: <u>3 hrs</u> Max Marks : 100 <u>10.30 am to 1.30 pm</u>

Instructions:

- 1) All questions are compulsory.
- 2) Assume suitable data wherever necessary.
- 3) Figures to the right indicate full marks.

- | | Marks | Bloom's Level | CO | | | | | | | | | | | | | | | |
|--|-------|----------------|--------|----------------|----|-----|--------------------------------------|------|------|----------------------------------|----|-----|----------------|---|---|----|----------------|-----|
| Q1 a) Specify, giving reasons whether the following systems are open, closed or isolated when in operation. (any three) <ul style="list-style-type: none"> i) Kitchen refrigerator ii) Thermometer iii) Boiler iv) Liquid cooling system of an automobile | 06 | L ₃ | CO1 | | | | | | | | | | | | | | | |
| b) Attempt any Two from the following | | | | | | | | | | | | | | | | | | |
| i) Following data is given in a steady flow process for compressor, <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th style="text-align: center;">Inlet</th> <th style="text-align: center;">Outlet</th> </tr> </thead> <tbody> <tr> <td>Pressure (KPa)</td> <td style="text-align: center;">80</td> <td style="text-align: center;">600</td> </tr> <tr> <td>Specific Volume (m³/Kg)</td> <td style="text-align: center;">0.65</td> <td style="text-align: center;">0.12</td> </tr> <tr> <td>Specific Internal Energy (KJ/Kg)</td> <td style="text-align: center;">40</td> <td style="text-align: center;">140</td> </tr> <tr> <td>Velocity (m/s)</td> <td style="text-align: center;">6</td> <td style="text-align: center;">4</td> </tr> </tbody> </table> <p>If Mass flow rate is 5Kg/s and Heat rejected by the system is 50KW, Find the power required to drive the compressor. Assume that changes in potential energy are negligible.</p> | | Inlet | Outlet | Pressure (KPa) | 80 | 600 | Specific Volume (m ³ /Kg) | 0.65 | 0.12 | Specific Internal Energy (KJ/Kg) | 40 | 140 | Velocity (m/s) | 6 | 4 | 06 | L ₃ | CO1 |
| | Inlet | Outlet | | | | | | | | | | | | | | | | |
| Pressure (KPa) | 80 | 600 | | | | | | | | | | | | | | | | |
| Specific Volume (m ³ /Kg) | 0.65 | 0.12 | | | | | | | | | | | | | | | | |
| Specific Internal Energy (KJ/Kg) | 40 | 140 | | | | | | | | | | | | | | | | |
| Velocity (m/s) | 6 | 4 | | | | | | | | | | | | | | | | |
| ii) Define Isobaric process, Isochoric process and Isothermal process. Represent these processes on a PV Diagram with common starting point. | 06 | L ₂ | CO1 | | | | | | | | | | | | | | | |
| iii) State and explain second law of thermodynamics. | 06 | L ₂ | CO1 | | | | | | | | | | | | | | | |

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Q2

Attempt **any Two** from the following

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|----|--|----|----------------|-----|
| a) | Explain the function of main components used in IC Engine. | 08 | L ₂ | CO3 |
| b) | Describe with neat sketch working of four strokes petrol engine. | 08 | L ₂ | CO3 |
| c) | Compare CI Engines with SI engines as the following points are concerned | 08 | L ₂ | CO3 |
| | i) Fuels used | | | |
| | ii) Working cycle | | | |
| | iii) Method of ignition | | | |
| | iv) Method of fuel injection | | | |
| | v) Compression ratio | | | |
| | vi) Speed | | | |
| | vii) Weight | | | |
| | viii) cost | | | |

Q3

Attempt **any Two** from the following

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|----|--|----|----------------|-----|
| a) | Which type of refrigeration system is used in domestic refrigerator?
Explain the same in brief with neat sketch | 08 | L ₂ | CO2 |
| b) | Define the following | 08 | L ₁ | CO2 |
| | i) Saturated air, | | | |
| | ii) Relative humidity | | | |
| | iii) Wet bulb temperature | | | |
| | iv) Dew point temperature | | | |
| c) | Draw a neat sketch of winter air condition system. State the function of each element used in it. | 08 | L ₂ | CO2 |

Q4

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|----|--|----|----------------|-----|
| a) | State the motion of the tool and workpiece while performing following operations on lathe <i>(any three)</i> | 06 | L ₃ | CO6 |
| | i) Turning | | | |
| | ii) Facing | | | |
| | iii) Taper turning | | | |
| | iv) Drilling | | | |
| b) | Attempt any Two from the following | | | |
| i) | State and explain steps involved in manufacturing in sand casting process. | 05 | L ₂ | CO6 |

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|------|---|----|----------------|-----|
| ii) | Define welding. Explain in brief arc welding process | 05 | L ₂ | CO6 |
| iii) | List a product manufactured by each of the following sheet metal operations | 05 | L ₃ | CO6 |
| | i) Drawing | | | |
| | ii) Spinning | | | |
| | iii) Blanking | | | |
| | iv) Punching | | | |
| | v) Embossing | | | |

Q5 Attempt **any Two** from the following

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|----|---|----|----------------|-----|
| a) | Suggest suitable power transmission devices for the following and justify your answer (any four) | 08 | L ₃ | CO5 |
| | i) Flour mill | | | |
| | ii) Transmission of power from main spindle of lathe to lead screw | | | |
| | iii) Transmission of power from electric motor to pump | | | |
| | iv) Sewing machine | | | |
| | v) Transmission of power from electric motor to spindle in machine tools | | | |
| b) | Why priming is required for centrifugal pump? Explain with neat sketch working of centrifugal pump. | 08 | L ₂ | CO5 |
| c) | Explain with neat sketch working of Reciprocating compressor. State its applications. | 08 | L ₂ | CO5 |

Q6 Attempt **any Three** from the following

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|----|--|----|----------------|-----|
| a) | Draw neat sketch of steam power plant. | 06 | L ₂ | CO4 |
| b) | State the function of the following elements used in hydroelectric power plant (any three) | 06 | L ₂ | CO4 |
| | i) Trash rack | | | |
| | ii) Surge tank | | | |
| | iii) Penstock | | | |
| | iv) Turbine | | | |
| c) | Explain typical wind mill with neat sketch. | 06 | L ₂ | CO4 |
| d) | What are different applications of solar energy. Explain any one in brief. | 06 | L ₂ | CO4 |