# SEE MODEL QUESTION PAPER

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**First Semester B.E. Degree Examination, March- 2022**

## Elements of Mechanical Engineering

Time: 3 hrs.                                                   Max. Marks: 100

*Note: Answer any Five full questions, choosing ONE full question from each module.*

| Q. No. | MODULE - 1 | Marks |
|---|---|---|
| 1.a. | Draw a neat sketch and explain the forging process. Also list the applications of the forging process | 5+3 |
| 1.b. | With the help of a neat sketch explain the arc welding process | 07 |
| 1.c. | It is required to prepare 500ml bottles of a soft drink. You as an engineer could suggest which method is to be used. Draw a neat sketch of the suggested process and explain. | 5 |

### OR

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| 2.a. | With the help of a neat block diagram explain all the steps involved in the additive manufacturing process. List the applications of the additive manufacturing | 7+3 |
| 2.b. | Draw a neat sketch of a rolling operation and explain. | 5 |
| 2.c. | Compare soldering, welding and brazing process | 5 |

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|---|---|---|
| 3.a. | Enumerate the following process with neat diagrams<br><br>   a.  Turning Process     b. Knurling Process     c. Facing Operation | 10 |
| 3.b. | Identify and explain the operation carried out on a drilling machine<br>   1.  Increase the diameter of the hole already drilled<br>   2.  To have a square cross section at the beginning of the hole<br>   3.  Reaming Operation. | 10 |

### OR

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|---|---|---|
| 4.a. | ABC is a company involved in the metal removal process using a milling machine. Identify and explain the following,<br>   1.  Operation performed to reduce the thickness of the workpiece<br>   2.  Operation performed to machine the vertical surfaces simultaneously<br>   3.  Operation performed to produce complex surfaces | 10 |
| 4.b. | Enumerate the following operations to be done on a lathe machine<br>   a.  Taper turning operation using the offsetting the tail stock<br>   b.  Thread cutting operation | 10 |
| 5.a. | It is required to have an application of a robot doing the material handling operation. Suggest as an engineer which configuration you would choose and explain the same with a neat sketch. | 10 |

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|---|---|---|
| 5.b. | Illustrate the various elements of closed loop system in CNC machine. How does it differ from on open loop CNC machine? | 10 |

**OR**

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|---|---|---|
| 6.a. | It is required to have an application of a robot doing the spot welding operation. Suggest as an engineer which configuration you would choose and explain the same with a neat sketch. | 10 |
| 6.b. | Explain the essential elements of a typical robot systems. | 10 |
| 7. a. | During a test on a four stroke diesel engine, the following readings were taken when running at full load:<br>Cylinder diameter – 25cm, Stroke of the piston – 40cm, Crank shaft speed – 250 rpm, Brake load – 70 kg, Brake load diameter – 2m, Mean effective pressure – 6 bar.<br>Determine the brake power, Indicated power, Frictional Power and Mechanical Efficiency | 10 |
| 7.b. | Draw a neat sketch of a Pelton wheel turbine and explain its working. | 10 |

**OR**

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|---|---|---|
| 8.a. | Draw a neat sketch and explain the working of a Vapor compression refrigeration system. | 10 |
| 8.b. | Explain the working of a 4 stroke petrol engine along with PV diagram. | 10 |
| 9.a. | In an open belt drive running in the clockwise direction, the tension in the tight side is 3000N and the arc of contact is $150^0$. If the coefficient of friction is 0.3, find the tension on the slack side of the belt. | 6 |
| 9.b. | A simple gear train is made up of 4 gears A, B, C and D having 20, 40, 60 and 70 teeth respectively. If gear A is the main driver rotating at 500 rpm clockwise, calculate the following:<br>    a.   Speed of intermediate gears     b. Speed and direction of the last follower.<br>        Also sketch the arrangement | 09 |
| 9.c. | Draw a neat sketch of a rack and pinion gear and explain when this is used. | 5 |

**OR**

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|---|---|---|
| 10.a | Two spur gears A and B connect two parallel shafts that are 500mm apart. Gear A runs at 300 rpm and gear B at 150 rpm. If the circular pitch is given as 30mm, calculate the number of teeth on gears A and B. | 05 |
| 10.b. | Explain the shigley's model of design process. | 10 |
| 10.c. | Enumerate the advantages and disadvantages of gear drive over belt drive | 05 |