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| **20ME402**  **Hall Ticket Number:**   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | | **II/IV B. Tech(Regular) DEGREE EXAMINATION** | | | | **August, 2022** | **Mechanical Engineering** | | | **Fourth Semester** | **Metal Cutting & Machine Tools** | | | **Time: Three Hours** | | **Maximum:70 Marks** | |  |
| |  |  | | --- | --- | | ***Answer question 1 compulsory.*** | **(14X1 = 14 Marks)** | | ***Answer one question from each unit.*** | **(4X14=56 Marks)** | |  |

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| 1 | a) | What is the cutting motion and feed motion of a drilling machine? |  |  |
|  | b) | Mention the specifications of a lathe machine |  |  |
|  | c) | Define helix angle in a twist drill geometry. |  |  |
|  | d) | Write the principle of quick return mechanism in a shaping machine. |  |  |
|  | e) | What is the working principle of a planner machine? |  |  |
|  | f) | Write the structure of specifying a grinding wheel. |  |  |
|  | g) | Define lapping operation. |  |  |
|  | h) | What is the main difference between up milling and down milling? |  |  |
|  | i) | What are the basic elements of machining? |  |  |
|  | j) | Define tool life. |  |  |
|  | k) | Write the chemical composition for high speed steel. |  |  |
|  | l) | Name some cutting oils which are used as cutting fluids in machining. |  |  |
|  | m) | Give the tool signature in ASA system. |  |  |
|  | n) | Orthogonal turning of a mild steel tube with a tool of rake angle 10° carried out with a uncut chip thickness of 0.14 mm. If the thickness of the chip produced is 0.28 mm, calculate the values of shear angle. |  |  |
| **Unit –I** | | | | |
| 2. | a) | Explain the Primary and Auxiliary motions of machine tools. | CO1 | 7M |
|  | b) | How do you calculate taper angle in taper turning? Discuss any one taper turning method in detail. | CO1 | 7M |
| **(OR)** | | | | |
| 3. | a) | Explain the working principle of taper turning attachment in a lathe. | CO1 | 7M |
|  | b) | Explain the various types of chucks in detail. | CO1 | 7M |
| **Unit –II** | | | | |
| 4. | a) | Explain various operations performed on a drilling machine with neat sketches. | CO2 | 7M |
|  | b) | Explain the working of a hydraulic shaper mechanism. | CO2 | 7M |
| **(OR)** | | | | |
| 5. | a) | Differentiate shaper and planner. | CO2 | 7M |
|  | b) | Describe the centreless grinding process. What are the various feeding methods used in centre less grinding. | CO2 | 7M |
| **Unit –III** | | | | |
| 6. | a) | What is lapping? How it is done? Explain Hand Lapping and Machine Lapping. | CO3 | 7M |
|  | b) | Explain about the universal dividing head for indexing in milling machines | CO3 | 7M |
| **(OR)** | | | | |
| 7. | a) | Write about the following milling operations with neat figures.   1. Slab milling (ii) Face milling (iii) End milling | CO3 | 7M |
|  | b) | Explain about the Direct indexing and Simple indexing. | CO3 | 7M |
| **Unit –IV** | | | | |
| 8. | a) | Explain the nomenclature of a single point cutting tool as per ASA system with a neat sketch. | CO4 | 7M |
|  | b) | Draw the Merchant’s Circle diagram for force analysis in orthogonal machining operation and also list out the assumptions made for it? | CO4 | 7M |
| **(OR)** | | | | |
| 9. | a) | Derive the following expression(for shear angle) in metal cutting.  TanΦ= rcosα/(1-rsinα)  Where, r is the chip thickness ratio, Φ is the shear angle and α is the rake angle. | CO4 | 7M |
|  | b) | Explain about the any four cutting tool materials which are used in metal cutting. | CO4 | 7M |

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