CBCS SCHEME

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,...171Y110gB/17MEB305

# Third Semester B.E. Degree Examination, Dec.2019/Jan.2020
## Machine Tools and Operations

Time: 3 hrs. Max. Marks: 100

***Note: I. Answer any FIVE full questions, choosing ONE full question from each module.***
***2. Handbook, charts and tables are*** *not required.*

### Module-1

1 a. Describe minimum ten different operations, which can be carried out on a Lathe. **(05 Marks)**
b. Explain with neat sketch, about the parts of Lathe, in detail. **(05 Marks)**
c. Explain the construction and specification in detail by drawing neat figures of (i) SPINDLE (ii) Tail-Stock of the lathe (iii) Carriage assembly (iv) Capstan and Turret Lathe. **(10 Marks)**

**OR**

2 a. Explain in detail, by drawing a neat sketch, about the
i) Working principal of a milling machine
ii) Construction of milling machine. **(05 Marks)**
b. Discuss in detail about UNIVERSAL MILLING MACHINE by drawing a neat figure of
i) With fixed head
ii) With SWIVELLING HEAD. **(15 Marks)**

### Module-2

3 Explain in detail by drawing adequate sketches regarding :
a. Lathe setting for thread cutting **(05 Marks)**
b. Any six drilling machine operations. **(15 Marks)**

**OR**

**4** Explain in detail by drawing neat sketches:
a. SLOT and GROOVE MILLING
b. PROFILE MILLING
c. GEAR MILLING
d. THREAD MILLING. **(20 Marks)**

### Module-3

**5** a. Evaluate machining time. What will be effect on machining time if cutting speed is increased by 50%? While in a turning operation following data is observed. D = 200mm, **L** = 600mm, cutting speed = V = 600 mm/sec, feed (0 = 0.4mm/rev. **(10 Marks)**
b. Evaluate time required for 100 job by assuming 02 minutes, for handling of each job. When a steel shaft of 100 mm diameter and 300mm long turned on LATHE. Speed of sindle = 3m/sec. Feed (f) = 0.3mm/rev. **(10 Marks)**

**OR**

6 a. Evaluate machining time, if number of teeth on the cutter is 4 and feed is 0.2mm/tooth. Other values are as follows, A plain surface of 50mm wide and 700 mm long is to be FACE-MILLED on a vertical spindle milling machine. The machining allowance is 3mm, to be removed in one pass. Take cutter diameter as 120mm and cutting speed (V) = 180 m/min. **(10 Marks)**

b. Evaluate the machining parameters of a solid cylinder which is to be ground longitudinally on a cylindrical grinding machine. The length of the cylinder is 300mm and 60mm diameter. The allowance per side is 0.3mm. The grinding wheel diameter and width is 600mm and 63 mm respectively. Given cutting speed is 30m/min. **(10 Marks)**

## Module_4

7 a. Explain tool signature or tool designation is used to denote a standardized system of specifying the principal tool angles of a single point cutting tool. Draw neat sketch for both system i) AMERICAN SYSTEM ii) OPTHOGONAL SYSTEM [Explain in detail]. **(10 Marks)**

b. Derive an expression for CHIP THICKNESS RATIO in orthogonal cutting operation for a single point cutting tool. (10 **Marks)**

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**OR**

8 a. Evaluate the following parameters :

i) Chip thickness
ii) Shear plane angle
iii) Coefficient of friction on tool face
iv) Shear force on shear plane
v) Energy consumed in KW min per cubic centimeter of metal removed for a tool with 18° rake angle is making an orthogonal cut, 3mm wide, at a speed of 36 mpm and feed of 0.25mm. The chip thickness ratio is 0.60, cutting force is 1392N and feed force as 363N. (10 **Marks)**

b. Analyze and prove that $\beta = \frac{(1 - \tan\alpha)}{2}$ when the RAKE-ANGLE is zero during orthogonal cutting. (10 **Marks)**



## Module_5

9 a. Describe the all eight factors which affect the life of cutting tool. (10 **Marks***_

b. Evaluate the change in tool life, if the cutting speed, feed, depth of cut are increased by 20% individually and also taken together. What will be their effect on the tool life? When the following equation for tool life is given for a turning operation $VT^{0.13} f^{0.37} = C$ A 60 min tool life was obtained, while cutting at V = 30 m/min, f = 0.30 mm/rev and depth of cut (d) = 2.5mm. **(10 Marks)**

**OR**

10 a. Evaluate: i) The most economical cutting speed and ii) Tool-life for maximum production, when, in a turning operation, it was observed that the tool life was 150min, the cutting speed was 20 m/min. As the speed was increased to 25m/min the tool life dropped to 25.2 minutes. If the time required to change the tool was 2 minutes and if the cost of regrinding the tool was ten (10) times the cost of turning per minute. **(10 Marks)**

b. Evaluate the following:

i) Total cost for producing 500 components.
ii) Optimum cutting speed for minimum cost and corresponding tool life.
iii) Cutting speed for maximum production and corresponding tool life.

For machining of a component on a lathe machine the following datas are obtained:

i) Machining constant (C) = 80
ii) Total changing time = 5min
iii) Total regrinding time = 3 min
iv) Total depreciation cost = Rs.1.2/regrind
v) Operating cost = Rs.0.25/min
vi) Labour + overheads per min = Rs.0.2
vii) Work loading and unloading time = 30sec
viii) Feed = 0.25mm/rev
ix) Exponent(n) = 0.25
x) Length of workpiece = 500mm
xi) Diameter of workpiece = 60mm
xii) Number of passes of complete machining = 4
xiii) Cutting speed = 30m/min
xiv) Idle time = 4 minute/piece
xv) Total grinding cost = Rs.1/grind. (10 **Marks)**