Sub Code: RME503

Paper Id: | 140508 | Roll No: [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

B.TECH.
(SEM V) THEORY EXAMINATION 2019-20
MANUFACTURING SCIENCE & TECHNOLOGY-II

Time: 3 Hours   *Total Marks: 70*

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1.   **Attempt *all* questions in brief.**   **2 x 7 = 14**

a.	During metal cutting operation with coefficient of friction (μ)=0.3 and rake angle($\alpha=12^0$), calculate shear plane angle using Lee and Shaffer theory of metal cutting.
b.	Differentiate between up milling and down milling.
c.	Differentiate between polishing and buffing operation.
d.	Define the term tolerance sink.
e.	Define deposition rate, reinforcement, weld bead and throat related to welding process.
f.	Define the term duty cycle.
g.	Differentiate between chemical machining and electrochemical machining.

SECTION B

2.   **Attempt any *three* of the following:**   **7 x 3 = 21**

a.	Show that during orthogonal cutting with a zero degree of rake angle, the ratio of the shear strength τ_s of the work material to specific cutting energy (U_c), is given by $$\tau_s / U_c = (1- \mu r).\ r/\ 1+r^2$$ Where r is chip thickness ratio and μ is coefficient of friction and U_c is specific cutting energy
b.	What do you mean by taper turning operation? Explain any two methods of taper turning with help of neat sketch.
c.	A 900 mm long steel plate is welded by manual metal arc welding process using welding current of 150A, Arc voltage of 20V and welding speed of 300m/min. if the process efficiency is 0.8 and surface resistance is 36 micro Ω, calculate the heat input.
d.	A hole and a shaft have a basic size of 60 mm and are to have a clearance fit with maximum clearance of 0.05mm and minimum clearance of 0.02 mm. the hole tolerance is to be 1.5 times of the shaft clearance. Determine the limits for both hole and shaft using (i) A hole basis system (ii) shaft basis system.
e.	During an electric discharge drilling of 10 mm square hole in a low carbon steel plate of 5 mm thickness brass tool and kerosene are used. The resistance and capacitance in the relaxation circuit are 50Ω and 10 μ, respectively. The supply voltage is 200 V and the gap is maintained at such a value that the discharge takes place at 150 V. Estimate the time required to complete the drilling operation.

SECTION C

3. **Attempt any *one* part of the following:**   7 x 1 = 7

(a)	For a certain job cost of metal cutting is Rs. 18C/V and cost of tooling is Rs. 270C/ TV. Where 'C' is constant, 'V' is cutting speed in m/min. and 'T' is tool life in min. The Taylors tool life equation is $VT^{0.25} = 150$. Calculate the optimum cutting speed (m/min) for minimum total cost.
(b)	In an orthogonal cutting operation the following data has been observed, uncut chip thickness = 0.128 mm, width of cut = 6035 mm, cutting speed (V)=2m/sec. Rake angle = 10^0, cutting force =567N, thrust force =227N, chip thickness=0.228 mm. Determine the shear angle, friction angle, shear stress along shear plane and chip flow velocity using merchant theory.

4. **Attempt any *one* part of the following:**   7 x 1 = 7

(a)	Differentiate between shaper and planner. Also explain the drive mechanism of shaper with help of neat sketch.
(b)	Show that maximum chip thickness in slab milling operation is given by $t_{max} = 2f\sqrt{d(D-d)}/NZD$, here f =table feed rate, N=rpm cutter, Z=number of teeth in the cutter, D= cutter diameter and d= depth of cut.

5. **Attempt any *one* part of the following:**   7 x 1 = 7

(a)	Discuss the material removal mechanism of chip formation of grinding process. Also explain cylindrical grinding with neat sketch.
(b)	Explain the wear mechanism of grinding wheel. Also explain specification of grinding wheel with suitable example.

6. **Attempt any *one* part of the following:**   7 x 1 = 7

(a)	Explain principle of Arc welding and Tungsten inert gas welding with help of neat sketch.
(b)	Explain the principle of Resistance welding process. Also explain Thermit welding process with help of neat sketch.

7. **Attempt any *one* part of the following:**   7 x 1 = 7

(a)	Explain the mechanism of electrochemical machining process. Also derive the expression for material removal rate.
(b)	Explain the working principle of laser beam machining with neat sketch. Also write down the limitations and application of laser beam machining.