Sub Code: NME503

Paper Id: 140520 Roll No: | | | | | | | | | | | | | |

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

Time: 3 Hours ***Total Marks: 100***

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

Section A

1. Attempt *all* questions in brief. 2 x10 = 20

a. Define rake angle and clearance angle.
b. Write down the properties of cutting fluid.
c. What is fit? Explain different types of Fits.
d. What are the functions of flux?
e. Differentiate between up milling and down milling.
f. Write down the function of electrolyte.
g. Define dressing and truing.
h. Why abrasive are not recycle in AJM.
i. What do you understand by straight polarity and reverse polarity?
j. What is machinability? List the factors that affect machinability.

SECTION B

2. Attempt any *three* of the following: 10 x 3 = 30

a. What are the desirable characteristics of cutting tool material?
The tool life for a HSS tool is expressed by the relation $VT^{1/7} = C_1$ and for Tungsten carbide $VT^{1/5}=C_2$. If the tool life for a cutting speed of 24 m/min is 128 min, compare the life of two tools at a speed of 30 m/min.

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.

c. A low carbon steel plate is to be welded by the manual metal arc welding process using a linear V - I characteristic DC Power source. The following data are available :
OCV of Power source = 62 V
Short circuit current = 130 A
Arc length, L = 4 mm
Traverse speed of welding = 15 cm/s
Efficiency of heat input = 85%
Voltage is given as V = 20 + 1.5 L.
Calculate the heat input into the W.

d. What do you mean by finishing operations? Explain with the help of neat sketch grinding operation. Also explain designation of grinding wheel.

e. It is intended to machine a hole in a glass part to a depth of 7.5 mm by USM. Halfway down, the abrasive grits are exhausted. New abrasives are supplied, but they are 20 percent larger in size. Calculate The percentage reduction or increase in total machining time for the hole

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SECTION C

3. Attempt any one part (10*1=10)

a. Sketch the merchants force circle diagram and states the assumptions made in developing their diagram. Also derive the following shear angle relationship $2\varphi + \beta - \alpha = \prod / 2$ Where φ= shear angle, β=friction angle and α=rake angle.

b. In orthogonal turning of a bar of 100 mm diameter, with a feed of 0.25 mm/rev, depth of cut of 4 mm and cutting velocity of 90 m/min, it is observed that the main (tangential) cutting force is perpendicular to friction force acting at the chip-tool interface.The main (tangential) cutting force is 1500 N.
Calculate the orthogonal rake angle of the cutting tool in degree and the normal force acting at tool chip interface in N.

4. Attempt any one part (10*1=10)

a. What are the main difference between shaper and planer? Which types of drive mechanisms used in shaper? Explain any one.

b. With the help of suitable sketch, describe the geometry of a twist drill and also explain how drill sizes are designated.

5. Attempt any one part (10*1=10)

a. Find the limit sizes, tolerances and allowances for a100 mm diameter shaft and hole pair, designated by F8h10. Also specify the type of fit that the above pair belongs to. Given: 100 mm diameter lies in the diameter step range of 0-120 mm. The fundamental Deviation for shaft designation 'f' is -5.5 D0.41 the values of standard tolerances for grades of IT 8 and IT 10 are 25i and 64i respectively. Also, indicate the limits and tolerance on a diagram.

b. Explain lapping and honing process .also explains centreless grinding.

6. Attempt any one part (10*1=10)

a. What is the difference between submerged arc welding and electro slag welding? Also explain the mechanism of resistance welding process.

b. The arc length -voltage characteristic of a DC arc is given by the equation: V = 24 + 4L, where V is voltage in volts and L is arc length in mm. The static volt-ampere characteristic of the power source is approximated by a straight line with a no load voltage of 80 V and a short circuit current of 600A. Determine the optimum arc length for maximum power.

7. Attempt any one part (10*1=10)

a. What is Abrasive jet machining (AJM)? Describe its working with suitable diagram. Also explain the effect of standoff distance and abrasive grit size on material removal rate in the AJM.

b. Derive the expression for the material removal rate of electro discharge machining. Also explain various types of circuit used in EDM.