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B.TECH.
(SEM V) THEORY EXAMINATION 2018-19
MANUFACTURING SCIENCE &TECHNOLOGY-II

Time: 3 Hours ***Total Marks: 70***

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

SECTION A

1. Attempt *all* questions in brief. **2x7=14**

a. Write down the properties of cutting tool materials.
b. What are the different types of flame used in gas welding?
c. Differentiate between up milling and down milling.
d. Write down the function of electrolyte.
e. Define the term glazing and loading of grinding wheel.
f. Why abrasive is not recycled in AJM.
g. Define the term chip thickness ratio and chip reduction ratio also write down the relation between shear angle, chip thickness ratio and rake angle.

SECTION B

2. Attempt any *three* of the following: **7x3=21**

a. The following data relate to orthogonal cutting of mild steel part
Cutting speed = 195 m/min, tool rake angle = 12°, width of cut = 1.75mm, uncut thickness = 0.25 mm, coefficient of friction between chip and tool = 0.52, shear stress of the work material = 385 N/mm², calculate (i) shear angle (ii) cutting and thrust component of machining force.
b. Classify the milling machines. Explain the working of knee and column type of horizontal milling machine with help of suitable diagram.
c. It is required to weld a low carbon steel plate by manual metal arc welding process using a linear V.I. characteristics D.C. power source. The following data are available:
Open circuit voltage =62V, short circuit current =130A, Arc length = 4 mm, transverse speed of welding = 15 cm/min, voltage = 20 +1.5L (L is arc length), efficiency of heat input = 0.84, calculate the heat input to the workpiece.
d. Explain abrasive machining process. Also classify abrasive machining process. Explain centerless grinding with the help of neat sketch.
e. ECM is performed to remove material from an iron surface of 20 mm *20 mm, under the following condition. Interelectrode gap = 0.2mm, supply voltage = 12 V, specific resistance of electrolyte = 2ohm-cm, atomic weight of iron = 55.85, valency of iron = 2, faraday's constant = 96540 coulomb, find the material removal rate in gm/sec.

SECTION C

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

a. State the assumptions made in Earnest and merchant theory. Also derive the following shear angle relationship $2\varphi + \beta - \alpha = \prod/2$ Where φ = shear angle, β =friction angle and α =rake angle.

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b. A batch of 1500 steel parts each 120 mm in diameter and 400 mm in length is to be rough then using a feed of 0.7 mm/rev. if the cost of grinding /grind is rupees 75, time required to reset the cutting edge is 2 min. and the total machining cost rate is Rs. 300/hr. if time taken to load and unload component is 2 min. and initial set up time is 3 hrs then for equation$VT^{0.25}$ =650. Calculate

i. Optimum cutting speed and corresponding tool life for minimum cost criteria.
ii. Total production time and cost for the batch
iii. Calculate above values by using maximum production rate criteria

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

a. What do you understand by indexing? What are the different methods of indexing? Cut 72 teeth on a blank of 40 mm diameter using compound indexing method.

b. Explain the radial type of drilling machine with suitable example. Also explain various drilling operation with neat sketch.

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

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 $D^{0.41}$ 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. Show that the maximum chip thickness tm is surface grinding, using grinding wheel diameter-

D is given by $t_{gm} = \frac{2 v_f}{b C V_w} \sqrt{\frac{d}{D}}$

Where v_f is the table feed, C is the number of abrasive grains per unit area of the grinding wheel surface, V_w is the grinding wheel surface speed, b is the width and d is the depth of cut.

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

a. Explain the working of submerged arc welding with help of suitable diagram, also write down their specific application and advantages and limitations.

b. Explain the principle of solid-state welding process. Also explain explosive welding with suitable diagram.

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

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 differentiate between EDM and ECM process.

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