PAPER ID-421715

Subject Code: KME403

Roll No: | | | | | | | | | | | | | |

# BTECH
## (SEM IV) THEORY EXAMINATION 2021-22
## MANUFACTURING PROCESSES

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

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

### SECTION A

**1. Attempt *all* questions in brief.** **2*10 = 20**

| Qno | Questions | CO |
|---|---|---|
| (a) | What is shrinkage allowance in casting? | 1 |
| (b) | Differentiate between open die forging and closed die forging? | 1 |
| (c) | Differentiate between single point and multi point cutting tool. | 2 |
| (d) | What are the advantaged of CNC over NC machines? | 2 |
| (e) | What is meant by hardness of grinding wheel? | 3 |
| (f) | Differentiate between dressing and truing process in grinding. | 3 |
| (g) | What do you mean by straight polarity in arc welding? | 4 |
| (h) | Differentiate between brazing and soldering process? | 4 |
| (i) | What is the function of electrolyte in ECM? | 5 |
| (j) | What are the applications of water jet machining? | 5 |

### SECTION B

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

| Qno | Questions | CO |
|---|---|---|
| (a) | Differentiate the hot working and cold working process. Justify which process is best suitable for wire drawing? | 1 |
| (b) | What do you mean by taper turning operation? Explain any one methods of taper turing with help of neat sketch. | 2 |
| (c) | How are grinding wheels specified? Clearly differentiate between grade and structure of a grinding wheel? | 3 |
| (d) | Explain the working of atomic hydrogen welding with help of suitable diagram; also write down their specific applications and advantages and limitations? | 4 |
| (e) | Write brief notes on all of the following :<br>(i) Electron beam Machining (EBM)<br>(ii) Ultrasonic Machining (USM)<br>(iii) Laser beam machining (LBM) | 5 |

### SECTION C

**3. Attempt any *one* part of the following:** **10*1 = 10**

| Qno | Questions | CO |
|---|---|---|
| (a) | Explain draft in rolling process. Show that the maximum draft is given by $\nabla h_{max} = \mu^2 R$<br>Where: μ is the coefficient of friction and R is the roll radius. | 1 |
| (b) | Explain the solidification phenomena in casting. Also describe any five casting defects and their remedies in brief. | 1 |

**4. Attempt any *one* part of the following:** **10 *1 = 10**

| Qno | Questions | CO |
|---|---|---|
| (a) | Explain Merchant's force circle diagram and derive the merchant's | 2 |

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| | | |
|---|---|---|
| | shear angle relationship. | |
| (b) | The following equation for tool life was obtained for HSS tool. A 60 min tool life was obtained using the following cutting condition $VT^{0.13}f^{0.6}d^{0.3}$= C. v = 40 m/min, f = 0.25 mm, d = 2.0 mm. Calculate the effect on tool life if speed, feed and depth of cut are together increased by 25% and also if they are increased individually by 25%; where f = feed, d = depth of cut, v = speed. | 2 |

**5. Attempt any *one* part of the following: 10*1 = 10**

| Qno | Questions | CO |
|---|---|---|
| (a) | Show that maximum chip thickness $t_m$ in surface grinding, using grinding wheel of diameter D, is given by $t_m = \sqrt{4f/\pi DrgC} * (d/D)^{1/2}$ Where f = feed, C= No. of abrasive grains per unit area of grinding wheel surface, d= depth of cut and rg is the ratio of grain width to uncut thickness per grit. | 3 |
| (b) | Write brief notes on all of the following<br>a) Honing<br>b) Lapping<br>c) Superfinishing | 3 |

**6. Attempt any *one* part of the following: 10*1 = 10**

| Qno | Questions | CO |
|---|---|---|
| (a) | The voltage-length characteristics of a direct current (DC) arc is given by V= (20+40l) Volts, where l is the length of arc in mm. The power source characteristics is approximated by a straight line with an open circuit voltage = 80 V and short circuit current = 1000 Amp. Determine the optimum arc length and corresponding arc power? | 4 |
| (b) | Explain the principle of Resistance welding process. Discuss how heat balance is achieved in resistance spot welding? | 4 |

**7. Attempt any *one* part of the following: 10*1 = 10**

| Qno | Questions | CO |
|---|---|---|
| (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 | 5 |
| (b) | Explain the mechanics of material removal in ECM Processes. If current of 1500 amp is used, determine the volume rate of material removal from the copper block. (Density of copper 8.96g/cm$^3$, valency 1 and gram atomic weight as 58.93) | 5 |