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B.TECH
(SEM VII) THEORY EXAMINATION 2021-22
MATHEMATICAL MODELING OF MANUFACTURING PROCESSES

Time: 3 Hours

Total Marks: 100

Notes: 1. Attempt all sections. if require any missing data; then choose suitably

SECTION A

1. Attempt All

02X10=20

a.	Write the causes of residual stresses.
b.	Name the parameters which affect the tool life at most.
c.	What are the modes of heat transfer in welding?
d.	Define heat affected zone in welding.
e.	What are the advantages of additive manufacturing process?
f.	What are the purposes of heat treatment?
g.	What are the principles of plastic processing?
h.	Write the suitable steps for glass manufacturing.
i.	What are Bio-materials?
j.	Define micro casting and micro machining

SECTION B

2. Attempt any 03 parts of the following:

03X10=30

a.	How mathematical modelling is related to problem solving?
b.	How can you classify between conventional and non-conventional machining?
c.	Explain in details about solid state welding and its types.
d.	Define powder metallurgy process and write its application with advantages.
e.	What are the fundamentals of heat treatment process and why it has been used for metals and its alloys?

SECTION C

3. Attempt any 01 part of the following:

01X10=10

(a)	Explain briefly how a material is plastically deformed and how residual stresses are removed if it being stored during plastic deformation.
(b)	Briefly explain solid state phase transformation process and reaction during the transformation.

4. Attempt any 01 part of the following:

01X10=10

(a)	Write the advantages of cutting fluids also explain the different types of cutting fluids in material removing process?
(b)	Explain tool wear and its types using a relevant illustration.

5. Attempt any 01 part of the following:

01X10=10

(a)	What are types of metal forming processes? Briefly explain the mechanics of sheet metal forming.
(b)	How does welding affect the microstructure? What are the three zones in a fusion weld?

6. Attempt any 01 part of the following:

01X10=10

(a)	What are the principle and development of additive manufacturing technologies?
(b)	What are the differences between casting and powder metallurgy process? Also explain the process of solidification during the casting process.

7. Attempt any 01 part of the following:

01X10=10

(a)	Explain ceramic materials and processing procedures.
(b)	Briefly explain how heat treatment process affects the microstructure of metal and its alloy.