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

BTECH
(SEM VII) THEORY EXAMINATION 2023-24
MATHEMATICAL MODELING OF MANUFACTURING PROCESSES

TIME: 3 HRS **M.MARKS: 100**

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

SECTION A

1. Attempt *all* questions in brief.

Q no.	Question	Marks	CO
a.	Enlist the four mechanical properties of materials.	2	1
b.	Distinguish between recrystallization and melting point temperature.	2	1
c.	Distinguish between linear and non-linear models.	2	2
d.	Define the term tool life.	2	2
e.	Define bulk deformation of metals.	2	3
f.	What do you understand by fusion welding?	2	3
g.	What do you mean by liquid phase sintering?	2	4
h.	Differentiate between casting and coating.	2	4
i.	Distinguish between macro machining and micro machining.	2	5
j.	Write down the objectives of heat transfer.	2	5

SECTION B

2. Attempt any *three* of the following:

a.	What do you understand by modeling? Also explain the different types of mathematical model used in manufacturing process.	10	1
b.	Calculate the specific cutting energy of the material in turning process.	10	2
c.	Explain the different types of welding heat source.	10	3
d.	Explain the steps of powder metallurgy. Also compare powder metallurgy and additive manufacturing.	10	4
e.	Explain micro manufacturing processes. Also write down the applications of micro manufacturing.	10	5

SECTION C

3. Attempt any *one* part of the following:

a.	What do you understand by engineered materials? Also write down the properties of engineered materials.	10	1
b.	Write a short note on solid phase transformation.	10	1

4. Attempt any *one* part of the following:

a.	Explain the mechanism of material removal of electro chemical machining process. Also explain the role of Electrolyte.	10	2
b.	Explain the heat generation and dissipation in (i) primary shear zone (ii) secondary zone (iii) tertiary zone in metal cutting.	10	2

5. Attempt any *one* part of the following:

a.	Write down the principle of solid-state welding process how it differs from arc welding.	10	3
b.	Classify the sheet metal forming process. Also explain the deep drawing mechanism.	10	3

6. Attempt any *one* part of the following:

a.	Write down the principle of additive manufacturing. How additive manufacturing classified. What are the challenges of additive manufacturing	10	4
b.	What is coating. Explain one method of coating.	10	4

7. Attempt any *one* part of the following:

a.	Explain how manufacturing technology changes from micro to Nano. What are the challenges of Nano manufacturing?	10	5
b.	Explain the effect of heat treatment processes on microstructure of steel.	10	5