Seat No./Enrollment No.: _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 4 – EXAMINATION – SUMMER 2026

Subject Code: BE04000191 **Date: 30/05/2026**

Subject Name: Manufacturing Processes

Time: 10:30 AM TO 01:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

Q.1	**(a)**	As per ASA system draw the geometry of the right hand single point cutting tool and show all angles on it.	**03**
	(b)	List the conditions that lead to the formation of continuous chips and discontinuous chips.	**04**
	(c)	During an orthogonal cutting test on 0.2% carbon steel with HSS tool the following observations were made: Cutting speed - 0.76 m/s; Rake angle - 15°; Feed - 0.13 mm/rev; Depth of cut - 2.65 mm; Chip thickness - 0.323 mm; Cutting force - 819 N; Feed force - 445 N. Find shear angle, shear strain, coefficient of friction, shear stress and Shearing energy.	**07**
Q.2	**(a)**	Explain the use of feed rod and lead screw in the lathe machine.	**03**
	(b)	One hundred shafts of steel 70 mm diameter and 200 mm long are to be turned in one cut each using a carbide tool. The suggested speed and feed for the above job are 1.67 m/s and 0.25 mm/rev. Estimate the total time required for the lot. The spindle speeds available on the machine are 140, 200, 280, 400, 560 and 800 RPM.	**04**
	(c)	List the work holding devices used in the lathe machine and with sketch explain the characteristics of holding of any three of it.	**07**
		OR	
Q.2	**(c)**	List the operations performed on the lathe machine and with sketch showing cutting parameters explain the importance of any three of it.	**07**
Q.3	**(a)**	Calculate the time required to mill the 250 X 100 mm surface of a cast iron block 250 X 100 X 75 mm in one cut. A HSS helical slab mill 100 mm diameter and 125 mm long is to be used. The number of teeth on the cutter is 16. The allowable cutting speed for the operation is 0.6 m/s; feed is 0.3 mm/tooth and depth of cut is 5 mm.	**03**
	(b)	Explain the working of crank and slotted lever quick return mechanism used in shaper.	**04**
	(c)	With neat sketch explain working and importance of the gang milling, straddle milling and string milling operations in milling machine.	**07**
		OR	
Q.3	**(a)**	Calculate the correct indexing for the following: (1) 36 teeth, (2) 17° 20'. The hole plates available with 15, 16, 17, 18, 19, 20, 21, 23, 27, 29, 31, 33, 37, 39, 41, 43, 47 and 49 holes.	**03**
	(b)	Differentiate clearly between shaper and planer machines.	**04**
	(c)	List the arbor mounted cutters and with sketch explain the working and application of any three cutters.	**07**

Q.4 **(a)** Justify the use of multi spindle drill press and gang drill press. **03**

(b) The flange of a coupling is to have 6 holes of diameter 20 mm on a pitch circle diameter of 300 mm. These holes are to be drilled on a radial drilling machine. The cutting speed and feed suggested for the operation are 0.5 m/s and 0.15 mm/rev respectively. Calculate the total time required to drill these holes. Assume that the flange thickness is 30 mm and the drill point angle is 120°. Neglect approach and overtravel. **04**

(c) Explain the working and application of Band Sawing machine. **07**

OR

Q.4 **(a)** Specify the difference with sketch in drilling, boring and reaming operations. **03**

(b) Sketch a typical broach tooth profile and name its elements. **04**

(c) Explain the working and application of Jig boring machine. **07**

Q.5 **(a)** Define loading, glazing and truing of grinding wheels. **03**

(b) Discuss with neat sketches the following alignment tests on lathe (1) True running of head stock centre (2) Parallelism of tailstock guideways with carriage movement. **04**

(c) With a neat sketch explain the working of different setups of surface grinding machine. **07**

OR

Q.5 **(a)** What is the importance of grade, grit and bond type in grinding wheels? **03**

(b) List the various types of instruments required for alignment test and state its importance. **04**

(c) Explain with sketch the difference between through feed, end feed and in feed grinding operations in centreless grinding. **07**

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