

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-4/T-2 B. Sc. Engineering Examinations 2017-2018

Sub : **IPE 401** (Machine Tools)

Full Marks : 280

Time : 3 Hours

The figures in the margin indicate full marks.

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

There are **FOUR** questions in this section. Answer any **THREE**.

1. (a) What is interchangeable manufacturing? How does design of feed gear box support the interchangeable manufacturing? Explain. (12)
- (b) What are the purposes of Top slide and Tail stock? Explain briefly. (12)
- (c) What do you mean by precision threads? How does a precision thread cut by lathe machine? Explain. (12)
- (d) In which cases, do the Rests, Lathe dog and Face plate required during lathe operation? Discuss their related mechanism with necessary sketches. (10 $\frac{2}{3}$)
2. (a) In which methods of taper turning do we need to give feed by top slide? Explain them with necessary sketches. (12)
- (b) What are the general features of turret lathe? Classify the turret lathe with necessary sketches. (12)
- (c) Classify the different types milling machine. Which one do you think better for versatile use? Justify your answer. (12)
- (d) In which case do you need differential indexing? Discuss the helical gear cutting process by milling machine. (10 $\frac{2}{3}$)
3. (a) Explain the generating principle of gear cutting with necessary sketch(es). Also discuss the multiple-tool shaping cutter head. (12)
- (b) What do you understand by Single pass and Double pass in gear cutting by gear shaper? Explain the motion involve in helical gear cutting by gear shaper. (12)
- (c) Discuss the hob cutter setting mechanism for cutting Spur and Helical gears in gear shaper. (12)
- (d) What are the necessity of Ribs and Fasteners in machine tool structure? Explain briefly. (10 $\frac{2}{3}$)
4. (a) What are the properties of materials suitable for machine tool structure? Discuss relative advantages of different materials. (12)
- (b) What are the ways of preloading in bearing? How much do you need to preload for machining accuracy as well as good running properly? (12)
- (c) What are the machine tool acceptance tests? Explain them briefly. (12)
- (d) Sketch the ball bearing and roller bearing to show the nomenclature. Discuss the ball inserting mechanism in ball bearing. (10 $\frac{2}{3}$)

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SECTION – B

There are **FOUR** questions in this Section. Answer any **THREE**.

5. (a) What type of control unit is used in copying lathe machine? Describe it with schematic diagram. (20 $\frac{2}{3}$)
- (b) Describe, with neat sketches, the working principle of *cone pulley drive*. How can you improve the cone pulley setup? Provide an example where cone pulley drive is used. (7+6+2=15)
- (c) What should be the input frequency of a 3-phase stepper motor if the desired speed is 100 rpm? 1° of mechanical rotation corresponds to 2.5° electrical rotation. (6)
- (d) Deduce a mathematical relation among Z , R_n , and ϕ , where the symbols bear the usual meanings. (5)
6. (a) Describe how Directional Control Valves can be used to actuate the reciprocating motion in Surface Grinding Machine. (15)
- (b) How can you control cams in machine tools? Briefly explain different types of cam mechanism. (6+9=15)
- (c) Explain hydrostatic slideways. Mention some of its advantages and disadvantages. (10 $\frac{2}{3}$ +6=16 $\frac{2}{3}$)
7. (a) The following data are provided for the design of a stepped gear box
- Motor speed = 412 rpm
Motor power = 10 KW
Minimum desired output = 100 rpm
Maximum desired output = 1700 rpm
Number of speed steps = 6
- Based on the data provided, draw all possible ray diagrams and calculate the speeds. (20)
- (b) State and prove the basic principles for designing sliding gear cluster. (10 $\frac{2}{3}$)
- (c) How can you differentiate CNC machine tools from NC machine tools? (8)
- (d) Derive the Kronenberg equation for depth of cut in LP series. (8)
8. (a) Classify hydraulic pumps. With neat sketches describe the working principle of P.I.V. drive. Mention at least 3 advantages of P.I.V. drive over belt drives. (2+10+3=15)
- (b) With neat sketches describe how the use of adjustment strip can affect the stability of dovetail slideways. How can you overcome this difficulty? (8+7=15)
- (c) List the advantages and disadvantages of hydraulic drive. (8 $\frac{2}{3}$)
- (d) An axial piston pump with an inclination of 25° rotates at 1200 rpm. Calculate the supply rate if the piston displacement is 28 mm. There are 10 pistons in total and the piston diameter is 5 mm. (8)
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BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-4/T-2 B. Sc. Engineering Examinations 2017-2018

Sub: **IPE 427** (Marketing Management)

Full Marks : 210

Time : 3 Hours

USE SEPARATE SCRIPTS FOR EACH SECTION

The figures in the margin indicate full marks.

SECTION – A

There are **FOUR** questions in this section. Answer any **THREE**.

1. (a) What is marketed? Explain with suitable examples. (10)
 (b) How can you distinguish the selling concept from the marketing concept? (10)
 (c) What is the four Ps of marketing? How can those four Ps of marketing help industrial and production engineers design products and services? (15)
2. (a) There are many productive ways to break down the market. What are those? Illustrate them with appropriate examples. (10)
 (b) Which method of evaluating current market demand involves multiplying a base number by several adjusting percentages? Explain the method with a practical example. (10)
 (c) Illustrate various types of closed-end questions used in marketing research. Use a variety of real-word examples to support your answer. (15)
3. (a) How can one assess the efficiency and effectiveness of marketing activities? Use numerical examples to justify your answer. (10)
 (b) Brand personality is defined as the specific mix of human traits that can be attributed to a particular brand. Justify this definition of brand personality with appropriate explanations and examples. (10)
 (c) How can one apply Abraham Maslow's need theory and Frederic Herzberg's two-factor theory for modeling and analyzing consumer behavior? Detail your answer with examples. (15)
4. (a) A consumer's decision to modify, postpone, or avoid a purchase decision is influenced by one or more types of perceived risk. What are those risks? Present them. (10)
 (b) Derive the Bass diffusion model. When can marketing decision makers use it? (15)
 (c) How can a firm assess strategic planning gap? Explain it with a figure. (10)

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SECTION – B

There are **FOUR** questions in this Section. Answer any **THREE**.

5. (a) Discuss the common methods of estimating demand curves. What are the major risks involved in “Experience-curve pricing”? (10)
- (b) What are the ways of covering the full market by a large firm? Discuss elaborately. (12)
- (c) What aspects of competitors should be researched, prior to setting the price of a product? Discuss the possible interpretations of the competitor’s lowered prices. (8)
- (d) What are the types of responses received from consumers upon recognition of a brand? Explain with example. (5)
6. (a) Discuss the roles played by the members of “Buying center” of an organization in the purchase decision process. (15)
- (b) Describe the behavioral segmentation of the consumer market on the basis of “Loyalty status”. What kind of information can be extracted from this category of segmentation? (10)
- (c) Discuss the roles of brands for consumers and firms. (10)
7. (a) Prepare a list of business marketing challenges. (8)
- (b) What are the reasons for “Markup pricing” being popular? Suppose a bread manufacturer has the following costs and sales expectation: variable cost = 7 BDT per unit; Overall fixed costs = 30,000 BDT; expected sales = 5,000 units. Now, assume the manufacturer wants to earn a 35% markup on sales. What should be the price of each unit of bread? (12)
- (c) Write a short note on **any two** roles of brand as a part of portfolio: (10)
- (i) Flanker
- (ii) Cash cow
- (iii) Low-end entry level
- (d) Discuss the functions of labeling on a product. (5)
8. (a) Write down the name of the stages in the buying process in case of “Business markets”. (8)
- (b) Discuss briefly about “Ethical choice of market targets”. (7)
- (c) Describe the steps in brand building according to the “BrandZ Model”. (10)
- (d) What are the requirements for successful ingredient branding? Discuss in brief. (10)
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SECTION - A

There are **FOUR** questions in this section. Answer any **THREE**.

- 1. (a) Write down the drawbacks of Phal and Beitz Model and Oshuga Model. Explain how to overcome these drawbacks. (10)
- (b) Differentiate between the followings with necessary sketches. (14)
 - (i) Pictorial projection vs. Orthographic projection
 - (ii) Parallel projection vs. Perspective projection
 - (iii) First angle vs. Third angle projection
- (c) Discuss about the advantages and disadvantages of wire frame geometry and surface representation schemes. (11)

- 2. (a) Develop the following solid model in figure 2 (a) using the method of Constructive Solid Geometry. (10)

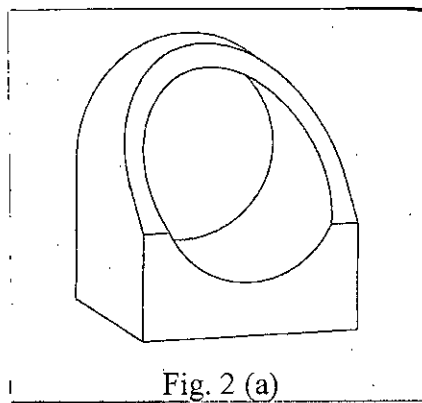


Fig. 2 (a)

- (b) Prove the geometric consistency of the solid model in figure 2(b) using the Euler's equation for Boundary representation. (15)

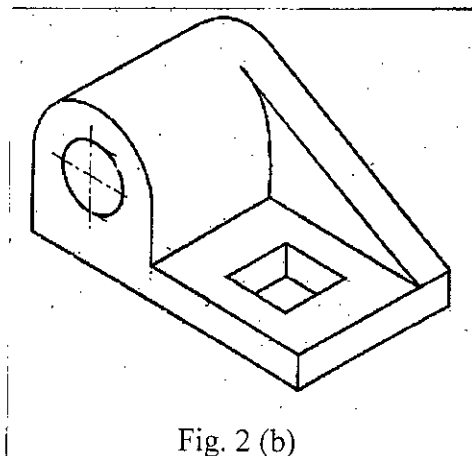


Fig. 2 (b)

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Contd ... Q. No. 2

(c) Suppose, a curve was drawn previously using Hermite cubic polynomial with the points $P_0 = (1, 1)$, $P_1 = (6, 5)$, $P'_0 = (0, 4)$, and $P'_1 = (4, 0)$. Generate the curve using Beziwer curve formulation. (10)

- (i) Find the coordinate values at $u = 0, 0.3, 0.5, 0.7, 1$.
- (ii) Draw the curve and its control polygon.

3. (a) A circle was drawn with the center $(30, 50)$ and radius $R = 15$. Suppose, you need to generate its mirrored circle about the given line starting at $(30, 10)$ drawn at an angle of 45° as shown in figure 3(a). If the window bounds are $(0, -60)$ and $(200, 120)$, the viewport bounds are $(10, 10)$ and $(150, 150)$, and the maximum display tolerance is 0.75 mm, find the screen co-ordinates for the mirrored circle (all dimensions are in mm) (25)

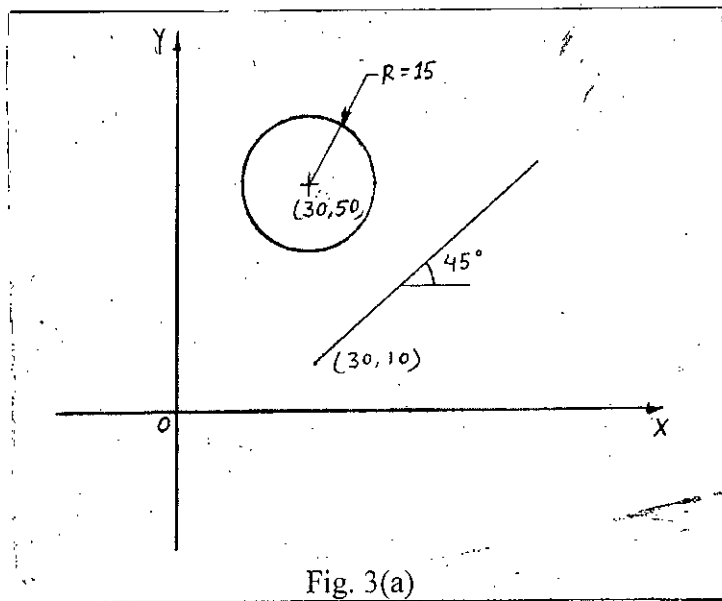


Fig. 3(a)

(b) Briefly discuss about the techniques for hidden surface removal in CAD system. (5)

(c) Name a type of curve formation that allows local modification. Explain how this local modification is possible in this formulation. (5)

4. (a) The square ABCD is defined in the $O_a X_a Y_a Z_a$ co-ordinate system. The co-ordinates of the points A, B, C, D, and O_w are $(30, 30, 0)$, $(60, 30, 0)$, $(60, 60, 0)$, $(30, 60, 0)$, and $(50, 0, 50)$ respectively according to the $O_a X_a Y_a Z_a$ co-ordinate system. Convert the co-ordinate of the square according to $O_w X_w Y_w Z_w$ system as shown as shown in figure 4(a). (15)

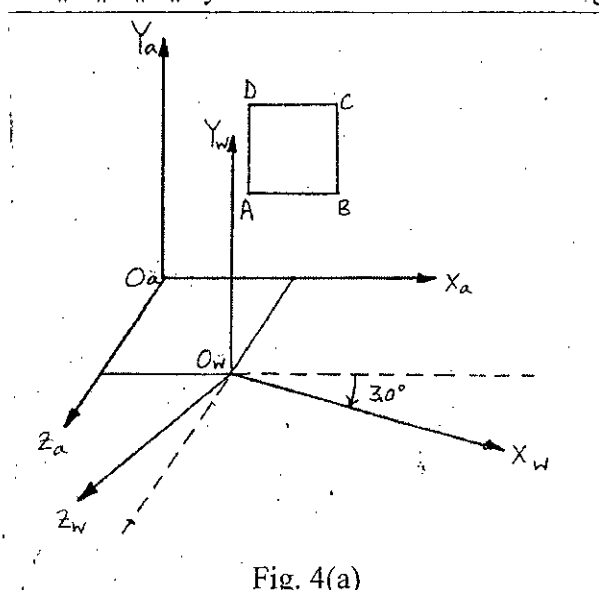
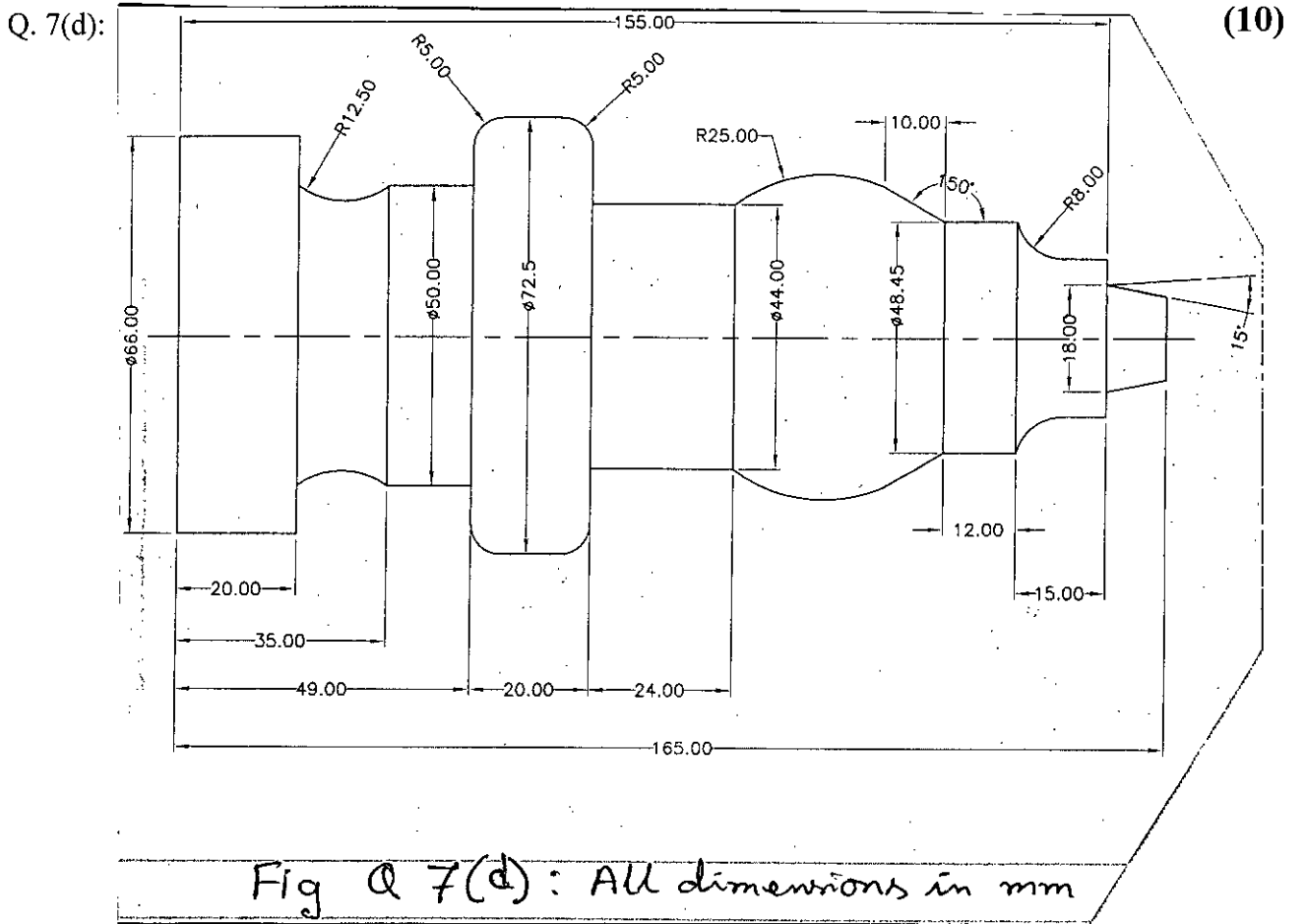


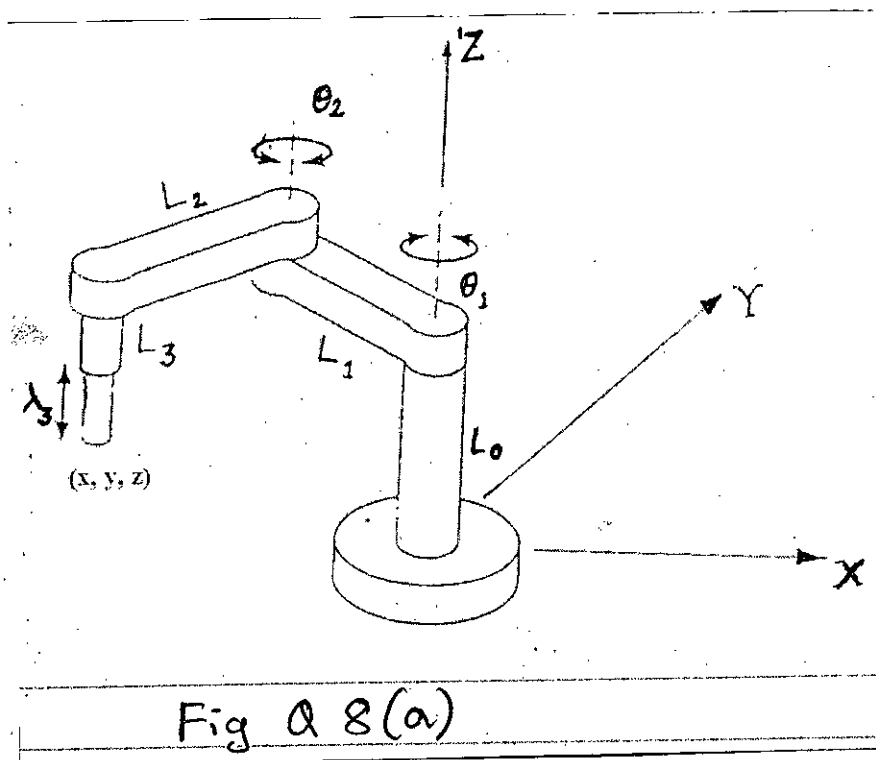
Fig. 4(a)

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7. (a) Provide appropriate examples for three different types of tool positioning modes. (6)
 (b) Briefly describe the working principle of CMM with neat sketch. (10)
 (c) What are the three different CNC controllers in position and motion control system? Provide machining example for each. (9)
 (d) Write down the turning profile of G-code for the cylindrical part shown in Fig. for Q. 7(d). (10)



8. (a) Find the forward and backward transformation for the VR:O robot in Fig for Q. 8(a). (20)



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Contd ... Q. No.8

(b) An industrial robot having a V type joint has the capability of 180° rotation. The bit storage capacity of the controller is 8 bits for this joint. The mechanical errors form a normally distributed random variable about a given taught point. The robot is intended to have a repeatability of 0.099°. If the mean of the distribution is zero, find the accuracy of the robot.

(8)

(c) Write short note on CAD system architectures.

(7)

G-code List for CNC Milling/Turning Operations

G-code	Description
G00	Rapid traverse
G01	Linear interpolation
G02	Clockwise circular interpolation
G03	Counterclockwise circular interpolation
G20	Inch data input
G21	Metric data input
G28	Automatic return to the reference point

G-code	Description
G40	Tool (nose) radius compensation cancel
G41	Tool (nose) radius compensation left.
G42	Tool (nose) radius compensation right
G54-59	Workpiece coordinate system 1-6 selection
G90	Absolute command programming
G91	Incremental command programming
G92	Zero offset setting

G-code	Description
G50	Maximum spindle speed command
G80	End of shape designation
G81	Start of longitudinal shape designation
G82	Start of traverse shape designation

G-code	Description
G85	Call for rough bar turning cycle
G87	Call for finishing turning cycle
G96	Constant cutting speed
G97	Fixed RPM

M-code List for CNC Milling/Turning Operations

M-code	Description
M02	End of program
M03	Spindle clockwise
M04	Spindle counterclockwise
M05	Spindle stop

M-code	Description
M06	Tool change
M08	Coolant on (spray)
M09	Coolant off
M30	End of program