BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-4/T-2 B. Sc. Engineering Examinations (January 2020 Term)

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

Full Marks: 120 Section Marks: 240 Time: 2 Hours (Section A + B)

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

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

01. (a) For the kinematic diagram shown in Fig. for Question 1(a), write the kinematic equations of short and long gear trains used for spindle rotation. Also, determine different RPMs available on the lathe machine. [20]

(b) With suitable diagrams write brief notes on the following- [15]
(i) 3 jaw self-centering chuck
(ii) Lathe centers
(iii) Differential indexing

(c) Describe four methods in which taper surfaces can be produced in an engine lathe. [15]

(d) Which method(s) will you prefer for mass manufacturing of high performance gears? Justify your answer. [10]

02. (a) With necessary sketches, describe different types of ball bearings. How does the load carrying capacity of ball bearing changes with different contact angles? [20]

(b) Differentiate between the climb cut and the conventional cut in milling machines with necessary sketches. [15]

(c) How can you check the straightness of a machine tool? What are the requirements of machine tool structures? [15]

(d) Identify the relevant motions in a gear shaper with a schematic diagram. [10]

03. (a) Analyze and derive the expressions for the force components and the average pressure in a combination of V and flat slideway. Write all the assumptions that you have to make during this analysis. [20]

(b) Describe the working principle of: [20]
(i) Hydrostatic slideways
(ii) Pneumatic slideway
(iii) Anti-friction slideway

(c) Classify milling machines. Provide schematic diagrams of the surfaces that can be obtained through different milling operations. [20]

SECTION – B

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

04. (a) What socio-economic roles are played by machine tools for the industries and the nation? State the locations and functions of the head-stock, tailstock, carriage and work-tool holding devices in center lathes with the help of simple line diagram. [15]

(b) State the basic functions of the kinematic structure of machine tools. Also explain the functional principle of each kinematic chain in the kinematic structure of any machine tool. [15]

(c) With the help of suitable illustrative diagrams, connect the G and D with CM/FM, T/W and the ways of getting G and D in cases of (i) Boring, (ii) Drilling, and (iii) Slab milling [15]

(d) Briefly describe with the help of a simple diagram the construction and functioning of a C_{13} type compound kinematic structure of any machine tool. [15]

05. (a) Explain the mechanisms which transform rotary motion into translation motion in various machine tools. State the relative merits and demerits of stepped drive over stepless drive in respect of transmission of motion and power in machine tools. [15]

(b) Describe briefly with the help of suitable diagram the construction and working of hydraulic-feed drive of any machine tool. [15]

(c) With necessary sketches, explain the working mechanism of a cone pulley drive. How the number of speeds in cone pulley drive can be increased using back gear drive? [15]

(d) How CNC machine tools are functionally different from NC machine tools? Write down the advantages and disadvantages of CNC and NC machine tools. [15]

06. (a) Using the structural formula, draw five ray diagrams for Z = 18 and transmission ratio = 1.41. [15]

(b) Describe the following with schematic illustrations: [15]
(i) Wuelfel kopp tourator
(ii) Recirculating ball nut
(iii) Forst-Enor drive

(c) Describe jaw and friction clutches with necessary diagrams. Explain the basic principles for designing sliding gear clusters. Prove the second principle. [15]

(d) Describe the mechanism of an axial piston pump with suitable sketches. In an axial piston pump, piston displacement is 50 cm. Radius of the piston circle is 25 cm. Angle of inclination of the swash plate is 30°. Cylinder bore diameter is 5 m, number of piston 12 and rotor speed 450 rpm. Calculate the supply rate of axial piston pump. [15]

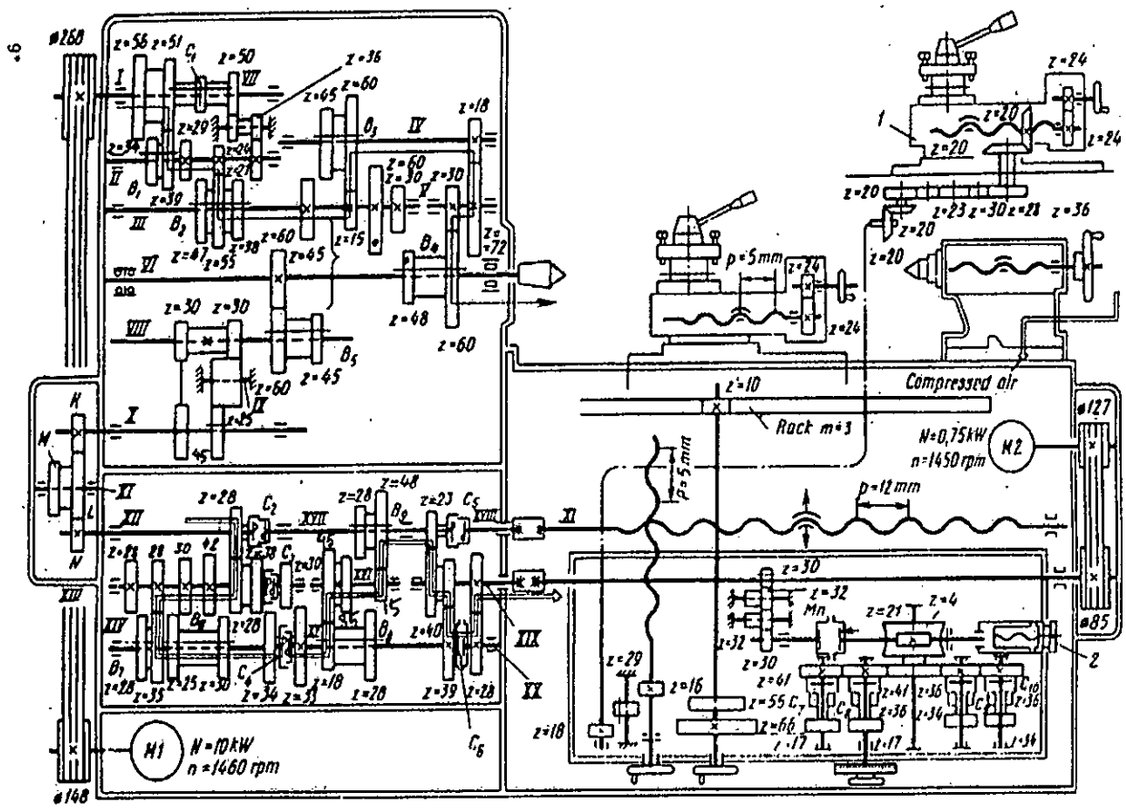


Fig. Kinematic diagram of model 16K20 engine lathe: *1* — power-driven top slide; *2* — feed-thrust adjustment nut

Figure for Question 1(a)

Date: 16/01/2021

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-4/T-II B. Sc. Engineering Examinations (January 2020 Term)

Sub: **IPE 409** (CAD/CAM)

Full Marks: 180 Section Marks: 90 Time: 2 Hours (Sections A + B)

USE SEPARATE SCRIPTS FOR EACH SECTION

The figures in the margin indicate full marks.

SECTION – A

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

1. (a) Discuss advantages and disadvantages of wire frame models, surface models and solid models. **(15)**

   (b) With a simple 3D model, explain the Euler-Poincare formula. **(15)**

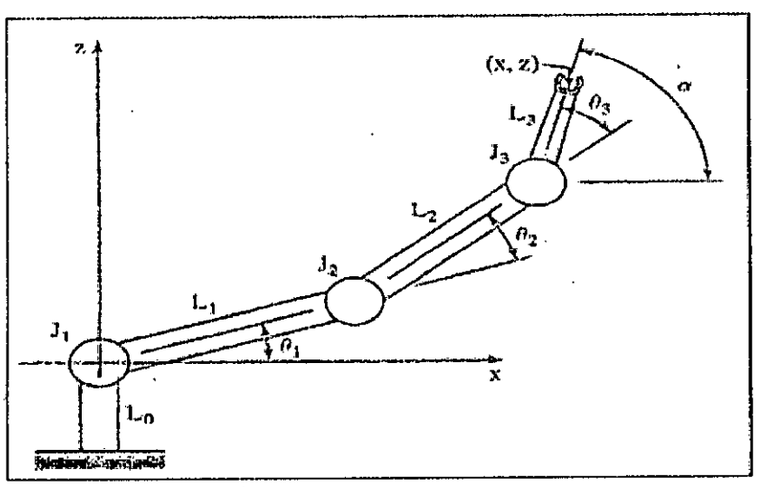
   (c) In case of vector generation, the number of lines depends on tolerances i.e the maximum allowable deviation from the curve. Explain with the help of a circle. **(15)**

2. (a) What will be the new coordinates of a point (2, 2, 2) in the xyz coordinate system, if the coordinate system is translated by +1 unit in each axis-direction and rotated by +90 degree with respect to each axis. Explain with necessary drawings. **(22)**

   (b) Four control points of a Bezier curve are [1 0], [3 3], [6 3] and [8 1]. Determine the coordinates of at least four points on the curve and draw the curve. What is the parametric mid point of the curve? **(23)**

3. (a) What is the importance of neutral formats for CAD models? List three most important neutral formats used by CAD systems and explain their differences. **(20)**

   (b) For a RR:R shown in the figure below, x = 600 mm and y = 800 mm and α = 30°. The link lengths L1, L2 and L3 are 700 mm, 500 mm and 100 mm respectively. Determine the joint angles. **(25)**



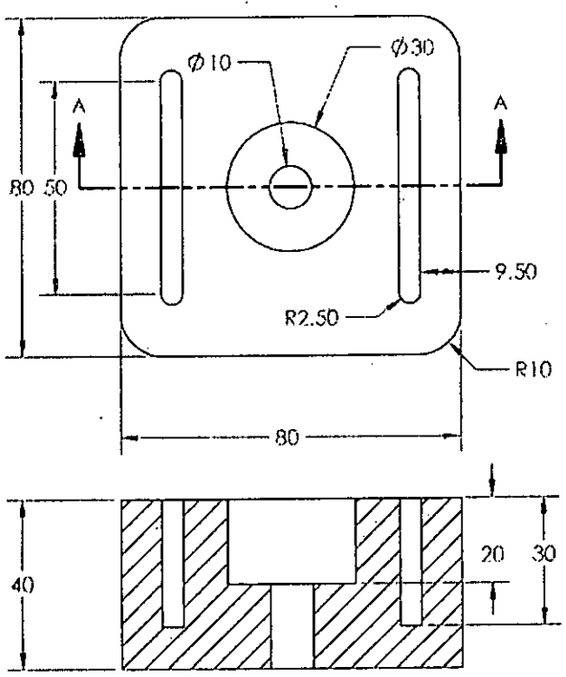
SECTION – B

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

4. (a) In CNC machining center, Tool holder is attached to Spindle head using two types of mechanism. What are those two and how do they work? **(8)**
   (b) What are the two different types of Leadscrew used in CNC machines? Which one of those is better and why? **(8)**
   (c) Servo control is better than stepper control mechanism – how? **(6)**
   (d) What is cutter runout? How can it affect the part dimension? **(7)**
   (e) Briefly describe three different types of ATC in machining center. **(16)**

5. (a) How can you you distinguish accuracy from repeatability? **(7)**
   (b) Tool offset setting is a must in CNC machining – why? **(7)**
   (c) Do you think line numbers are necessary in modern CNC program? What are the benefits of having line numbers in the code? **(6)**
   (d) Write a G-M code for the part shown in Fig Q 5 (d) **(25)**

6. (a) What are the three different positioning mode in CNC? Briefly explain with example. **(10)**
   (b) Write down the benefits of CNC/NC over traditional machines. **(8)**
   (c) Mention the difference in axes (names) movements for Spindle moving mechanism and Table moving mechanism in CNC machining center. **(7)**
   (d) Write a G code for the part shown in Fig Q 6 (d). Show only the tool movement in different axes. **(20)**



SECTION A-A
SCALE 1 : 12

Fig. Q. 5 (d) [All dimensions in mm]

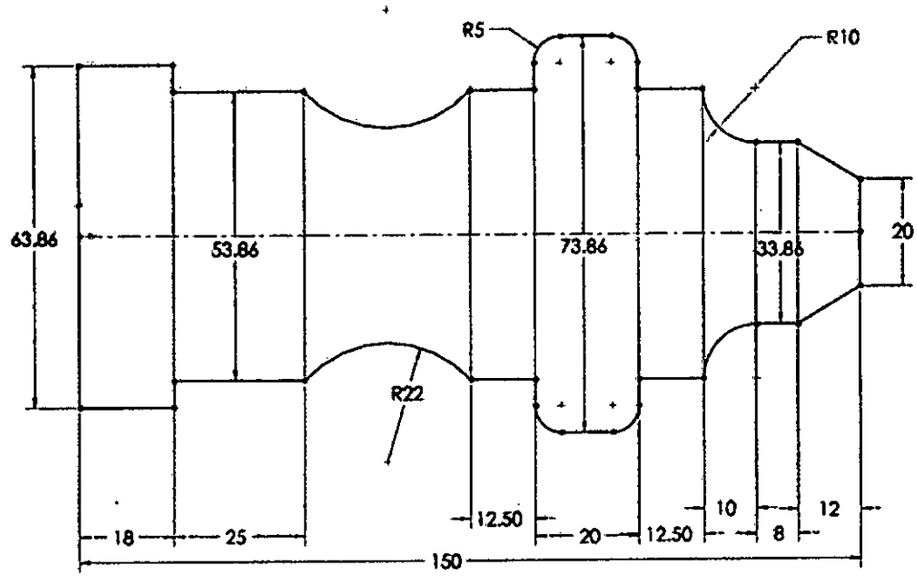


Fig. Q. 6 (d) [All dimensions in mm]

List of G-code 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

List of M-code 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

 Date: 12/01/2021

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-4/T-2 B. Sc. Engineering Examinations (January 2020 Term)

Sub: **IPE 411 (Industrial and Business Management)**

Full Marks: 180 Section Marks: 90 Time: 2 Hours (Sections A + B)

USE SEPARATE SCRIPTS FOR EACH SECTION

The figures in the margin indicate full marks.

SECTION – A

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

1. (a) Describe the functions, roles, and skills of managers. **(15)**

   (b) Which theories have been developed to overcome the limitations of F.W. Taylor's philosophy? Justify your answer. **(15)**

   (c) Why is the organizational structure important? Would you rather work in a mechanistic organization or an organic organization? Justify your answer. **(15)**

2. (a) Discuss the importance of regional trading alliances and global trade mechanisms. **(15)**

   (b) What challenges do managers face in creating and accommodating safe work environments for employees? **(15)**

   (c) Discuss specific ways managers can encourage ethical behavior. **(15)**

3. (a) Describe different types of orientation and training for employees, and also illustrate how each types of training can be provided to them. **(15)**

   (b) Discuss contemporary issues in managing human resources. **(15)**

   (c) How do goal-setting, reinforcement, and equity theories explain employee motivation? **(15)**

SECTION – B

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

4. (a) Define a group with necessary examples. Explain how external conditions and group member resources affect group performance and satisfaction. **(15)**

   (b) Contrast the MBTI and the Big Five model. Describe five other personality traits that help explain individual behavior in organizations. **(15)**

   (c) List the four psychological factors affecting employee behavior in an organization. Discuss the three components of a psychological factor- 'attitude' and explain the job-related attitudes. **(15)**

5. (a) Define communication, interpersonal communication, and organizational communication. Explain the interpersonal communication process with appropriate diagram. **(10)**

   (b) What is motivation and why is it important? Discuss how goal-setting and reinforcement theories explain employee motivation. **(15)**

   (c) Describe the path-goal model of leadership. On what theory of motivation is the **(20)**

model based on? According to this model, how do managers with different leadership styles differ in their ability to influence or reward subordinates? What variables, according to this theory, help to determine the most effective leadership style?

6. (a) Differentiate the classical and the behavioral approaches of management. **(15)**

(b) Explain different components of team-effectiveness model. **(15)**

(c) How can managers blend the guidelines of making effective decision in today's world with the rationality and bounded rationality models of decision making, or can they? Explain. **(15)**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-4/T-2 B. Sc. Engineering Examinations (January 2020 Term)

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

Full Marks: 180 Section Marks: 90 Time: 2 Hours (Sections A + B)

USE SEPARATE SCRIPTS FOR EACH SECTION

The figures in the margin indicate full marks.

SECTION – A

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

1. a) Suppose a company is planning to launch a new beverage in the market. Briefly describe the market segmentation process for this upcoming product. **(15)**

   b) Explain how competitive strategies change over the life cycle of a product. **(15)**

   c) Explain the importance of product and service differentiation for a product to be successful in the target market. **(15)**

2. a) Discuss the twelve dimensions of business innovation. **(15)**

   b) Explain the role played by a family in consumer buying decision. What is a marketing dashboard? How to prepare and chart it? **(15)**

   c) Define brand awareness. How to numerically evaluate it? Show computations. **(15)**

3. a) Discuss the effects of external marketing environment for a smart-phone. **(15)**

   b) Illustrate various types of closed-end questions in marketing research. Use a variety of real world examples to support your answers. **(15)**

   c) Describe the dimensions of holistic marketing with appropriate examples. **(15)**

SECTION – B

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

Assume Reasonable Values for Missing Data, if any.

4. (a) Suppose, you are working as an industrial manager of a smartphone manufacturing company, and you want to build and position your new smartphone brand in a new market. Your research and development team have identified the following attributes and the level of attributes, for example, by gathering data from the market.

Key Attributes and Levels of Attributes:

(i) Charging speed (*1X, 2X, 3X, 4X*)

(ii) In built Apps (None, Limited, moderate, extensive)

(iii) Price (Current, 20% Higher, 30% higher, 40% Higher)

(iv) Supplier (*A, B, C, D*)

Assuming appropriate reasonable values that should not match with others, perform a conjoint analysis and compute the attractiveness of each of the existing supplier in the market. Now, as a decision-maker, comment on the inclusion or exclusion of new attributes for positioning your new smartphone in the market. **(45)**

5. (a) When and how does the VALS segmentation system fail? Present your own arguments. **(10)**

(b) As you know, there are many laptop computers brands available in Bangladesh; also, some laptop brands have been lost from the market. Develop the Brand Asset Valuator (BAV) model for the laptop computer industry of Bangladesh and show the BAV model in a quadrant. What are the key messages that your BAV model deliver to new manufacturers planning to enter the market? **(25)**

(c) How does the idea of perceived-value pricing work? Explain with an example. Your example should be different from others/other sources. **(10)**

6. (a) Using examples, different from your text book or any other sources, illustrate the idea of product line length and product mix width. Show them using a suitable diagram. **(25)**

(b) When and how can you apply the Bass diffusion model in practical situation? Support your answer with a numerical example. The example should be different from others/other sources. **(20)**