Khulna University of Engineering & Technology
Department of Industrial Engineering and Management
B.Sc. Engineering 1st Year 2nd Term Examination, 2018

IPE 1201

Manufacturing Process - II

Full Marks: 210 Time: 03 hrs

N.B: *i) Answer any THREE questions from each section in separate scripts.*
ii) Figures in the right margin indicate full marks.
iii) Assume reasonable data if missing any.

SECTION–A

1. (a) What is meant by metal cutting? Write short notes on (i) cutting speed (ii) feed (iii) depth of cut. 15
   (b) Explain the principle of metal cutting with net sketch. 10
   (c) Differentiate between continuous and dis-continuous chip formation. 10

2. (a) Explain shear stress and shear strain on the chips. 12
   (b) Discuss relationship among various forces of orthogonal cutting. 13
   (c) Determine the cutting speed and machining time per cut when the work having 35 mm diameter is rotated at 200 RPM. The feed given is 0.2 mm/revolution and length of cut is 60 mm. 10

3. (a) What is meant by tool wear? Explain different types of tool wear. 12
   (b) To turn a mild steel component the power required is 0.1/cm^3/min. The maximum power available at the machine spindle is 5 HP. If the cutting speed is 35 meter/min and feed rate is 0.25 mm/rev., determine the followings: 10
      (i) Maximum metal removal rate
      (ii) Depth of cut
      (iii) Cutting force
      (iv) Normal pressure on chip
   (c) Explain the term 'dynamometry'. Describe about hydraulic dynamometer with net sketch. 13

4. (a) Derive an expression for the optimum cutting speed at which the cost will be minimum. 12
   (b) The Taylorian tool life equation for machining C-40 steel with 18-4-1 H.S.S at a feed of 0.2 mm/min and a depth of cut of 2 mm is given by $VT^n = C$ where n and C are constants depending on the cutting conditions and tool work combinations. The following V and T observations have been noted: 13

Cutting speed (v m/min):	25	36
Tool life (T min):	88	20

Calculate the index n and constant c. Hence recommended the cutting speed for a desired tool life of 65 minutes.

(c) What are the functions of cutting fluid? Write down the essential properties of cutting fluid. 10

SECTION–B

5. (a) What are the components included in carriage assembly of a lathe machine? Describe them with their functions. 13

(b) A mild steel rod having 50 mm diameter and 500 mm length is to be turned on a lathe. Determine the machining time to reduce the rod to 45 mm in one pass when cutting speed is 30 m/min and feed of 0.7 mm/rev is used. 12

(c) Write short notes on the following: (i) lathe center (ii) face plate (iii) mandrels 10

6. (a) What is the function of clapper box? Briefly explain quick return mechanism in shaper machine. 13

(b) Differentiate between shaper and planer machine. 10

(c) Briefly explain any three of drill machine operation with necessary sketch. 12

7. (a) What is indexing? Briefly explain the differential indexing with suitable example. 13

(b) What is meant by up and down milling? Why milling is better suited than shaping for producing flat surfaces in mass production? Explain. 10

(c) What are the differences between peripheral milling and face milling. Briefly explain one peripheral milling operation and face milling operation. 12

8. (a) How can you define grinding wheel structure? What does it mean by the specification A-70-L-2-B-23. 10

(b) Briefly explain the centerless grinding with necessary sketches. 10

(c) Define non-conventional machining process. Why it is necessary? Explain. 08

(d) Write down the advantages, disadvantages and application of EDM process. 07

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IPE 1203

Engineering Materials

Full Marks: 210 Time: 03 hrs

N.B: *i) Answer any THREE questions from each section in separate scripts.*
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iii) Assume reasonable data if missing any.

SECTION–A

1. (a) What is Engineering Materials? Write down the classification of Engineering Materials with examples. 13
   (b) Differentiate between BCC and FCC structures. Explain with proper figures. 10
   (c) Write short notes on: 12
      (i) Polymorphism
      (ii) Plasticity
      (iii) Stiffness

2. (a) Explain with proper figure "ductile to brittle transition". 12
   (b) Define fatigue. What are the factors that affect fatigue life? Explain. 13
   (c) Write short notes on 10
      (i) Fatigue strength
      (ii) Brittle fracture
      (iii) Repeated stress cycle

3. (a) What are the major types of corrosion? Discuss briefly Erosion – Corrosion. 12
   (b) Mention different corrosive environment. How can you prevent corrosion? 12
   (c) What is oxidation? Describe the effects of causing "swelling and dissolution" in polymers. 11

4. (a) Define creep. Discuss the three stages of creep with necessary diagram. 12
   (b) What is meant by solid solution? Briefly explain the cooling curve for a solid solution. 13
   (c) What is meant by phase equilibrium and metastable state? Write down the lever rule of two phase regions. 10

SECTION–B

5. (a) What is meant by polymerization? Describe the mechanism of polymerization. 13
   (b) Discuss characterization of polymer. 10
   (c) Write down the physical and chemical properties of glass. 12

6. (a) Differentiate between thermoplastic and thermosetting plastics. 10
   (b) Discuss PMC. What are the reasons for using glass as fiber? 13
   (c) What are the agents used to obtain the different shades in glass with mentioning their percentages? 12

7. (a) Describe crystalline and Non-crystalline ceramics. 11
   (b) Discuss the methods of improving fracture in ceramics. 12
   (c) Write short notes on: 12
      (i) Biodegradation of plastics
      (ii) PVC
      (iii) PTFE polystyrene
      (iv) Nylon 66

8. (a) Briefly discuss the laminar, sandwich, and metal matrix composites. 15
   (b) What are the applications of bio-materials? 10
   (c) What are the main reasons for producing composites? How can you classify these composites? Discuss. 10

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IPE 1209

Computer Fundamentals and Programming

Full Marks: 210 Time: 03 hrs

N.B: *i) Answer any THREE questions from each section in separate scripts.*
ii) Figures in the right margin indicate full marks.
iii) Assume reasonable data if missing any.

SECTION–A

1.	(a)	What is a computer? State the differences among mainframe, mini and micro-computers.	13
	(b)	Write down the applications of computer in production.	10
	(c)	Draw the basic anatomy of a digital computer system.	12
2.	(a)	What are the characteristics those distinguish one generation computer from other?	12
	(b)	Classify computer based on speed and describe them.	12
	(c)	What are the factors those determine the performance of hard disk? Explain.	11
3.	(a)	Explain touch screen, OMR and bar code reader.	12
	(b)	Describe system software, word processing software, and spread sheet software.	12
	(c)	What is compiler? Mention its job.	11
4.	(a)	Explain booting. What are the initiatives those can be taken to increase the computer performance?	12
	(b)	Define programming. Draw a flowchart for the division of given two number.	12
	(c)	Write down the differences between multi-programming and time-sharing system.	11

SECTION–B

5. (a) Describe the basic structure of 'C' programming. 10

(b) Determine the value of each of the following logical expression, if a=12, b=-3 and c=1. 10

(i) A>12 && b<0
(ii) ! (a/b) || c>b
(iii) c/a==0 && a/b!=0
(iv) !!(a<b)
(v) (b>c)? a^{++}: $^{-}$c

(c) Write a C program to determine the roots of quadratic equation ($ax^2+bx+c=0$) using the following well-known quadratic formula, 15

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

6. (a) Explain 'break' and 'continue' statement with suitable example(s). 08

(b) Write a C program to find the prime factors of a given number n. 10

(c) Write a C program to display the following pattern. 12

```
1 2 3 4 5
  1 2 3 4
    1 2 3
      1 2
        1
```

(d) How does an array differ from an ordinary variable? 05

7. (a) Explain local and global variables with proper example(s). 06

(b) What is function? Write down the advantages of using function in C. 07

(c) Write a C program to calculate the factorial of a given number using recursion. 10

(d) Write a C program to multiply two matrices with the sizes of (3×2) and (2×4). 12

8. (a) What is the purpose of using null character at the end of a string? 03

(b) Write a C program to concatenate two strings without using 'strcat' function. 10

(c) Write a C program to read roll, name, and CGPA of 120 students and sort the list according to CGPA using structure. 12

(d) Write a C program to open a file and write Fibonacci series up to n terms in the file. 10

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IPE 1211

Professional English

Full Marks: 210 Time: 03 hrs

N.B: *i) Answer any THREE questions from each section in separate scripts.*
ii) Figures in the right margin indicate full marks.
iii) Assume reasonable data if missing any.

SECTION–A

1. (a) Transform the following sentences as directed. 14
   - (i) Give me some food that I may eat. (Simple)
   - (ii) No one can tell me how this will end. (Affirmative)
   - (iii) I returned home because of my illness. (Complex)
   - (iv) Propa is less clever than some other girls. (Positive)
   - (v) Very few countries are as rich as America. (Comparative)
   - (vi) One should keep one's promises. (Passive)
   - (vii) We must respect our constitution. (Negative)

   (b) Make sentences using the following words as directed. 12
   Close (as noun); Down (as verb); Down (as adjective); Down (as adverb); Last (as verb); Last (as adverb).

   (c) Change the following words as directed and make sentences with the changed words. Familiar (into noun); Familiar (into verb); Familiar (into adverb); people (into noun); people (into verb); people (into adjective). 09

2. (a) Make a new word with each of the following prefixes and suffixes and use them in sentences. Be …, De …, Hypar …, with …, … ish, …some, … wise. 14

   (b) Make sentences expressing the following emotions/ notions. (i) Apology (ii) Annoyance (iii) Farewell (iv) Invitation (v) Request (vi) Promise. 12

   (c) Identify the parts of speech of the underlined words of the following sentences. 09
   - (i) You are <u>but</u> a mere child.
   - (ii) Look <u>before</u> you leap.
   - (iii) The boat is sailing <u>down</u> the river.
   - (iv) <u>Either</u> will do.
   - (v) The <u>half</u> of ten is five.
   - (vi) He was <u>half</u> dead with fear.

3. (a) Frame Wh questions from the underlined parts of the following answers. 14
   - (i) Every success comes after <u>hard labor</u>.
   - (ii) <u>No one</u> can know his fate beforehand.
   - (iii) We know <u>the man</u> loitering here and there.

(iv) It needs perseverance to be a doctor.
(v) The tallest of the boy won the prize.
(vi) The prime minister of the UK is supposed to visit Bangladesh this year.
(vii) You can achieve credibility by honesty and sincerity.

(b) Complete the sentences with subordinate clauses as directed. 12

(i) I know nothing of … (Noun clause)
(ii) I wonder … (Noun clause)
(iii) I live at the place … (Adjective clause)
(iv) I know the time … (Adjective clause)
(v) You can not succeed … (Adverb clause of time)
(vi) …, the teacher refused to let him in. (Adverb clause of cause)

(c) Make sentences using the following phrases and idioms. Fresh blood; In fine; pros and cons; out and out; at large; dead against. 09

4. (a) Make sentences on the following structures. 14

(i) Subj. + verb + noun + to infinitive
(ii) Subj. + verb + noun + past participle
(iii) Subj. + verb + noun + adjective
(iv) Subj. + verb + noun + adverbial
(v) Subj. + verb + that clause
(vi) There + verb + subj. + adverbial
(vii) Subj. + verb + complement

(b) Make sentences using the following modals as directed. 12

(i) Be to (to express arrangement)
(ii) Be to (to express command)
(iii) Be going to (to express strong possibility)
(iv) Be going to (to express intention/ plan)
(v) Had better (to express preference)
(vi) Could (to express inference)

(c) Supply a suitable word to fill in the gaps. 09

(i) Take it … on your paper.
(ii) Neither of the man … important to solve the matter.
(iii) … the rod, spoil the child.
(iv) … your help, I could not do it.
(v) I shall find him out … he has gone.
(vi) The chair … I hired broke down.

SECTION–B

5. (a) Read the following passage carefully and answer the questions that follow. 20

'সব সাধকের বড় সাধক আমার দেশের চাষা' Razia Khatun Chowdhurany, an author in Bangali literature, says the idea on the quality of a farmer, who devotes most of all to the welfare of the countrymen. He meditates on the life of a man how he can progress with the essentials of life. Food eg. rice, fishes, meats, vegetables, fruits etc. are produced with the hard labor of the farmers. Not only food but also clothes, which are from raw materials from the agricultural productions of the farmers, came from the earnest effort or labor of the farmers. For instance, wool

from the fur of sheep, silk from silkworm, fiber obtained from jute and the pods of several plants etc. are essential for the peoples for clothes. So different crops and agricultural commodities help the peoples of the country for their source of nutrition and dress. But their life is not as happy as we have the happiness of benefit from their agricultural commodities. Because their agriculture is depended on the vagaries of nature and risky. Besides, their agricultural system is highly labor oriented. So physical labor supply foams their strength. In addition to these the most unkind view in their life is that which price they earn from the commodities of agriculture is not properly evaluated in point of their production cost and scanty in fulfilling the necessities of their life. Above all, we the educated and public or private servants, don't evaluate the farmers considering their contribution to our life. Many times, we mistreated them with behavior eg. the farmers want service in lands, roads' construction, education for their children, etc. Do we serve them honestly? But we should not forget the contribution, the farmers do for our life.

Questions:

(i) What do the farmers do and how?

(ii) What come from the hands of the farmers for peoples as nutrition and clothes?

(iii) How kind of life of the farmers is and why?

(iv) What underestimations to the farmers have from the educated ones?

(b) Make a precise of the above written passage (Q.5.a) with a suitable title. 15

6. (a) Write a report on your departmental library. 20

(b) Write a paragraph on smoking. 15

7. (a) Write a letter of consolation to your friend, who recently lost his father. 20

(b) Amplify the idea 'Reading makes a full man'. 15

8. Write a composition on the following. 35

(i) Diligence and development

Or

(ii) Honesty and life in the world

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B.Sc. Engineering 1st Year 2nd Term Examination, 2018

MATH 1211

Mathematics-II

Full Marks: 210 Time: 3 hrs

N.B: *i) Answer any THREE questions from each section in separate scripts.*
ii) Figures in the right margin indicate full marks.
iii) Assume reasonable data if missing any.

SECTION–A

1. (a) Determine the angle through which the axes must be rotated to remove xy-term in the equation $4x^2 + 2\sqrt{3}xy + 2y^2 - 1 = 0$ and find the transformed equation. 11
   (b) Identify the conic $x^2 - 5xy + y^2 + 8x - 20y + 15 = 0$. Also reduce it to the standard form. 13
   (c) Define direction cosines of a line. Prove that, $l^2 + m^2 + n^2 = 1$, where l, m, n are direction cosines of a line. Also find the direction cosines of the z-axis. 11

2. (a) Find the distance of the point $(2, -4, 5)$ from the plane $2x + 5y + 6z = 11$ measured parallel to the line $\frac{x}{2} = \frac{y}{1} = \frac{z}{-1}$ 10
   (b) Find the ratio and the co-ordinates of the point in which the zx-plane divides the segment joining the points $(-2,4,7)$ and $(3, -5,8)$. 10
   (c) Examine whether or not the straight lines $\frac{x-3}{3} = \frac{y-8}{-1} = \frac{z-3}{1}$ and $\frac{x+3}{-3} = \frac{y+7}{2} = \frac{z-6}{4}$ are coplanar. If they are non-coplanar, then find the shortest distance between them. 15

3. (a) Find the equation of a plane which passes through the point $(2, -3, 1)$ and perpendicular to the line joining the points $(3,4, -1)$ and $(2, -1,5)$. 11
   (b) Find the co-ordinates of the point where the line joining the points $(2, -3,1)$ and $(3, -4, -5)$ cuts the plane $2x + 3y + z = 10$. 12
   (c) Find the equation of cone with vertex at $(1,1,1)$ and which passes through the guiding curve $x^2 + y^2 = 4,\ Z = 2$. 12

4. (a) Define great circle. Find the centre and radius of the sphere $x^2 + y^2 + z^2 + 2x - 4y + 8z + 10 = 0$. Also find the tangent plane to this sphere at $(0,1, -1)$. 12
   (b) Find the rectangular and spherical polar coordinates for a point, whose cylindrical polar coordinates are $(4\sqrt{5}, \tan^{-1}(\frac{1}{3}), -2)$. 11
   (c) Find the equation to the right circular cylinder with radius 2 and whose axis is the line $\frac{x-1}{2} = \frac{y-2}{-3} = \frac{z-3}{6}$. 12

SECTION–B

5. (a) Define inverse matrix. Find the inverse of the matrix by using elementary row transformations 12

$$A = \begin{bmatrix} 2 & -1 & -1 \\ 1 & -2 & 1 \\ 1 & -1 & 2 \end{bmatrix}$$

(b) Solve the following system of linear equations with the help of matrix method: 10

$$\left.\begin{aligned} x + y + z &= 6 \\ x - y + z &= 2 \\ 2x - y + 3z &= 9 \end{aligned}\right\}$$

(c) Acc noveltry wishes to produce three types of products type A, B, and C. To manufacture a type–A product requires 2 minutes on machine I, 1 minute on machine II & 2 minute on machine III. A type-B product requires 1 minute on machine I, 3 minutes on machine II & 1 minute on machine III. A type-C product requires 1 minute on machine I, 2 minutes on machine II & III. There are three hours available on machine I, five hours available on machine II and four hours available on machine III for processing the order. How many products of each type should Acc noveltry in order to use all the available time? 13

6. (a) Determine whether or not the following vectors are linearly dependent: 11

$$v_1 \equiv (1,-2,1), v_2 \equiv (2,1,-1), v_3 \equiv (7,-4,1)$$

(b) Find the eigen values and eigen vectors corresponding to one eigen value of the matrix, 12

$$A = \begin{bmatrix} 2 & 0 & 0 \\ -1 & 1 & 0 \\ 1 & -4 & 0 \end{bmatrix}$$

(c) Define vector field with example. Find the work done in moving a particle in a force field given by $\bar{F} = 3xy\hat{\imath} - 5z\hat{\jmath} + 10x\hat{k}$ along the curve $x = t^2 + 1, y = 2t^2, z = t^3 ; 1 \le t \le 2$ 12

7. (a) If $\bar{A} = xz^3\hat{\imath} - 2x^2yz\hat{\jmath} + 2yz^4\hat{k}$, then find $\bar{\nabla} \times \bar{A}$ at the point $(1,-1,1)$. 10

(b) Find the directional derivative of $x^2y^2z^2$ at the point $(1,1,-1)$ in the direction of the tangent to the curve $x = e^t, y = \sin 2t + 1, z = 1 - \cos t, at\ t = 0$ 10

(c) State Stoke's theorem. Hence verify the theorem for $\bar{F} = (y - z + 2)\hat{\imath} + (yz + 4)\hat{\jmath} - xz\hat{k}$ over the surface of a cube $x = 0, y = 0, z = 0, x = 2, y = 2, z = 2$ above the XOY plane (open the bottom). 15

8. (a) If $\bar{F} = (x^2 - y^2 + x)\hat{\imath} - (2xy + y)\hat{\jmath}$. Is this field irrotational? If so find its scalar potential. 10

(b) Write geometrical interpretation of scalar triple product. Find the volume of tetrahedron having vertices (-$\hat{\jmath}$-$\hat{k}$), ($4\hat{\imath} + 5\hat{\jmath} + q\hat{k}$), ($3\hat{\imath} + 9\hat{\jmath} + 4\hat{k}$), 4(-$\hat{\imath} + \hat{\jmath} + \hat{k}$). Also find the value of q for which these four points are coplanar. 12

(c) Evaluate $\iint_s \bar{A}.\hat{n}ds$ where $\bar{A} = (x+y^2)\hat{\imath} - 2x\hat{\jmath} + 2yz\hat{k}$ and s is the surface of the plane $2x + y + 2z = 6$ in the first octant. 13