

Khulna University of Engineering & Technology
Department of Industrial Engineering and Management

B.Sc. Engineering 1st Year 2nd Term Examination, 2015

IPE 1201

(Manufacturing Process-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.

SECTION-A

1. (a) What is metal cutting? Explain orthogonal cutting and oblique cutting with proper sketches. 10
(b) Explain with the help of neat sketches the complete geometry of a single point cutting tool. 13
(c) Write short notes on the following: 12
 i) Chip breakers; ii) Chip reduction coefficient; iii) Tool signature;
2. (a) Proof that, $\tan\beta = \frac{r\cos\alpha}{1-r\cos\alpha}$ where all the symbols contains of significant 12
 meanings.
(b) What is a multiple point cutting tool? Sketch twist drill and describe its various elements. 12
(c) Determine the power required to cut a brass bar on a lathe when the cutting speed is 18 11
 meters per minute, feed is 0.06 mm per revolution and depth of cut is 0.058 cm. Assume that
 the power lost in friction is 40%. Also assume that $k = 12000$ for brass.
3. (a) Describe how to calculate the resultant force acting on a single point cutting tool. 07
(b) Sketch Merchant's circle diagram and explain the different quantities involved. 15
(c) The power required by a lathe when running idle is 300 watts. The power input rises to 2400 13
 watts when an alloy steel is machined on lathe at 120 r.p.m. If the depth of cut is 3.50 mm,
 feed is 0.2 mm/rev and cutting speed is 24 m/min calculate the following:
 i) Cutting force and torque at the spindle ii) H.P/cm³/min required to cut the material.
4. (a) Define dynamometry in metal cutting. Describe the working principle of any two type 10
 dynamometer.
(b) Prove that according to Ernst Merchant theory the relationship between rake angle (α), shear 10
 angle (β) and friction angle (γ) is given by, $\beta = \frac{\pi}{4} - \frac{\gamma}{2} + \frac{\alpha}{2}$ ($\gamma = \text{gamma}$).
(c) During the metal cutting test under orthogonal conditions it was found that cutting force is 15
 110 kg and feed force is 102kg when cutting at 185 m/min. The rake angle of the tool is 11°
 and shear plane angle was found to be at 18°. Determine:
 i) Shear velocity ii) Chip flow velocity iii) Work done per minute.

SECTION-B

5. (a) Write down the working principle of lathe machine. How to determine the lathe size? 07
(b) Classify the lathe and briefly describe the engine lathe with net sketch. 12
(c) Write down the different methods available for taper turning. Explain any one of them with 10
 net sketch.
(d) Write short notes on the following machining processes: 06
 i) Knurling; ii) Grooving.
6. (a) Differentiate between shaper, planer and slotter machine. 07
(b) What is the function of clapper box? Briefly explain quick return mechanism in shaper 13
 machine with net sketch.

- (c) Write short notes on: 10
i) Reaming ii) Counter boring iii) counter shinking
- (d) Write down the basic difference between radial and sensitive drilling machine. 05
7. (a) What is indexing? What methods are generally used in indexing? Explain any two of them. 15
(b) Write down the differences between up milling and down milling. 08
(c) Briefly explain the straddle milling and face milling with net sketch. 12
8. (a) Describe the basic working principle of LASER beam machining process and state its advantages and limitations. 15
(b) State the reasons responsible for the development of unconventional machining processes. 07
(c) How is electro-discharge machining (EDM) carried out? Explain briefly 13

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B.Sc. Engineering 1st Year 2nd Term Examination, 2015

IPE 1203

(Engineering Materials)

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.

SECTION-A

1. (a) What is meant by material science and material engineering? Why is it necessary to study engineering material for an industrial engineer? 12
- (b) Define lattice and unit cell. Evaluate the APF of BCC structure. 12
- (c) What are allotropy, Substitutional impurity, Frankel defect and Schottky defect? 11

2. (a) Define fracture. Describe ductile fracture with necessary sketches. 12
- (b) Describe the ductile-to-brittle transition. 10
- (c) What is fatigue life? Discuss the factors that affect fatigue life. 13

3. (a) Define corrosion of metal. Describe the general techniques used for preventing corrosion. 10
- (b) Briefly explain the equilibrium cooling of a solid solution alloy showing the microstructures at various points. 15
- (c) What is galvanic series? How can it help to resist corrosion? 10

4. (a) What is glass? "Glass is a super cooled liquid"- Justify this statement. 11
- (b) Describe the physical and chemical properties of glass. 12
- (c) What is the importance of fluxes? Write short notes on soda-lime glass, safety glass and borosilicate glass. 12

SECTION-B

5. (a) What is meant by copolymer? Draw the molecular structure of PVC, Polypropylene, PTFE, Polystyrene, and Nylon 66. 10
- (b) Which types of additives are used in plastics? Describe. 12
- (c) Describe the recycling process of plastics and the development of plastics that are biodegradable. 13

6. (a) Discuss the molecular structures of polymers. 13
- (b) Differentiate thermosetting polymer from thermoplastic. 10
- (c) Define vulcanization. Show the comparison between vulcanized and unvulcanized natural rubber. 12

7. (a) What is smart material? Write down the importance of composites. 12
- (b) What are ceramics and vitrification? Write down the importance of glazing. 08
- (c) What are the shaping techniques of ceramics? Describe ball milling. 13

8. (a) Write short notes on the following types of composites: 15
 - i) Portland cement concrete.
 - ii) Sandwich panel.
 - iii) Laminar composites.
- (b) Classify polymer matrix composite and describe each type mentioning the reasons of using those fibers in the composite. 12
- (c) What is bio-material? Write down the applications of biomaterial. 08

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B.Sc. Engineering 1st Year 2nd Term Examination, 2015

IPE-1209

(Computer Fundamentals and Programming Language)

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.

SECTION-A

1. (a) What is a mainframe computer? What are the advantages of fifth generation computers over the other four generation of computers? 10
- (b) Define the term "hardware". Explain the basic anatomy of a digital computer system. 12
- (c) What is impact printer? Describe the mechanism of a laser printer. 13

2. (a) Define data processing. Briefly explain the method of data processing. 13
- (b) What do you mean by Boolean Algebra? Prove the following statement by truth table:
i) $(x + y)(x + y') = x$ 12
ii) $xy + x'z + yz = xy + x'z$
- (c) Write a short note on: 10
i) Register
ii) Compiler
iii) Monitor
iv) Operating System

3. (a) Define the term 'computer program'. What are the different types of software? Explain with proper example. 13
- (b) Write a short note on 'Bit' and 'byte'. 05
- (c) What do you mean by the terms carry and overflow? How do computer operations of data processing compared with human action? 12
- (d) Describe the differences between RAM and ROM. 05

4. (a) Define Algorithm and flowchart. What are the essential properties of algorithm? 11
- (b) Draw a flowchart for the following problem: 12
$$S = 1 + x + x^2 + x^3 + \text{-----} + x^n.$$
- (c) What do you mean by the term system flowchart? Develop an algorithm to obtain the book "computer and common sense" by hunt and Shelley from the library. 12

SECTION-B

5. (a) Write down the rules of naming variable in C with proper example. 10
- (b) Determine the value of each of the following logical expression if a = 10, b = -4 and c = 5 10
i) $a/2 != c$
ii) $b > a \parallel !(a/b)$
iii) $!(b > -5 \ \&\& \ c < 0)$
iv) $!a \parallel !b$
v) $!(b > a)? b^- : a^{++}$
- (c) Write a program that asks user an arithmetic operator ('+', '-', '*', or '/') and two operands and perform the corresponding calculation in the operands. 15

6. (a) What is the purpose of 'do-while' statement? How does it differ from 'while' statement? 10
- (b) Write a program to find the sum of the following series for a given value of n. 12

$$\text{Sum} = 1! + 2! + 3! + \dots + n!$$
- (c) What will be the output of the following program segment? Explain it shortly. 08

```
for (int i = 2; i <= 10; printf("%d\n", i)){i = i + 2;}
```
- (d) What is the basic difference between 'break' and 'continue' statements? 05
7. (a) What is function in C? Write down the advantages of using function. 08
- (b) Write a program to display the factors of a given number by using function. 15
- (c) Write a program that converts a given value of second into hours, minutes and seconds. 12
8. (a) What is pointer variable? What is the purpose of using pointer variable in C? 07
- (b) What is structure? How does it differ from an array? 08
- (c) How does an append mode differ from a write mode in file? 05
- (d) Write a program using a structure named 'student' that contains student roll, name and cgpa. 15
 Then take data for 60 students from user and sort the list of students according to their results and finally print the sorted list and output screen.

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B.Sc. Engineering 1st Year 2nd Term Examination, 2015

HUM-1211

(Professional English)

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.

SECTION-A

1. (a) Make appropriate W/H questions from the underlined parts of following answers. 14
- i) The bulky people cannot work for a long time.
 - ii) We need papers to write on.
 - iii) Dhaka is the capital of Bangladesh.
 - iv) Mr. Hoque left Bangladesh for the U.S.A.
 - v) Nobody believes a liar.
 - vi) They will go to Delhi by air.
 - vii) He is from the U.S.A.
- (b) Make nun words with each of the following prefixes and suffixes and use the nun words in sentence. 09
- Auto _____, Be _____, En _____, _____ ate, _____ en, _____ worthy.
- (c) Correct the following sentences. 12
- i) He should not tell lie.
 - ii) Andamans is a group of islands.
 - iii) They why 90 there is mysterious.
 - iv) Since it is the rainy season the farmers plant their seed.
 - v) He is idle, so does his duties regularly.
 - vi) He applied for free-ship.
2. (a) Make sentence with each of the following modals as asked in brackets. 12
- i) Should. (To express one's duty).
 - ii) Should + have + past principle of the base form of verb. (To express the past action which was not discharged)
 - iii) Can. (To express approval)
 - iv) May. (To express polite request)
 - v) Shall. (To offer sb. else).
 - vi) Would rather. (To express preference)
- (b) Transform the following sentences as directed. 14
- i) The ship rested unmoving. (negative)
 - ii) There were two people on board. (complex)
 - iii) I know that he is honest. (simple)
 - iv) The man shot the bird. (interrogative)
 - v) Father wants me to be a professor. (compound)
 - vi) Whom do you know? (Passive)
 - vii) They were hugrier than I thought. (positive)
- (c) Supply a suitable word to fill in the blanks. 09
- i)had we left the station when the train stopped.
 - ii) They arefor a man.
 - iii) What do you want?
 - iv) Our aim is to the village woman.
 - v) I could not help at his behavior.
 - vi) Have you everto London?
3. (a) Make sentences using the following words as directed. 12
- But (as pronoun); But (as adverb); But (as conjunction); Near (as verb); one (as pronoun); what (as adjective);

- (b) Define non-finite verb. How many non-finite verbs are there? List them and give two examples of each of them in sentences. 11
- (c) Express the following notions/functions in sentence. 12
 i) Shame, ii) Sympathy, iii) Good wishes, iv) Desperation, v) Intention, vi) Kindness.
4. (a) Make sentences with the following structures using the words given in brackets. 14
 i) Subject + Linking Verb + Adjective Complement. (Feel as verb)
 ii) How + Subj. + Verb + Object + Verb + Adj. Complement. (complete and is as verb)
 iii) Subj + Verb + As + Adj. + As + Subj. (is as verb)
 iv) Subj + Verb + Noun Complement + Relative Pronoun + Verb + Adv. Of Place. (is and teach as verb).
 v) If + Subj. + Verb + Object, Subj. + Verb + Adv. Of Place. (perform and succeed in life)
 vi) Subj. + Verb + So + Adj. Complement + That + Subj. + Verb + Object. (is and honor as verb)
 vii) Subj. + Verb + Neither + Noun Complement + Nor + Noun Complement. (is as verb)
- (b) Change the following words as directed in brackets and make sentence with the changed forms. 12
 Choice (into verb), Bath (into verb), Bedevil (into noun), Vagueness (into adj.), Festivity (into adj.), Infertility (into adj.)
- (c) Make sentences using the following phrases and idioms. 09
 Eat humble pie; come to light; virgin soil; sixth sense; sharp practice; salt of the earth.

SECTION-B

5. (a) Read the following passage carefully and answer the questions that follow. 20
 Hartals are very common now-a-days. Political parties go on a hartal with the people when they have any grievance against the government. They generally resort to hartal to extort their rights. People have become conscious of their rights and privileges. When other means of settling dispute fails, they go on hartal. People read newspapers and listen to speeches delivered by their political leaders. They can realize that they are oppressed and go on a hartal. The authority does not easily yield to the rights of the people, even to their legitimate demands. The political leaders, with the people, are then compelled to go on strike. When hartals are maintained, it causes hardships to poor workers and their families. Their children suffer for want of food. It causes less production, which affect the economy of the country. Again hartals in public utility services like railways, buses, municipal services, postal services etc. cause serious consequences. Considering the interest of the nation and the country hartals cannot be supported. In the present civilized age hartals are acceptable in no way. In Bangladesh the political consciousness has increased so fast that the people will not be imprisoned by the name of hartal. We cannot imagine how fast hartals demolished the economic backbone of a country. It may be said that Bangladesh has not found the face of development till now. Only reason of this is inconsiderate activities of political leaders and unreasonable hartals. So it should be stopped. We should make an auspicious political scene to keep abreast of the world politics.
 i) When does a political party go on a hartal?
 ii) How do the people understand their rights being deprived of?
 iii) What are the consequences of a hartal on the people of a country?
 iv) What should we do to stop hartal?
- (b) Make a précis of the above written passage (Q. 5.a) with a suitable title. 15
6. (a) Write a cause and effect paragraph on postponement of examination. 15
 (b) Write a short note on observation of Pahela Baishak. 20
7. (a) Amplify the idea "Uneasy lies the head that wears a crown" (Around 800 words) 15
 (b) Write a report on your departmental library. (Around 1200 words) 20
8. Write a free composition on any one of the following. 35
 a) Bribery: A social problem in Bangladesh
 b) patriotism

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B.Sc. Engineering 1st Year 2nd Term Examination, 2015

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.

SECTION-A

1. (a) Determine the equation of the curve $x^2 - y^2 - 2\sqrt{2}x - 10\sqrt{2}y + 2 = 0$ after rotating of axes through 45° . 10
- (b) If $l_1, m_1, n_1; l_2, m_2, n_2; l_3, m_3, n_3$ are direction cosines of three mutually perpendicular lines. The line whose direction cosines are proportional to $l_1 + l_2 + l_3, m_1 + m_2 + m_3, n_1 + n_2 + n_3$, prove that this line makes equal angles with them. 13
- (c) Prove that the straight lines whose direction cosines are given by the relation $al + bm + cn = 0$ and $fml + gnl + hlm = 0$ are perpendicular if $f/a + g/b + h/c = 0$ and parallel if $\sqrt{(af)} \pm \sqrt{(bg)} = \pm \sqrt{(ch)}$. 12
2. (a) Find the equation of the plane through the points (2, 2, 1) and (9, 3, 6) and perpendicular to the plane $2x + 6y + 6z = 9$. 10
- (b) Prove that the straight lines $\frac{x}{a} = \frac{y}{\beta} = \frac{z}{\gamma}, \frac{x}{a\alpha} = \frac{y}{b\beta} = \frac{z}{c\gamma}, \frac{x}{l} = \frac{y}{m} = \frac{z}{n}$ will lie in one plane if $\frac{l}{\alpha}(b - c) + \frac{m}{\beta}(c - a) + \frac{n}{\gamma}(a - b) = 0$. 13
- (c) A line with direction cosines proportional to (2, 7, -5) is draw to intersect the line $\frac{x-5}{3} = \frac{y-7}{-1} = \frac{z+2}{1}$ and $\frac{x+3}{-3} = \frac{y-3}{2} = \frac{z-6}{4}$. Find the co-ordinates of the point of intersection and the length intercepted on it. 12
3. (a) If any tangent plane to the sphere $x^2 + y^2 + z^2 = r^2$ makes intercepts a, b, c on the axes, Prove that $\frac{1}{a^2} + \frac{1}{b^2} + \frac{1}{c^2} = \frac{1}{r^2}$. 10
- (b) Show that the lines $\frac{x-5}{4} = \frac{y-7}{4} = \frac{z+3}{-5}, \frac{x-8}{7} = \frac{y-4}{1} = \frac{z-5}{3}$ are coplanar, find their common point and the equation of the plane in which they lie. 13
- (c) Put the equation of the line $x + y + z + 1 = 0 = 4x + y - 2z + 2$ in symmetric form. 12
4. (a) Find the equation of the right circular cone whose vertex is the origin axis the z-axis and semi vertical angle α . 10
- (b) Find the shortest distance between the lines $\frac{x-3}{3} = \frac{y-8}{-1} = \frac{z-3}{1}$ and $\frac{x+3}{-3} = \frac{y+7}{2} = \frac{z-6}{4}$. 15
- (c) What do you mean by linear dependent, linear independent, linear function and bilinear forms? 10

SECTION-B

5. (a) Reduce the matrix A to its normal form and then find its rank, where 15
$$A = \begin{bmatrix} 1 & 1 & 1 & -1 \\ 1 & 2 & 3 & 4 \\ 3 & 4 & 5 & 2 \end{bmatrix}$$
- (b) Find the unit vectors in spherical polar coordinates system and hence represent the vector, $\vec{A} = z\hat{i} - 2x\hat{j} + y\hat{k}$ in spherical coordinates. 15

- (c) When do you call a set of three vectors are linearly dependent? Given such an example. 05
6. (a) Define eigen values and eigen vectors of a matrix and find these for the matrix $B = \begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$ 12
- (b) A vector field is given by $\vec{F} = (\sin y)\hat{i} + z(1 + \cos y)\hat{j}$.
Evaluate the line integral over the circular path by $y^2 + z^2 = a^2, x = 0$. 13
- (c) Is the vector field given by $\vec{F} = 2x(y^2 + z^3)\hat{i} + 2x^2y\hat{j} + 3x^2z^2\hat{k}$ conservative? Find its scalar potential if possible. 10
7. (a) Solve the equation with the help of matrix. 15
- $$\begin{aligned} 3x + 5y - 7z &= 13 \\ 4x + y - 12z &= 6 \\ 2x + 9y - 3z &= 20 \end{aligned}$$
- (b) In what direction from the point (1, -2, 3) is the directional derivative of $\varphi = 2xy^2 - z^2$ a minimum? 10
What is the magnitude of this minimum?
- (c) What do you mean by $\vec{A} \cdot \vec{B} \times \vec{C}$, where $\vec{A}, \vec{B}, \vec{C}$ are three non-zero vectors? Geometrically explain this. 10
8. (a) Find the inverse of the matrix $A = \begin{bmatrix} 2 & -1 & 3 \\ 4 & 0 & -1 \\ 3 & 3 & 2 \end{bmatrix}$ 15
- (b) Find two non-singular matrices P and Q such that PAQ is in normal form, where 10
- $$A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 9 \end{bmatrix}$$
- (c) Evaluate $\int_S \vec{F} \cdot \vec{N} ds$, where $\vec{F} = yz\hat{i} + zx\hat{j} + xy\hat{k}$ over the surface of $x^2 + y^2 + z^2 = 1$, in the first octant. 10