

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

B.Sc. Engineering 1<sup>st</sup> Year 2<sup>nd</sup> Term, 2017

**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.  
iii) Assume reasonable data if missing any.

**SECTION-A**

1. (a) What is meant by tool signature? Describe the parameters of a single point cutting tool with figure. 13  
(b) Prove that  $\tan \beta = \frac{\cos \alpha}{K - \sin \alpha}$ , where the symbols have their usual meaning. 12  
(c) During turning a mild steel component with a  $0 - 10 - 7 - 7 - 8 - 9 - 1.5 \text{ mm}$  orthogonal shaped tool, a depth of cut  $1.8 \text{ mm}$  is used. If feed is  $0.18 \text{ mm/rev}$  and chip thickness of  $0.36 \text{ mm}$  is obtained, Determine:  
(i) Share angle. (ii) Chip thickness ratio. 10
2. (a) Draw the Ernst Merchant's circle diagram and prove that  $\mu = \frac{F_H \tan \alpha + F_V}{F_H - F_V \tan \alpha}$ , where all the symbols represent their usual meaning. 15  
(b) Classify cutting fluid. Explain the effects of cutting fluids on chip contraction. 08  
(c) A carbide cutting tool lasted for 100 minutes while machining mild steel work material at a cutting speed of  $40 \text{ m/min}$ . Determine the tool life of the tool is used for machining mild steel at a 20% higher speed. Also, calculate the value of cutting speed of the tool is required to machine for  $160 \text{ min}$  without falling. Assume  $n = 0.26$ . 12
3. (a) What is meant by tool life? Explain different types of tool wear. 12  
(b) Drive an expression for optimum cutting speed in turning operation at minimum cost. 13  
(c) A mild steel rod having  $50 \text{ mm}$  diameter and  $500 \text{ mm}$  length is to be turned on a lathe. Determine the machining time to reduce the rod to  $45 \text{ mm}$  in one pass when cutting speed is  $30 \text{ m/min}$  and a feed of  $0.7 \text{ mm/rev}$  is used. 10
4. (a) Define dynamometry in metal cutting. Describe the working principle of any two type dynamometer. 10  
(b) Differentiate between orthogonal and oblique cutting. Briefly explain the flank wear with neat sketch. 15  
(c) During the metal cutting process under orthogonal conditions, it was found that cutting force is  $110 \text{ kg}$  and feed force is  $120 \text{ kg}$  when cutting at  $185 \text{ m/min}$ . The rake angle of the tool is  $11^\circ$  and share plane angle was found to be at  $18^\circ$ . Determine- (i) Shear velocity (ii) Chip flow velocity 10

**SECTION-B**

5. (a) Describe at least three work holding device used in machine shop practice. 12  
(b) Write down the functions of the following lathe parts: 13  
(i) Chuck (ii) Lead screw (iii) Feed rod (iv) Compound rest  
(c) Determine the optimum cutting speed for an operation carried on a lathe machine using the following operations: 10  
Tool change time=4 minutes; tool regrind time=3 minutes; machining running cost= 20 paise per minute; depreciation tool regrind=Re. 1; the tool life equation is given by  $VT^n = C$ . Assume  $C = 60, n = 1/5$ .

6. (a) Define indexing. Explain any two indexing method with suitable example. 15  
(b) Briefly describe the slab milling and straddle milling. 10  
(c) Determine the power required by a milling cutter to take a cut 100 mm wide X 3 mm deep at 75 mm/min feed for alloy steel. If the cutter diameter is 100 mm and cutting speed is 15 m/min, find the mean torque of the arbor. Assume  $K = 8.5$  for alloy speed. 10
7. (a) What is broaching operation? Mention its advantages and limitations. 13  
(b) What are the major actions that take place at the point of a drill? Write down the functions of a radial drilling machine. 12  
(c) What are the primary purposes of reaming? Write down the main advantages of planers machines over shapers. 10
8. (a) Describe the basic working principle of ECM process. 13  
(b) What is meant by modern manufacturing process? What are the advantages of modern manufacturing process over conventional machining process? 10  
(c) Write down the applications, advantages and disadvantages of EDM. 12



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**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.  
iii) Assume reasonable data if missing any.

**SECTION-A**

1. (a) What is meant by material science? Why it is important for an industrial engineer to learn about engineering materials? 12
- (b) Explain with example: 'Polymorphism' and 'Allotropy'. 08
- (c) What is lattice and unit cell? Make comparison with net sketch among BCC, FCC, and HCP crystal structure. 15
  
2. (a) What are the possible causes of ductile to brittle transition? Why it is not preferred? Discuss. 12
- (b) What is galvanic corrosion? How can you reduce this type of corrosion in the practical field? 13
- (c) Differentiate between creep and fatigue failure. 10
  
3. (a) What is degradation of polymers? Describe effects of causing "swelling and dissolution" and "bond rupture" in polymers. 11
- (b) What are the liquidus and solidus lines? How can you get these lines from the cooling curves? 12
- (c) Write short notes on: 12
  - (i) Plasticity
  - (ii) Ductility
  - (iii) Stiffness
  - (iv) Toughness
  
4. (a) Define creep. Explain the terms "stages of creep" and "effects of stress and temperature" on creep. 13
- (b) What is meant by phase, phase diagram and triple point? Write down Gibbs phase rule with proper example. 10
- (c) Discuss iron-iron carbide phase diagram. 12

**SECTION-B**

5. (a) Define thermoplastic and thermosetting plastic with example. 05
- (b) What are the additional chemicals are used in the processing of glass? Mention their functions. 10
- (c) "Glass is a supercooled liquid"-justify this statement. 10
- (d) What are the agents used to obtain the different shades in glass with mentioning their percentages. 10
  
6. (a) What are the advanced applications of ceramics? Describe three general categories of ceramics. 13
- (b) Discuss the stress-strain behavior of ceramics. 12
- (c) Write down the comparative advantages of ceramics with other engineering materials. 10

7. (a) What is polymerization? Describe briefly the addition polymerization and condensation polymerization. 10
- (b) Define natural rubber? Mention its important properties that make it suitable for the manufacturing suitable and valuable goods. 10
- (c) What is copolymer? Draw molecular structure of PVC, polypropylene, PTFE polystyrene and Nylon 66. 15
8. (a) What is bio-material? Write down the application of bio-materials. 10
- (b) Describe briefly: 13
- (i) Sandwich composites
- (ii) Metal matrix composites
- (c) Discuss the structural composites. 12

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**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.  
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**SECTION-A**

1. (a) Describe the classification of computer based on size, cost, processing speed. 13  
(b) Define operating system. Explain the function of operating system. 12  
(c) Describe the difference between machine language and assembly language. 10
  
2. (a) Give a brief description of basic functional units of computer. 10  
(b) What are the stages in the development of software? 05  
(c) What is the difference between online data processing and offline data processing? 08  
(d) Draw a software hierarchy for computers. Explain different types of software language. 12
  
3. (a) Define flowchart. What are the conventions that should be followed while drawing a flowchart? 11  
(b) Write down the flowchart in obtaining the sum of the following series. 13  
$$S = 1 + x + x^2 + x^3 + \dots + x^n$$
  
(c) What are meant by batch processing, time sharing and interactive computing? 11
  
4. (a) Define algorithm. What are the essential properties of an algorithm? 07  
(b) Write an algorithm for finding the solution of the following pair of equations in  $x$  and  $y$ . 13  
$$a_1x + a_2y = b_1$$
$$a_3x + a_4y = b_2$$
  
(c) Use 2's complement to perform M-N with the given binary numbers, where 05  
$$M = (1010100)_2 \text{ and } N = (1000100)_2$$
  
(d) Simplify the following Boolean functions to a minimum number of literals. 10  
(i)  $(x + y)(x + y')$  (ii)  $y(wz' + wz) + xy$

**SECTION-B**

5. (a) Name and describe the three basic data types in C. 08  
(b) A C program contains the following declaration and initial assignments: 08  
$$\text{int } i = 8, j = 5, k;$$
$$\text{float } z;$$
$$\text{char } a, b, c = 'c', d = 'd';$$

Determine the value of each of the following expression

(i)  $z = i/j$  (ii)  $i += (j - 2)$   
(iii)  $k = (j > 5)? i : j$  (iv)  $a = (c < d)? c : d$

  
- (c) Write a C program to calculate the sum of the following series. 12  
$$1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots + \frac{x^n}{n!}$$
  
- (d) Write down the basic structure of "C" program. 07



6. (a) What is meant by looping? Write down the basic structures of various form of looping in C. 08
- (b) Write a C program to find the greatest common divisors (GDC) of three given numbers. 10
- (c) Write a C program to print Fibonacci series up to n terms. 12  
 0 1 1 2 3 5 8 13 ..... n<sup>th</sup> terms
- (d) What is meant by pointer variable? What is the purpose of using pointer variable in C? 05
7. (a) Write down the advantages of using function in C. 05
- (b) Write a C program to convert a given decimal number into binary number using function. 15
- (c) How does a string differ from an array? 05
- (d) Write a C program to count the number of lowercase and uppercase letters of a given string. 10
8. (a) Write a C program to calculate the sum of diagonal elements of a square matrix. 12
- (b) What is structure in C? How does it differ from an array? 08
- (c) How does an append mode differ a write mode file management of C? 05
- (d) Write a C program to open a file and read a list of numbers and print it on output screen. 10

**Khulna University of Engineering & Technology**  
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B.Sc. Engineering 1<sup>st</sup> Year 2<sup>nd</sup> Term, 2017  
**HUM 1211**  
Professional English

Full Marks: 210

Time: 3 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) Frame Wh questions from the underlined parts of the following: 14
- i) Government in 1955 established Bangla Academy.
  - ii) Government in 1955 established Bangla Academy.
  - iii) One day a French ship took prisoner a young British sea man
  - iv) The 21<sup>st</sup> February is our Language Martyrs Day.
  - v) The war of independence continued for nine months.
  - vi) He lives with his uncle.
  - vii) Shamim went to hospital.
- (b) Make use of the following words in sentence as asked in brackets. 12  
Bed (as verb), Skin (as verb), Love (as adjective), Abstract (as verb), Account (as verb), Damn (as verb).
- (c) Write two synonyms for each of the following words and make sentence with the 09  
synonyms.  
Hard, Peace, Work
2. (a) Identify the parts of speech of the underlined words of the following sentences. 14
- i) Any pen will do.
  - ii) Point out the errors if there be any.
  - iii) A beautiful wife and a back door off make a rich man poor.
  - iv) As 9 am ill, I cannot go.
  - v) I hope to see more of you.
  - vi) Be more careful.
  - vii) Call me when you are at the station.
- (b) Make new words with the following prefixes and suffixes and use them in sentences. 12  
Fore....., For....., Re....., .....ance, .....ster, .....ty.
- (c) Change the following words as directed and make sentences with the changed words. 09  
Awe (into adjective); Hate (into adjective); Hate (into noun); Able (into verb); Autocrat (into noun); Weak (into verb).
3. (a) Correct the following sentences 14
- i) Chairman is supposed to chair in the meeting.
  - ii) I have lot of work to do.
  - iii) He loves to play cricket.
  - iv) Mim resembles to his father.
  - v) He is awaiting for you.
  - vi) How answers for the question he is difficult to understand.
  - vii) He is evil than his brother.
- (b) Make sentence with each of the following modals as asked in brackets. 12
- i) Must. (to express a logic)
  - ii) Be + To + base form of verb. (to express command)
  - iii) Dare. (to express indulgence)
  - iv) Had better. (to express a suggestion)
  - v) Would rather (to express preference)
  - vi) Should. (to expect something to happen)
  - vii) Shall. (to express an offer)
- (c) Define Transitive verb, Intransitive verb and Infinitive with example. 09



4. (a) Complete the sentences with subordinate clauses as directed. 14
- Walk slowly .....(adverb clause of purpose)
  - ....., they said nothing (adverb clause of concession)
  - Strike ....., (adverb clause of time)
  - My horse ..... is an Arab (adjective clause)
  - The reason ..... is unknown (adjective clause)
  - ..... is a mystery (noun clause)
  - I know nothing ..... (noun clause)
- (b) Transform the following sentences as directed 12
- Give me some food which I may eat. (simple)
  - No one can tell me how this will end. (affirmative)
  - I returned home because of my illness. (complex)
  - Rimi is less clever than some other girls. (positive)
  - Very few countries are as rich as America. (comparative)
  - One should keep on his promises. (passive)
- (c) Fill in the gaps with suitable word. 09
- We should not run ..... money always.
  - Go on ..... your studies.
  - Waste not, ..... not.
  - Several decisions ..... been taken.
  - The mugger ..... snatched away your watch has been arrested.
  - I found ..... difficult in front of the market.

**SECTION-B**

5. (a) Read the following passage carefully and answer the questions that follow 20
- The government does a lot of programs to progress women and it is essential to account for women that the government should do those programs for women as we feel 'বিশ্বে যা-কিছু মহান সৃষ্টি চির-কল্যানকর, / অর্ধেক তার করিয়াছে নারী, অর্ধেক তার নর।'(সঞ্চিতা, নারী, 3-4)
- ('whatever great on everlasting welfare as creations is in the world / half of it is done by women while half by men' Translations by me.) (Anthology, women). So it is observed that government comes forward to create opportunities for women. A ministry for women's affairs has been set up for women's development. The government is more active to engage thousands of unemployed women in the country. Some departments like banking, postal service, education, nursing etc are employing women in a huge way. Even the government is trying to open for women the opportunities to begin their career as scientist, doctors, engineer, technicians, artists, painters etc. Also the government if finds efficient women, it promotes women in the highest posts in the administrations. But not only the government but also people should get rid of all bias and superstitions and allow women in all fields suitable to their talents. Because thus there may be a united effort to involve women in all sectors of a country and women can develop their life. Despite the facts, there is no much development in women. Sometimes they cannot prove their worth. They can prove their worth in all sectors of a country as efficiently as they can do in childcare and other types of household works. Even in this regard they can play a greater role than their male counterparts do. For this purpose they should be more talented than their male counterparts. They then should come out of the old concept their only for household works. Resultantly they should follow the philosophy-self help is the best help. Only then they can prove their worth and the government's purpose to development the country can be successful.
- Questions:
- Why does the government consider women for a lot of programs?
  - What opportunities and posts does the government open for women?
  - What is the responsibility of peoples for women and why?
  - What reality do you see in women and what should they do?
- (b) Make a précis of the above writing passage (Q.5.a) with a suitable title. 15
6. (a) Amplify the idea contain in of the following: Procrastination is the thief of life. 20
- (b) Write a listing paragraph on truthfulness in life. (around 800 wards) 15
7. (a) Write a newspaper report on the miserable condition of the people of a flood affected area. 20
- (b) Write formal report on your language laboratory. 15
8. Write a free composition on one of the followings. (around 2000 words) 35
- Fascinating tourists' spots of Bangladesh.
  - Science education and development in Bangladesh.



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B.Sc. Engineering 1<sup>st</sup> Year 2<sup>nd</sup> Term, 2017

**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) Define with examples 09  
(i) Orthogonal matrix (ii) Symmetric matrix (iii) Nilpotent matrix
- (b) Write the matrix  $A = \begin{bmatrix} 1 & 2+i & 3i \\ 1-i & 2i & 4 \\ 5 & 3 & 2-i \end{bmatrix}$  as the sum of a Hermitian and Skew- 13  
Hermitian matrices.
- (c) Find the inverse of the matrix  $A = \begin{bmatrix} 1 & 3 & 3 \\ 1 & 4 & 3 \\ 1 & 3 & 4 \end{bmatrix}$ . Is the inverse of a matrix unique? 13
2. (a) Test the vectors  $(1, 2, -3), (1, -3, 2), (2, -1, 5)$  are linearly dependent or 10  
independent. If dependent, then find the linear combination of them.
- (b) Find the eigen values and eigen vectors of the matrix  $A = \begin{bmatrix} 1 & 2 \\ 0 & -4 \end{bmatrix}$ . 13
- (c) Investigate for what values of  $\lambda$  and  $\mu$ , the following equations has 12  
(i) no solution (ii) more than one solution (iii) unique solution  
$$x + y + z = 6$$
$$x + 2y + 3z = 10$$
$$x + 2y + \lambda z = \mu$$
3. (a) Find a unit vector parallel to the  $YZ$ -plane and perpendicular to the vector 12  
 $2\mathbf{i} + 3\mathbf{j} - \mathbf{k}$ .
- (b) Evaluate  $\nabla^2(\log r)$  13
- (c) Show that  $\nabla\phi$  is a vector perpendicular to the surface  $\phi(x, y, z) = C$ , where  $C$  is a 10  
constant.
4. (a) Define conservative vector field. If  $\underline{F} = (2xy + z^3)\mathbf{i} + x^2\mathbf{j} + 3xz^2\mathbf{k}$  is a 10  
conservative force field, then find the scalar potential.
- (b) Verify divergence theorem for  $\underline{A} = 4x\mathbf{i} - 2y^2\mathbf{j} + z^2\mathbf{k}$  taken over the region 13  
bounded by  $x^2 + y^2 = 4, z = 0$  and  $z = 3$ .
- (c) Evaluate  $\iint_S \underline{F} \cdot \underline{n} dS$ , where  $\underline{F} = 4xz\mathbf{i} - y^2\mathbf{j} + yz\mathbf{k}$  and  $S$  is the surface of the 12  
cube bounded by  $x = 0, x = 1, y = 0, y = 1, z = 0, z = 1$ .

**SECTION-B**

5. (a) Write the general equation of second degree. When the general equation of second 09  
degree represents (i) a parabola (ii) an ellipse (iii) a rectangular hyperbola?
- (b) Find the equation to the right circular cylinder of radius 2 whose axis passes 13  
through  $(1, 2, 3)$  and has direction ratios  $2, -3, 6$ .
- (c) Verify the four points  $(1, -2, 3), (1, 1, -1), (0, 3, 2), (2, 1, 0)$  are coplanar or not. 13  
If coplanar, then find the equation of plane containing them.

6. (a) The axes being rectangular, find the equation of the perpendicular from the origin to the line  $x + 2y + 3z + 4 = 0 = 2x + 3y + 4z + 5$ . Also find the co-ordinates of the foot of the perpendicular. 17
- (b) Find the length and the equation of the S.D. between the lines whose equations are  $x + y = 0, z = 4$  and  $\frac{x-1}{4} = \frac{y-2}{3} = \frac{z-36}{-6}$ . 18
7. (a) Find the cylindrical and spherical polar co-ordinates of a point whose Cartesian co-ordinates are  $(1, -2, 3)$ . 11
- (b) Find the distance of  $(1, -2, 3)$  from the straight line passing through  $(2, -3, 5)$ , which makes equal angles with the axes. 12
- (c) A plane passes through a fixed point  $(a, b, c)$  and cuts the axes in  $A, B, C$ . Show that the locus of the centre of the sphere  $OABC$  is  $\frac{a}{x} + \frac{b}{y} + \frac{c}{z} = 2$ . 12
8. (a) Define orthogonal sphere. A sphere of radius  $K$  passes through the origin and meets the axes in  $A, B, C$ . Prove that the centroid of the triangle  $ABC$  lies on the sphere  $x^2 + y^2 + z^2 = \frac{4}{9}K^2$ . 12
- (b) Find the equation of the right circular cone whose vertex is  $(\alpha, \beta, \gamma)$ , semi-vertical angle  $\alpha$  and the axis has direction cosines  $l, m, n$ . 10
- (c) Define vector space, linear dependent, linear independent and linear mapping. Show the following mapping  $F$  is linear  $F: R^2 \rightarrow R^2$  defined by  $F(x, y) = (x + y, x)$ . 13