

**KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY**

**Department of Mechanical Engineering**

B. Sc. Engineering 1st Year 1st Term Examination, 2017

Ch 1105

(Engineering Chemistry)

Time: 3 Hours.

Full Marks: 210

- 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 any missing.

**SECTION – A**

- |      |  |    |
|------|--|----|
| 1(a) | What is degree of polymerization? Discuss the mechanism of ionic polymerization.                                 | 11 |
| 1(b) | What is conducting polymer? What are the advantages of conducting polymer over traditional polymer?              | 08 |
| 1(c) | “Addition polymerization is also called chain polymerization” – illustrate this statement with suitable example. | 07 |
| 1(d) | Describe the manufacturing process of Nylon 6-6.   | 09 |
| 2(a) | Describe briefly the method of obtaining crude rubber from latex.  | 12 |
| 2(b) | Explain the different types of vulcanization techniques.   | 09 |
| 2(c) | What are the difference between plastics and rubber?   | 09 |
| 2(d) | Shortly discuss the function of accelerators in rubber.  | 05 |
| 3(a) | Describe the manufacturing process of cement in Chatak cement mill with the flow chart diagram.                  | 12 |
| 3(b) | What are Calcareous materials and Argillaceous materials? Give examples.   | 06 |
| 3(c) | Discuss the setting and hardening process of cement.   | 10 |
| 3(d) | What is meant by Portland cement? Write the general composition of Portland Cement.                              | 07 |
| 4(a) | Discuss the function of fluxes, stabilizer and cullet in manufacturing process of glass.                         | 12 |
| 4(b) | “Glass is a super cooled liquid” – Explain this statement.   | 08 |
| 4(c) | Discuss the classification of ceramic wares based on degree of vitrifications.                                   | 10 |
| 4(d) | What is Glazing? Write down the purposes of Glazing.   | 05 |

## SECTION – B

- 5(a) What is electrophoresis? How does this phenomenon provide information that colloid particles are electrically charged? 12
- 5(b) Define coagulation and precipitation. In between  $CaCl_2$  and  $KCl$  which one is better coagulant and why? 11
- 5(c) Write down the difference between lyophilic and lyophobic colloid. 08
- 5(d) What is meant by Tyndall effect? 04
- 
- 6(a) Explain that the fully exposed metal surface is more beneficial than the partially exposed metal surface from the corrosion point of view. 08
- 6(b) Discuss the electrochemical mechanism of wet corrosion. 11
- 6(c) Explain the cathodic protection method of corrosion control. 12
- 6(d) Distinguish between corrosion and erosion with suitable examples. 04
- 
- 7(a) What is pulp? Explain the alkaline process for making sulphate of kraft pulp from wood. 12
- 7(b) Describe the calendaring process of making paper. 10
- 7(c) Explain in details the recovery of sugar from molasses. 08
- 7(d) Write down the uses of bagasses. 05
- 
- 8(a) Write down the characteristics of good fertilizer. Explain in brief about “ $p^H$  value of the soil”. 10
- 8(b) Write down the raw materials and describe the manufacturing process of TSP fertilizer with schematic flow diagram. 13
- 8(c) Describe the manufacturing process of sugar with flow diagram from sugar cane. 12

**KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY**

**Department of Mechanical Engineering**

B. Sc. Engineering 1st Year 1st Term Examination, 2017

Hum 1105

(English)

Time: 3 Hours.

Full Marks: 210

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 any missing.

**SECTION – A**

- 1(a) Make sentence with the following structures using the words given in brackets. 14
- (i) Subj. + Linking Verb + Adjective Complement. (Seem as verb)
  - (ii) Subj. + Transitive verb + object. (Write as verb).
  - (iii) Subj. + Intransitive verb + Adverb of place. (Dance as Verb).
  - (iv) That + Subj. + Verb + Adverb of manner + Verb + Adj. Complement.  
(Speak and is as Verb).
  - (v) Subj. + Transitive Verb + Object + What + Subj. + Verb. (Call and name as verb).
  - (vi) Subj. + Modifier + Verb + That + Subj.+ Verb + Object.(Is and help as verb ).
  - (vii) No + only + Subj. + but also + Subj. + Verb + Adverb of place.  
(participate as verb).
- 1(b) Change the following words as asked in brackets and make sentence with the changed forms: 12
- Feeble (into verb); Broad (into verb); Awefulness (into Adjective); Atrociousness (into Adjective); Amplify (into Noun); Enlargement (into verb).
- 1(c) Write two synonyms for the following words and use the new words in sentence. 09
- Nice, Honesty, Ability.
- 2(a) Make W-H question with the underlined words or phrase from each of the following sentences. 14
- (i) Kamal sings sweetly now a days.
  - (ii) Mim read the book repeatedly.
  - (iii) Habib works in this college.
  - (iv) Kalam is 5 feet and 2 inches tall.
  - (v) He behaves in a friendly manner with his friends.
  - (vi) Siplu has been living in this village for 10 years.
  - (vii) His home is two miles away.
- 2(b) Make use the following words in sentence as asked in brackets: 12
- Call (as Adjective); View (as Adjective); Cloud (as verb); Book (as verb); Abstract (as verb); Damn (as exclamation).
- 2 (c) Make new words with the following prefixes and use the new words in sentence. 09
- A....., By....., Contra....., En....., Em....., De.....
- 3(a) Transform the following sentences as directed. 14
- (i) He rode his uncle's horses (Complex).
  - (ii) The man came here when there was storm. (Simple).
  - (iii) His subordinates accused him of various offences. (Passive).

- (iv) No one will deny that he is innocent. (Affirmative).  
 (iv) My horse runs faster than yours. (Positive).  
 (v) No other mosque is as large as this. (Superlative).  
 (vi) He is not illiterate. (Affirmative).
- 3(b) Frame sentences expressing following notions / emotions. 12  
 (i) Wish, (ii) Refuse, (iii) Liking, (iv) Greeting, (v) Surprise and  
 (vi) Invitation.
- 3(c) Make sentences using each of the following phrases and idioms. 09  
 Turn down; Ins and outs; Ups and downs; Come of; Fish out; Settle down.
- 4(a) Make sentences with each of the following Modals as asked in brackets: 14  
 (i) Could (To express part ability)  
 (ii) May (To express request)  
 (iii) Must (To express internal obligation)  
 (iv) Am + to (To express command)  
 (v) Would (To express polite request)  
 (vi) Used to (To express part habit)  
 (vii) Be going to (To express future)
- 4(b) Correct the following sentences. 12  
 (i) I gave him four and half Taka.  
 (ii) He prefers to sing than to dance.  
 (iii) I look forward to receive your letter.  
 (iv) This my book is interesting.  
 (v) He is not so strong like you.  
 (vi) I do not like to insulted.
- 4(c) Supply a suitable word to fill in the blanks in each of the following: 09  
 (i) He has no passion ----- politics.  
 (ii) Take an umbrella with you when you go out. It .....rain later.  
 (iii) A stich in time saves ----- .  
 (iv) Choose only such friends ----- you can trust.  
 (v) Each boy and each girl ----- given a prise.  
 (vi) Scarcely had he reached the station ----- the train left.

### SECTION – B

- 5(a) Read the following passage carefully and answer the questions that follow. 20
- There is almost a good deal of truth in a will-power of a human being for success. Because it makes maximally not completely the success of a human being possible. Napoleon once said, "The word-Impossible exists only in the dictionary of the fools." He says the idea to remove the concept of lot in face of will power of a human being. Mountains can be removed by patience, determination and strong will. These- patience, determination and strong will lead to success. A successful man rises from the lowest position to the highest. It is because he possesses a strong will and determination. The unsuccessful man, on the other hand, lacks strong will and determination. He waves and hesitates in doing a work. He can never do anything great in life. Thus, if a man wants to be successful in life, he must possess a strong will and determination. The examples of many great men are before us. First of all we take the example of Robert Bruce. He was firm bold and fearless. He had a very strong will. Many difficulties came in his way, but he overcame all of them. He didn't care for failures and frustrations. At last his efforts were crowned with success. He got the taste of victory. Among other great men of

strong will power were Living stone, Garibald, Bismark and Lenin. Livingstone explored the dark regions of Africa, Garibald united Italy, Bismark made Germany a strong nation and Lenin made Russia free from the tyrannies of the Czars. They all had a strong will power. So they found out a way of achieving their hearts desire.

Questions: i. Why does Napoleon remark on impossibility as the word of a fool?

ii. What does a strong will function?

iii. What is the condition of an unsuccessful man?

iv. What lesson do we have from Robert Bruce?

- 5(b) Make a précis of the above written passage (Q.5.a) with a suitable title. 15
- 6(a) Write a contrast paragraph on “Technical Education and General Education”. 17
- 6(b) Amplify the following idea. (Around 1200 words) 18
- “ Smoking or Health”- the choice is yours.
- 7(a) Write a listing paragraph on “Punctuality”. (Around 1200 words) 20
- 7(b) A heat-wave is sweeping over the country for a four days. The metreologist have forecasted about it. You are the staff reporter of a newspaper. Now make a report on it. 15
- 8 Write a free composition on one of the followings. (Around 1800 words) 35
- i) Role of media in nation building.
- ii) Equal opportunities for woman in Bangladesh.

**KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY**

**Department of Mechanical Engineering**

B. Sc. Engineering 1st Year 1st Term Examination, 2017

ME 1107

(Production Process)

Time: 3 Hours.

Full Marks: 210

- 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 any missing.

**SECTION – A**

- |      |   |    |
|------|---|----|
| 1(a) | What is production process? What are the importances of production process?   | 06 |
| 1(b) | What are the properties of good moulding sand? How moulding sand is tested? Classify various types of moulding sand.  | 10 |
| 1(c) | What is pattern allowances? What are the allowances commonly considered while designing a pattern? Write the advantages of disposable patterns over removal patterns.                     | 09 |
| 1(d) | What are the properties of a good core? Explain.  | 10 |
| 2(a) | What is centrifugal casting? What are the advantages and limitations of centrifugal casting?  | 10 |
| 2(b) | What is welding? Describe different types of welding positions with necessary sketches.   | 13 |
| 2(c) | Describe different types of welding flames produced during Oxy-acetylene gas welding.   | 12 |
| 3(a) | Why and what types of shielded gas are used during TIG welding? With the neat sketch, write the working principle of TIG welding process. Also mention the advantages of thermit welding. | 10 |
| 3(b) | What is welding defect? Explain various types of welding defects and their remedies with neat sketches.   | 07 |
| 3(c) | How does braze welding differ from soldering? What are the advantages, disadvantages and applications of Electron Beam Welding?   | 08 |
| 3(d) | What types of defect are generally be found in casting? Explain.  | 10 |
| 4(a) | What is metal forming process? Write the merits and demerits of Hot working process. Write the names of five hot working processes and five cold working processes.                       | 07 |
| 4(b) | Is it possible to carry out hot working process at room temperature? Explain the various forging process of metal forming with neat sketch.   | 10 |
| 4(c) | What is bending Allowance? Classify the various bending processes. How does bending allowance measured when a circular bar will to be bent at a certain angle?                            | 08 |

- 4(d) Write short notes on: 10  
(i) Blanking; (ii) Punching; (iii) Perforating; (iv) Slitting and (v) Extrusion.

**SECTION – B**

- 5(a) Draw a single point cutting tool to show its different angles and elements. 08
- 5(b) What is meant by tool signature (10, 12, 15, 10, 15, 8, 3)? Describe different angles of right hand single point cutting tool with neat sketch. 10
- 5(c) Define chip thickness ratio. Show that  $\tan \beta = \frac{r \cos \alpha}{1 - r \sin \alpha}$ , where symbols have their usual meanings. 10
- 5(d) What is metal cutting? Identify the mechanism of chip formation. Why chip breaker is used? 07
- 6(a) List eight operations that can be performed in a lathe machine. 08
- 6(b) How does 3-Jaw universal chuck differ from 4-Jaw independent chuck? How is the size of a lathe machine determined? 07
- 6(c) How does shaper differ from planer? Describe the "Quick-Return Mechanism" of shaper machine. 10
- 6(d) What is indexing? Classify the various indexing methods and explain any one of them with proper example. 10
- 7(a) Describe centre less grinding method with its advantages and disadvantages. 10
- 7(b) Define the following terms: 10  
(i) Honing; (ii) Lapping; (iii) Super finishing; (iv) Coining and (v) Embossing.
- 7(c) What should be the properties of cutting fluid? Write down the factors upon which tool life depends. 15
- 8(a) Describe the electro-discharge machining process with neat sketch. Write the functions of dielectric fluid when used in EDM process. 10
- 8(b) What is laser and how is it used to machine the material? Explain USM process with neat sketch. 10
- 8(c) Why modern machining processes have been developed? Derive an expression for MRR in ECM process. 10
- 8(d) What are the differences between ECG and conventional grinding? 05

**KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY**

**Department of Mechanical Engineering**

B. Sc. Engineering 1st Year 1st Term Examination, 2017

ME 1105

(Thermal Engineering)

Time: 3 Hours.

Full Marks: 210

- 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 any missing.  
iv) Mollier Chart / Steam Table may be supplied on request.

**SECTION – A**

- 1(a) What are the available sources of energy in Bangladesh? Describe the prospect of renewable energy in Bangladesh. 13
- 1(b) State the liabilities and limitations for uses of alternatives to fossil fuel. 07
- 1(c) Write a short note on Ocean thermal energy. 05
- 1(d) Define the following terms: 10  
(i) Pure substance; (ii) Dryness fraction of steam; (iii) Internal energy of steam and (iv) Triple point.
- 2(a) What is phase diagram? Draw the P-V-T surface diagram of a substance that expand on freezing. 08
- 2(b) What is meant by Mollier chart? Write the advantages and disadvantages of using steam table over the Mollier chart. 08
- 2(c) What are the advantages of using super heated steam in different purpose. 06
- 2(d) A pressure cooker contains 2kg of steam at 5 bar and 0.9 dry. Calculate the quantity of heat which must be rejected so as the quality of steam becomes 0.5 dry. 13
- 3(a) What is a steam boiler? What are the essential requirements of a good steam boiler? 10
- 3(b) What are the special features of Cochran boiler and why steam dome is used in Locomotive fire-tube boiler? 08
- 3(c) Describe the working principle of a Benson boiler with neat sketch. 12
- 3(d) Why economizer is not called as a feed water boiler? 05
- 4(a) Write down the functions of the flowing components in boiler: 12  
(i) Fusible plug; (ii) Anti-Priming pipe;  
(iii) Blow off cock valve and (iv) Steam stop valve.
- 4(b) Explain the factors that are used to measure the performance of a steam boiler. 08
- 4(c) A coal fired steam boiler plant consumes 500kg of coal per hour. The boiler evaporates 4 ton of water at 42°C into superheated steam at a pressure of 13 bar and 295°C. If the calorific value of fuel is 32500 kJ/kg of coal, determine– 15  
(i) Equivalent evaporation 'from and at 100°C; and  
(ii) Thermal efficiency of the steam boiler. Assume specific heat of superheated steam is 2.1 kJ/kg.K.



## SECTION – B

- 5(a) What is meant by fuel? Briefly describe its classification. 08
- 5(b) Define higher calorific value and lower calorific value. State the merits and demerits of gaseous fuels. 10
- 5(c) Write down the combustion equations of important gaseous fuels. 07
- 5(d) Calculate the lower calorific value of a coal specimen which contains 6% hydrogen, from the following data: 10  
Mass of coal burnt = 1 gm  
Quantity of water in calorimeter = 2.5 kg  
Increase in temperature of water = 2.8°C  
Water equivalent of apparatus = 390 gm.
- 6(a) Describe the construction and working principle of an Orsat apparatus which is used for the flue gas analysis. 10
- 6(b) A certain fuel has the following composition by mass: 15  
C 80%, H<sub>2</sub> 10%, and S 10%. The volumetric analysis of the fuel gas is CO<sub>2</sub> 10%, CO 1%, O<sub>2</sub> 10% and N<sub>2</sub> 79%.  
Find per kg of coal:  
(i) the minimum air required;  
(ii) the actual air supplied and  
(iii) the excess air supplied.
- 6(c) Show that  $(COP)_H = 1 + (COP)_R$ . Differentiate between refrigeration system and heat pump. 10
- 7(a) Differentiate between vapor cycle and gas cycle refrigeration system. 06
- 7(b) Describe the mechanism of a simple vapour compression refrigeration system with neat sketch. 12
- 7(c) Define different types of psychometric process. 07
- 7(d) Describe the working principle of summer air conditioning system with schematic diagram. 10
- 8(a) Define heat engine. How the internal combustion engines are classified? 10
- 8(b) Explain the Octane and Cetane number rating of fuel. 05
- 8(c) What are the effects caused by the overheating of IC engine parts? Mention the function of lubrication system of IC engine. 08
- 8(d) What is meant by gas turbine? Describe the working principle of a simple open cycle gas turbine with neat sketch. 12