

Khulna University of Engineering & Technology  
B. Sc. Engineering 1<sup>st</sup> year 1<sup>st</sup> Term (Regular) Examination, 2017  
Department of Electrical and Electronic Engineering  
Hum 1103  
Technical 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.

**Section A**

- Q1. (a) Make sentences with the following structures using the words given in brackets: (14)
- i. Subject + Intransitive verb + Adverbial of time (run as verb).
  - ii. Subject + Linking verb + Adjective complement (keep as verb).
  - iii. Subject + Linking verb + Noun complement (appoint as verb).
  - iv. Subject + Be + Adverbial complement (use any Be verb).
  - v. Subject + Transitive verb + Indirect object + Direct object (offer as verb).
  - vi. Subject + Transitive verb + Object + Noun complement (call as verb).
  - vii. There + Verb + Subject + Adverb of place (live as verb).
- (b) Make sentences using the following words as directed: (12)  
Face (as verb), Walk (as noun), Capital (as adjective),  
Bridge (as verb), Back (as adverb), Sport (as noun adjective)
- (c) Change the word as directed and make sentences with them: (9)  
Duty (adjective), Explanation (verb), Endure (adjective), Fortunate (adverb), Hungry (noun), Location (verb)
- Q2. (a) Frame WH questions: (14)
- i. They will address the letter to the Chairman.
  - ii. We shall take this risk to gain something.
  - iii. I am laughing on seeing the cartoon.
  - iv. The widow wants to pass her life in a holy place.
  - v. Our house is 3km from our school.
  - vi. The gardener is watering the garden.
  - vii. She wants to see Lipi.
- (b) Correct the following sentences: (12)
- i. The number of students in this class are 100.
  - ii. His choice of words are excellent.
  - iii. No bus or no train were seen.
  - iv. Each boy have got a prize.
  - v. Neither the moon nor the stars was visible.
  - vi. Politics are a complicated issue.
- (c) Write one antonym and one synonym of the following words and use them in sentences: (9)  
Protect, Fertile, Guess.
- Q3. (a) Make sentences using the following Modals as directed: (14)
- i. Could (to express polite request).
  - ii. Must (to express internal obligation).
  - iii. Must (to express order).
  - iv. Need (to express unnecessary action in the past).
  - v. Had better (to express preference).
  - vi. Used to (to express past habit).
  - vii. Be going to (to express future intention).
- (b) Make sentences with the following phrases and idioms: (12)  
Flesh and blood, In such a way, Go to the dogs, Out of date, Make use of, To a great purpose.

- (c) Define the following with examples: (9)
- i. Present participle ii. Gerund iii. Intransitive verb.
- Q4. (a) Complete the following: (13)
- i. I had been to a doctor because \_\_\_\_\_.
- ii. She is intelligent though \_\_\_\_\_.
- iii. I would live in Dhaka if \_\_\_\_\_.
- iv. Go to bed if \_\_\_\_\_.
- v. The work is not so easy \_\_\_\_\_.
- vi. The journey took longer than \_\_\_\_\_.
- vii. The passage is so difficult \_\_\_\_\_.
- (b) Express the following notions/attitudes in sentence: (13)
- i. Greetings ii. Regrets iii. Intension iv. Invitation v. Praise
- vi. Surprise vii. Advice.
- (c) Make new words with each of the following prefixes and suffixes and use them in sentences: (9)
- \_\_\_\_\_er, \_\_\_\_\_tion, \_\_\_\_\_dom, \_\_\_\_\_ship,
- A \_\_\_\_\_, Pro \_\_\_\_\_.

## **Section B**

- Q5. (a) Read the passage carefully and answer the questions that follow: (20)
- Experience teach us that we should seek timely precautions against changes. If a defect is left unattended for some time, it may become difficult to improve it. It therefore, stresses the need of doing our work in time. A small hole in a garment, if not stitched in time may develop in a big hole and requires nine stitches later on. It might also result in the total loss of the garment. Similarly, if a discare is allowed to develop and is not attended in the beginning, it may become incurable. It is better to have preventive measures in the beginning than to have curative measures later on. Different context of the life ask us the necessity of nipping the evil in the bud. A rebellion must be put down almost at once, otherwise it might overthrow even a mighty emperor. Timely action in every walk of life is therefore always helpful and advantageous. A person who fails toward the future dangers in time always suffers. History is full of such examples. Humayan lacked this quality of acting at the right moment. He lost his empire and had to remain in exile for 15 years. It is, therefore, proper for us to take action before we suffer. It should be done in every stages of our life.
- Questions:
- i) What should we do to remove difficult situation?
- ii) What does the total loss of garment signify?
- iii) Differentiate between preventive measures and curative measures.
- iv) What does timely action role in our life?
- (b) Make a précis of the above written passage (Q. 5a) with a suitable title. (15)
- Q6. (a) Write a paragraph on “Environmental Pollution” following the technique of cause and effect. (18)
- (b) Amplify the idea contained in the following: (17)
- Rumours are carried by haters, spread by fools and accepted by idiots.
- Q7. (a) In some part of your district people are demanding a bridge over a river for long. As the correspondent of a national daily, write a report on this. (20)
- (b) Suppose you are looking for the post of an Electrical Engineer in a company. Prepare a CV with an application. (15)
- Q8. Write a composition on : (35)
- Importance of money in life  
or  
Role of technology in our daily life

Khulna University of Engineering & Technology  
B. Sc. Engineering 1<sup>st</sup> year 1<sup>st</sup> Term (Regular) Examination, 2017  
Department of Electrical and Electronic Engineering  
Math 1103

Mathematics-I

Time: 3 hours

Full Marks: 210

- N.B.: (i) Answer **ANY THREE** questions from each section in separate scripts.  
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**Section A**

- Q1. (a) Define invariants. Find the transformed equation of  $50x^2 - 75xy + 25y^2 - 5 = 0$  of which the origin remain unchanged and the direction of axes is rotated through angle  $\tan^{-1}\left(-\frac{4}{5}\right)$ . (12)
- (b) Identify the conic,  $3x^2 - 8xy - 3y^2 + 10x - 13y + 8 = 0$ . Also reduce this conic to the standard form. (13)
- (c) Define direction cosines of a line. Determine the length of projection of a segment joining the points  $(2, 1, -2)$  and  $(-1, -2, 1)$  on a straight line whose direction cosines are  $\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}, 0$ . (10)
- Q2. (a) Find the angle between two lines whose direction cosines are given by the equations  $l + m + n = 0$  and  $l^2 + m^2 + n^2 = 0$ . (11)
- (b) Examine the four points  $(0, 1, 2), (3, 0, 1), (4, 3, 6)$  and  $(2, 3, 2)$  are coplanar or not. If they are non-coplanar, then find the volume of the tetrahedron whose vertices are those four points. (12)
- (c) Find the distance from the point  $(2, -4, 5)$  to the plane  $2x + 5y + 6z = 11$  measured parallel to the line  $\frac{x}{2} = \frac{y}{1} = \frac{z}{-2}$ . (12)
- Q3. (a) Show that the equation,  $2x^2 - y^2 + 2z^2 - yz + 5zx + xy = 0$  represents a pair of planes and also find the angle between them. (12)
- (b) Find the length of shortest distance between two lines  $x + y = 0, z = 4$  and  $\frac{x-3}{4} = \frac{y-2}{3} = \frac{z-36}{-6}$ . (13)
- (c) Find the equation of a straight line which is perpendicular to the  $xy$ -plane and passing through a point whose  $x$ -coordinates is  $-2$ , and  $y$ -coordinate is  $4$  on that  $xy$ -plane. (10)
- Q4. (a) Define function. Let  $A = \mathbb{R} - \{-1/2\}$  and  $B = \mathbb{R} - \{1/2\}$ . Let  $f: A \rightarrow B$  be defined by  $f(x) = \frac{x-3}{2x+1}$ . (10)  
Then  $f$  is one-one and onto. Find a formula that defines  $f^{-1}$ .
- (b) Let  $R$  be the relation in the natural numbers  $N$  defined by the open sentence “ $(x - y)$  is divisible by  $5$ ”; that is, let  $R = \{(x, y) \mid x \in N, y \in N, (x - y) \text{ is divisible by } 5\}$ . Prove that  $R$  is an equivalence relation. (10)
- (c) What is Boolean Algebra? Construct a circuit for the following Boolean polynomials  $(A \wedge B) \vee [A' \wedge (B' \vee A \vee B)]$ . Discuss the behavior of the circuit. (15)

## Section B

- Q5. (a) A function  $f(x)$  is defined by  $f(x) = \begin{cases} x, & \text{for } 0 < x < 1 \\ 2 - x, & \text{for } 1 \leq x \leq 2 \\ x - \frac{x^2}{2}, & \text{for } x > 2 \end{cases}$  (15)
- Show that  $f(x)$  is continuous at  $x = 1$  and  $x = 2$ , and that  $f'(2)$  exists, but  $f'(1)$  does not.
- (b) Evaluate  $\lim_{x \rightarrow 0} \left(\frac{\sin x}{x}\right)^{1/x^2}$ . (10)
- (c) State Rolle's theorem. Verify the Rolle's theorem for  $f(x) = 4 + (2x - 1)^{4/5}$  in  $0 \leq x \leq 1$ . (10)
- Q6. (a) State Leibnitz's theorem. If  $y = \cos(10 \cos^{-1} x)$ , show that  $(1 - x^2)y_{12} = 21xy_{11}$ . (13)
- (b) Investigate for what values of  $x$ ,  $f(x) = 5x^6 - 18x^5 + 15x^4 - 10$  is a maximum or minimum. (10)
- (c) What is meant by homogeneous function? State and prove Euler's theorem on homogeneous function. (12)
- Q7. (a) Find the equation of the tangent and normal to the curve  $\left(\frac{x}{a}\right)^3 + \left(\frac{y}{b}\right)^3 = 2$  at the point  $(a, b)$ . (12)
- (b) Find the equation of the circle of curvature at the point  $(3, 1)$  on the curve  $y - x^2 + 6x - 10 = 0$  (13)
- (c) Expand  $\frac{2}{x+3}$  in the powers of  $(x - 1)$ . (10)
- Q8. (a) Show that in the curve  $by^2 = (x + a)^3$ , the square of the subtangent varies as the subnormal. (11)
- (b) Find the radius of curvature at the origin for the curve  $x^3 + y^3 - 2x^3 + 6y = 0$ . (12)
- (c) Find the asymptotes of  $y^3 + x^2y + 2xy^2 - y + 1 = 0$ . (12)

Khulna University of Engineering & Technology  
B. Sc. Engineering 1<sup>st</sup> year 1<sup>st</sup> Term (Regular) Examination, 2017  
Department of Electrical and Electronic Engineering  
Ph 1103  
Physics I

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.

**Section A**

- Q1. (a) State and explain zeroth law of thermodynamics. (04)  
(b) State briefly the principles of constant volume hydrogen thermometer (06)  
(c) Describe the principle, construction and working of a thermo-electric thermometer. (15)  
(d) The values of resistances of a platinum resistance thermometer are 2.585 ohms and 3.510 ohms at 0 °C and 100 °C, respectively. When placed in a hot bath, the resistance is found to be 9.098 ohms. Calculate the temperature of the hot bath on the gas scale. Assume  $\delta = 1.5$  for pure platinum. (10)
- Q2. (a) Discuss the fundamental assumptions of kinetic theory of gas. (08)  
(b) Discuss kinetic interpretation of temperature. (08)  
(c) What is the law of equipartition of energy? Derive an expression for the relation between  $\gamma$  and the number of degrees of freedom. (10)  
(d) At what Celsius temperature will the oxygen molecules have the same r.m.s velocity as that of hydrogen molecules at -100 °C? (09)
- Q3. (a) What do you understand by visual angle and angular magnification? (06)  
(b) Write short notes on telephoto lens. (06)  
(c) What are critical constants of a gas? Calculate the values of these constants in terms of the constants of Van der Waals equation. (13)  
(d) For hydrogen gas critical pressure is 12.8 atmospheres and the critical volume 69.68 c.c per gm-mol. Calculate the values of (i) the constants of Van der Waal's equation for one gm-molecule of the gas, (ii) the critical temperature and (iii) the Boyle temperature. (10)  
( $R = 8.4 \times 10^7 \text{ ergs/K}$ , 1 atmosphere =  $1.01 \times 10^6 \text{ dynes/cm}^2$ )
- Q4. (a) What do you mean by reversible and irreversible processes? Give example. (06)  
(b) What is efficiency of an engine? Derive an expression for efficiency of an ideal heat engine in terms of temperature of the source and sink. (13)  
(c) Derive an expression for change in entropy for an irreversible process. (08)  
(d) A Carnot's engine whose temperature of the source is 400 K takes 200 calories of heat at this temperature and rejects 150 calories to the sink. What is the temperature of the sink? Also calculate the efficiency of the engine. (08)

**Section B**

- Q5. (a) What is simple harmonic motion? Show that simple harmonic motion is an oscillatory motion in terms of displacement, velocity and acceleration. (13)  
(b) Show that average kinetic energy and average potential energy are equal in case of a simple harmonic motion. (12)  
(c) The force and displacement of a simple dynamic system undergoing sinusoidal (10)

excitation are given by the equations  $F = 10 \sin\left(\frac{\pi t}{10}\right)$  Newtons and  $Y = 0.10 \sin\left(\frac{\pi t}{10} - \frac{\pi}{3}\right)$  meters. Calculate the work done by the excitation force in (i) 20 seconds and (ii) 2.5 minutes.

- Q6. (a) Show that there is no transfer of energy across any section of the medium in the case of a stationary wave. (10)
- (b) Establish the differential equation of a damped harmonic oscillator and solve it to obtain an expression for the displacement of the oscillator. Discuss the condition under which the oscillations become critically damped. (15)
- (c) A particle of mass 2 gm is free to vibrate under the action of an elastic force of 128 dyne/cm and a damping force of 8 dyne-sec/cm. A periodically varying outside force of maximum value 250 dynes is applied to the particle. Find the frequency for displacement resonance and velocity resonance. (10)
- Q7. (a) What is stationary waves? Discuss analytically the formation of stationary wave due to reflection at a free boundary. Explain how the characteristics change with position and with time. (20)
- (b) Discuss the distribution of velocity and pressure in a plane progressive wave. (07)
- (c) A source of sound has a frequency of 412 Hz and amplitude of 0.22 cm. What is the flow of energy across a square cm per second if the velocity of sound in air is 332 m/s and the density of air is 0.00129 gm/m<sup>3</sup>? (08)
- Q8. (a) Discuss the factors on which loudness depends? (08)
- (b) Deduce the Sabine's Reverberation formula for energy density inside a room. (17)
- (c) A car sounding a horn producing a note of 550 Hz approaches and then passes a stationary observer at a steady speed of 24 m/s. What will be the frequencies apparent to the observer when the car is (i) approaching and (ii) receding? What is the interval between these two notes? (Velocity of sound = 340 m/s). (10)