

Khulna University of Engineering & Technology
Department of Building Engineering and Construction Management
 B. Sc. Engineering 1st Year 2nd Term Regular Examination, 2017
CE 1201
 (Engineering Mechanics)

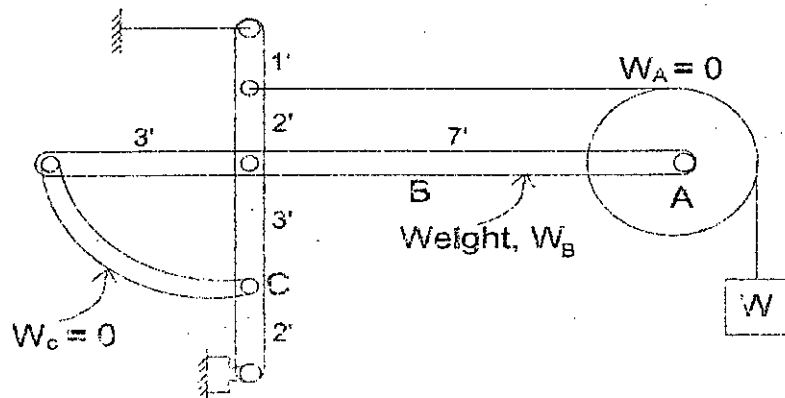
Full Marks: 210

Time: 3 hrs

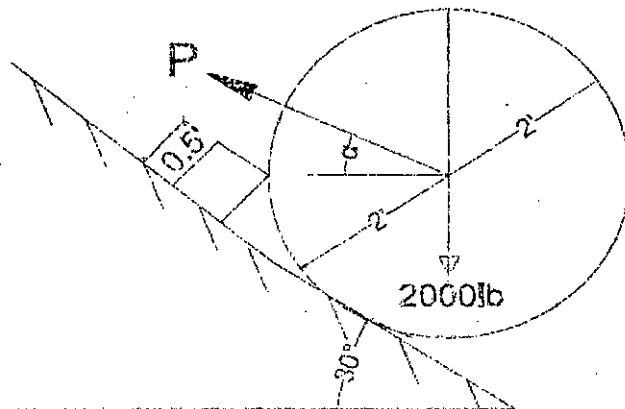
- N.B.** i) Answer any three questions from each section in separate script.
 ii) Figures in the right margin indicate full marks.
 iii) Assume reasonable value for any missing data.
 iv) All figures are not drawn in scale.

Section – A

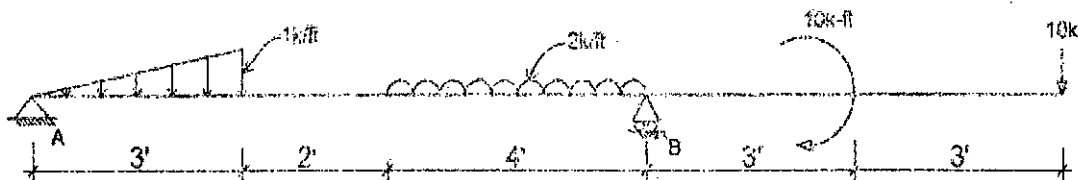
1. (a) Define – (i) Transmissibility of force (ii) Two force member (iii) Equilibrium (v) Free body diagram. Draw the free body diagram of members of the following structure. (17)



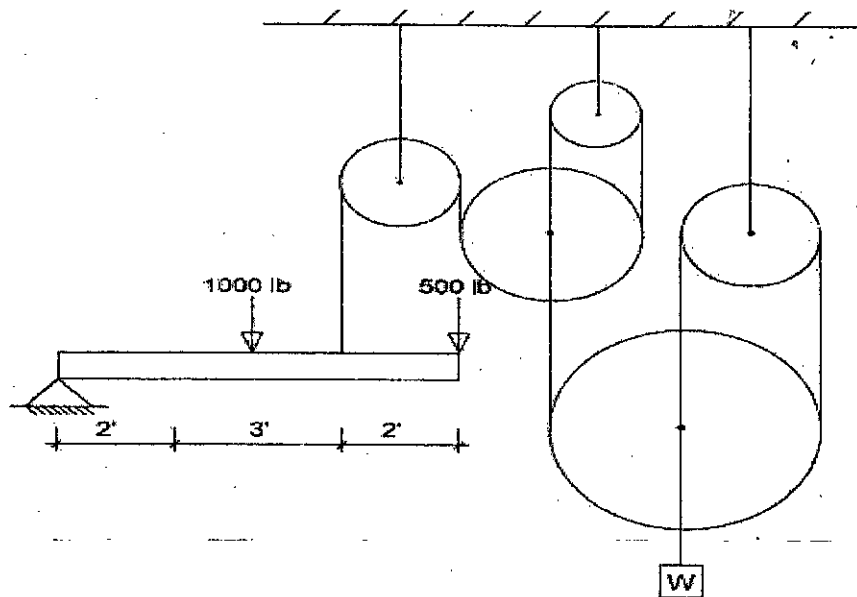
- (b) Determine the amount and direction of the smallest force P required to start the wheel in the following figure over the block. What is the reaction at the block? (18)



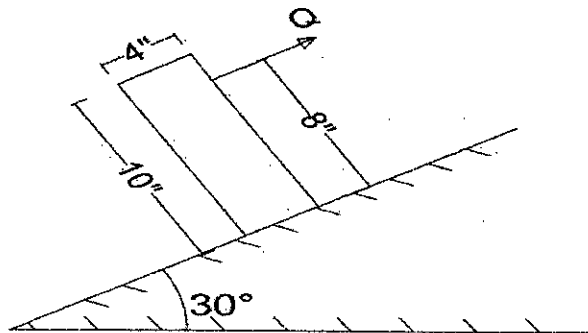
2. (a) Define shear force and bending moment. Find the reaction at support A and B: (15)



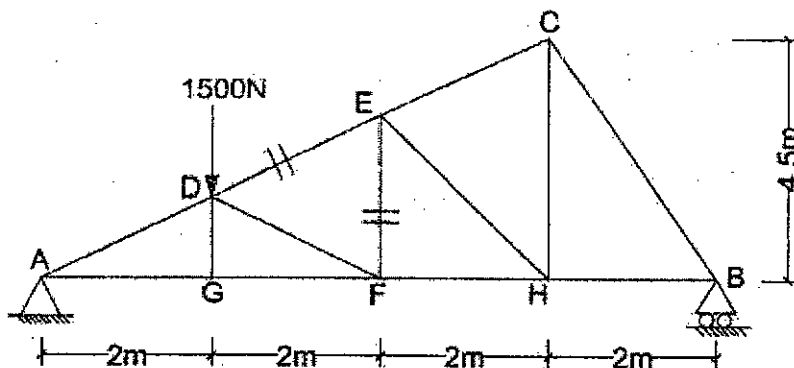
- (b) A cable weighing 1.3 lb per ft is suspended between two points on the same level with a span of 300ft and a sag of 20ft. Determine (i) length of cable, (ii) tension in the cable at the lowest point, and (iii) maximum tension in the cable. (20)
3. (a) In the following figure, what will be the value of 'W' for equilibrium? Assume the pulleys are frictionless and weightless. (17)



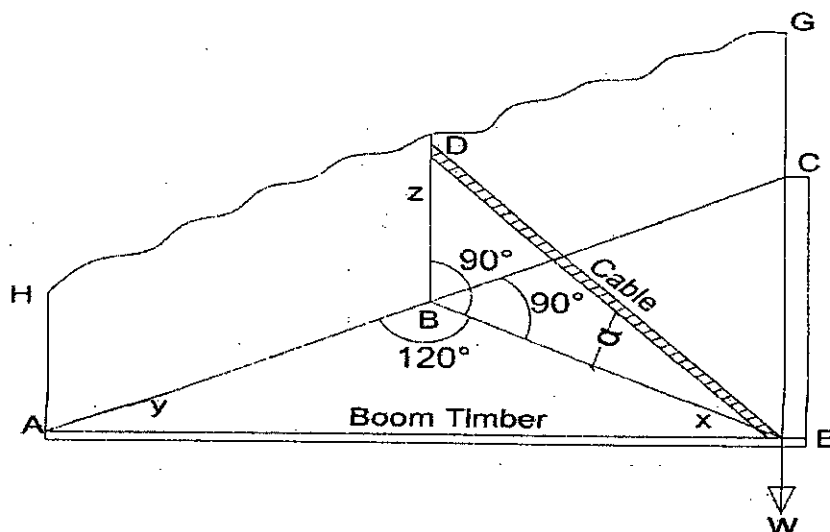
- (b) A relative tall and slender body is shown in figure below with a gradually force Q applied to it. If $W = 105$ lb, $f = 0.4$ and inclination of the plane is 30° , will the body slide or tip over? (18)



4. (a) Determine the nature and magnitude of the forces in the members DE, EF and FH for the following truss. (17)

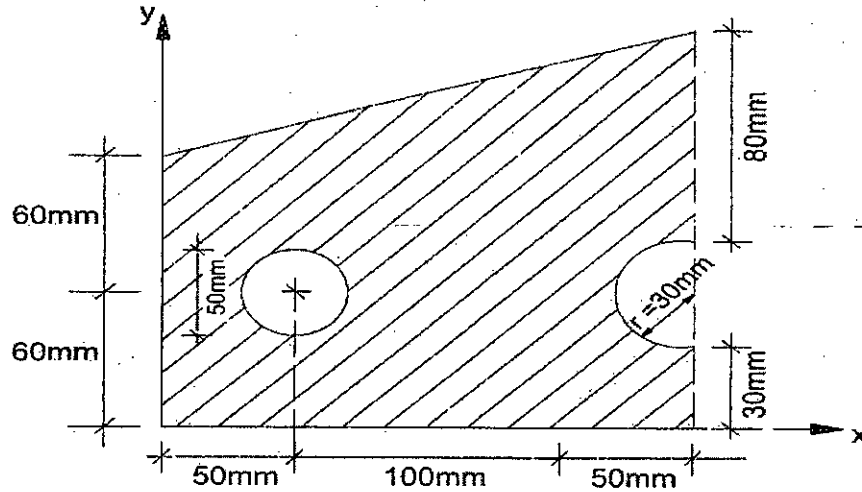


- (b) Define wedge and plane motion. The following figure represents a boom that support a load of $W = 2$ kip, If $AB = BC = BD = 8$ ft and $BE = 6$ ft, find the tension in the cable and the force in each member AE and CE. (18)

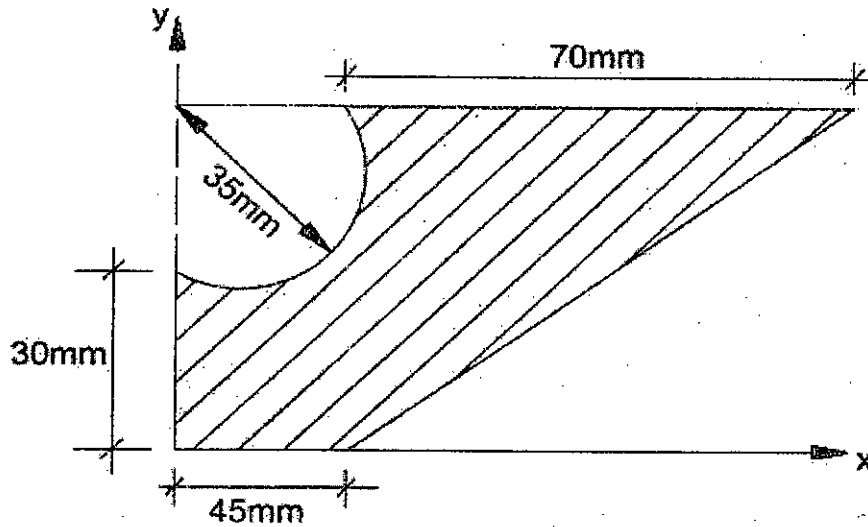


Section – B

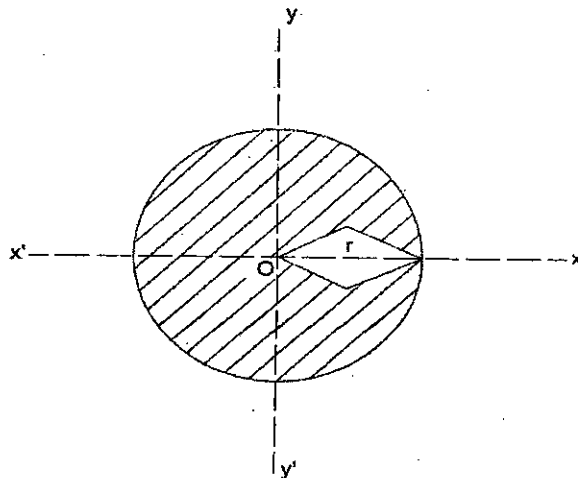
5. (a) What do you mean by centroid. Briefly describe with figures 'the axis of symmetry'. (10)
 Locate the centroid of sector of a circle of radius r which subtends an angle of 2θ .
- (b) Compute \bar{x} and \bar{y} of the shaded area shown in figure below. (25)



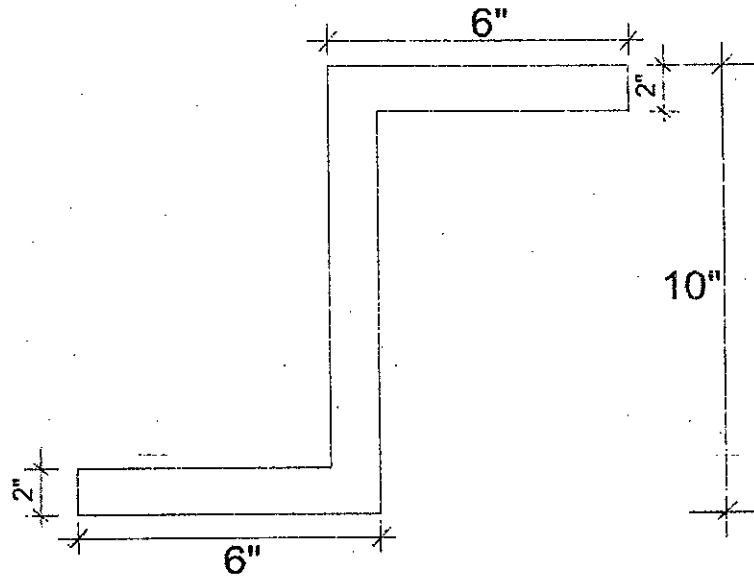
6. (a) Define rectangular moment of inertia, polar moment of inertia and radius of gyration. Prove that, $J = I_x + I_y$, where the symbols bear their usual meanings. (12)
- (b) What are the applications of moment of inertia? For the shaded area of the following figure calculate moment of inertia about parallel and centroidal axis. (23)



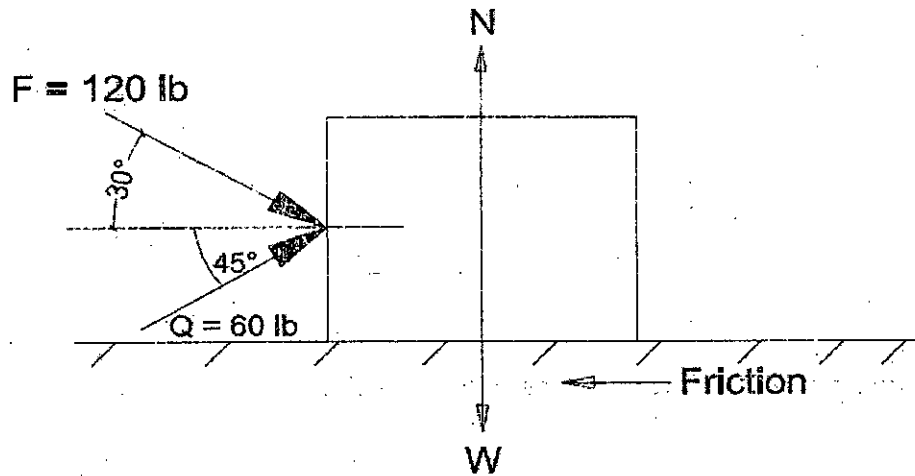
7. (a) A square hole is made in a circle lamina, the diagonal of the square is equal to the radius of the circle as shown in figure below. Calculate the shift in the center of gravity. (17)



- (b) Find the product of inertia of an 10 x 6 x 2 in, Z-section about the centroidal axis. (18)



8. (a) State the principle of linear impulse and momentum. Prove that, $R\Delta t = \Delta mv$, where the symbols bear their usual meanings. (17)
- (b) A 90 lb body is on a horizontal plane, where the co-efficient of kinetic friction, $f = 0.25$. A "Q and F" are applied to the body as shown in figure. (i) What is the impulse of Q and F force in the horizontal direction during 2.5 sec? (ii) What is the net impulse on the body during the same time? (18)



Khulna University of Engineering & Technology
Department of Building Engineering and Construction Management
B. Sc. Engineering 1stYear 2ndTerm Regular Examination, 2017
CE 1213
(Building and Construction Materials)

Full Marks: 210

Time: 3 hrs

- N.B. i) Answer any three questions from each section in separate script.
ii) Figures in the right margin indicate full marks.

Section – A

1. (a) Define the following terms (i) Quick lime (ii) Calcinations of lime (iii) Slaking of lime. (06)
- (b) Write down the uses of lime. Briefly discuss the tests that are generally performed to determine the strength of lime. (13)
- (c) What are the properties of natural rubber? Discuss shortly on reflected glass and insulated glass. (09)
- (d) What is the purpose of using admixture in concrete? Classify the admixtures according to their use in concrete. (07)

2. (a) Draw neat sketch of a rotary Kiln and explain the different stages of cement manufacturing in the wet process. (10)
- (b) Write short note on (i) Hydration of cement (ii) Sulphate resisting cement (iii) Fineness of cement (iv) False setting of cement. (10)
- (c) Write down the standard tests that are carried out ordinary portland cement? Discuss briefly the consistency and soundness test of ordinary cement. (09)
- (d) Point out the basic properties of ferrocement. What are the characteristics of good timber? (06)

3. (a) Write explanatory note on the following (i) Bleeding of concrete (ii) Self consolidating concrete (iii) Effect of curing age on strength of concrete (iv) Measurement method of workability of fresh concrete. (12)
- (b) Why compressive strength of concrete cube is greater than that of cylinder strength? Differentiate between creep and shrinkage of concrete. (08)
- (c) Draw a typical experimental stress-strain curve of normal weight concrete and from this curve how you can determine the initial modulus, tangent modulus and secant modulus? (08)
- (d) A 100 x 200 mm cylindrical specimen is crushed under a failure load of 591 KN at 28 days curing. Determine the failure load to crush a 100x100x100 mm cube specimen prepared from the same mix before and tested at the same period of curing. (07)

4. (a) Write down the basic functions of Geo-textile? Specify the physical and mechanical properties of carbon fiber reinforced polymer. (06)
- (b) What are the purpose of the compacting factor test and J-ring test of fresh concrete? Briefly describe the method of controlling sulphate attack in concrete. (06)

- (c) Design a concrete mix using ACI method for the construction of an elevated water tank. The specified design strength of concrete (characteristics strength) is 30 Mpa at 28 days measured on standard cylinders. Standard deviation can be taken as 4 Mpa. The specific gravity of FA and CA are 2.65 and 2.7 respectively. The dry rodded bulk density of CA is 1600 kg/m³ and fineness modulus of FA is 2.80. The maximum size of aggregate is 20mm. Ordinary portland cement (Type I) will be used. A slump of 50mm is necessary. CA is found to be absorptive total extent of 1% and free surface moisture in sand is found to be 2 percent and non-air-entrained concrete. Assume any other essential data. [Necessary graph and table will be supplied] (23)

Section – B

5. (a) Write down the objectives and significance of engineering materials in the construction industry. (10)
- (b) Define mortar and grout. Write down ASTM C270 mortar classification and mention proportion, aggregate ratio, strength and possible uses. (10)
- (c) Distinguish between fine and coarse grout. Define plasticizers and retarders with examples. (06)
- (d) What is adobe brick? Describe its mechanical properties. (09)
6. (a) Describe the dry process of brick moulding. Describe the construction and working principle of Bull's Trench Kiln. (15)
- (b) Write down the functions of lime and alkalis in brick properties. Write down the characteristics of second class brick. (10)
- (c) Write short note on (i) Painting (ii) White washing (iii) Color washing (iv) Distemping. (10)
7. (a) Define ceramic. Detail the glazing in tiles. Write down the function of surki in mortar. (12)
- (b) Write short note on cement mortar. What are the objectives of plastering? Draw different types of pointing. (12)
- (c) Define toughness, flakiness index and surface texture. Write down the recommendations of AIV test. (11)
8. (a) Write down the properties of good sand. What is the bulking of sand? Two samples of sand one from Kalikair (FM=2.84) and other from Sunamganj (FM=2.28) were mixed together to get fineness modulus (FM)=2.59. Determine the ratio in which they were mixed? (10)
- (b) Draw percentage increase in volume vs. percentage by weight of moisture added in sand graph and explain bulking. Draw the curve of well, gap and uniform graded sand for particle distribution. Why we use semi-log graph paper for such grain size distribution? (15)
- (c) Define varnish and resin. What are objectives of paint? Write down the characteristics of good paint. What are the components of varnish? (10)
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Khulna University of Engineering & Technology
Department of Building Engineering and Construction Management
 B. Sc. Engineering 1st Year 2nd Term Regular Examination, 2017
Math 1223
 (Mathematics-II)

Full Marks: 210

Time: 3 hrs

- N.B. i) Answer any three questions from each section in separate script.
 ii) Figures in the right margin indicate full marks.

Section – A

1. Solve any three of the followings (35)
- (a) $\sin^{-1} \frac{dy}{dx} = x + y$
- (b) $xydx - (x^2 + y^2)dy = 0$
- (c) $(x^2y - 2xy^2)dx - (x^3 - 3x^2y)dy = 0$
- (d) $\frac{dy}{dx} = \frac{6x - 2y - 7}{2x + 3y - 6}$
2. Solve any three of the followings (35)
- (a) $\frac{d^2y}{dx^2} + y = \sec x$
- (b) $\frac{d^2y}{dx^2} + 9y = 5x^2 + e^{2x}$
- (c) $\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + 2y = x^2 e^{2x}$
- (d) $x^3 \frac{d^3y}{dx^3} - x^2 \frac{d^2y}{dx^2} + 2x \frac{dy}{dx} - 2y = x^3$
3. (a) Solve $(1+x)^2 \frac{d^2y}{dx^2} + (1+x) \frac{dy}{dx} + y = 4 \cos \ln(1+x)$ (10)
- (b) Find the particular Solution of $\frac{d^2y}{dx^2} - 9y = 3x$ when $y(0) = 0, y'(0) = 0$ (10)
- (c) Solve $\frac{d^2u}{dx^2} = \frac{1}{K} \frac{du}{dt}$ with boundary condition $u(0) = 0$ or, $u(0, t) = 0$ and $u(1, t) = 0$ for values of t . (15)
4. (a) Define order and degree of differential equation with example (08)
- (b) Solve $\frac{d^2z}{dx^2} = \frac{1}{a^2} \frac{d^2z}{dy^2}$, given that Z never infinite (for any real values of x and y) and $z = 0$. When $x = 0$ or $y = 0$ by using the method of separation of variable (13)
- (c) Solve $\frac{d^2y}{dx^2} + 4y = 4 \tan 2x$ by using the method of variation of parameters (14)

Section – B

- 5 (a) Find the Cartesian and cylindrical polar co-ordinates of a point whose spherical polar co-ordinates are $(4, \frac{\pi}{2}, \frac{\pi}{3})$. (10)
- (b) Find the direction cosines of the two lines which are given by the equations $2l + 2m - n = 0$ and $lm + mn + nl = 0$. Also show that the lines are perpendicular to each other. (12)
- (c) Prove that the acute angle between any two diagonals of a cube is $\cos^{-1}(\frac{1}{3})$. (13)
- 6 (a) Verify whether the lines $\frac{x-4}{3} = \frac{y-1}{2} = \frac{z-3}{1}$ and $x + y + z = 0 = 3x - 2y - z - 3$ are coplanar or not. If coplanar, then find the equation of plane containing them. (09)
- (b) 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. (13)
- (c) Find the length and the equation of the shortest distance between the lines $\frac{x-3}{3} = \frac{y-8}{-1} = \frac{z-3}{1}$ and $\frac{x+3}{-3} = \frac{y+7}{2} = \frac{z-6}{4}$. (13)
- 7 (a) Find the equation of the plane passing through the line of intersection of the planes $x + 2y + 3z = 4$ and $2x + y - z + 5 = 0$ and perpendicular to the plane $5x + 3y + 6z + 8 = 0$. (12)
- (b) Find the angle between the plane $2x + y + 2z + 5 = 0$ and the line $\frac{x-3}{6} = \frac{y-2}{3} = \frac{z+1}{-2}$. (11)
- (c) Find the equation of the plane through $(0, 4, -3)$, $(6, -4, 3)$ and which cuts off from the axes intercepts whose sum is zero. (12)
- 8 (a) Find the equation of the sphere that passes through the points $(4, 1, 0)$, $(2, -3, 4)$, $(1, 0, 0)$ and touch the plane $2x + 2y - z = 11$. (10)
- (b) Show that two circles $x^2 + y^2 + z^2 - 2x + 3y - z + 1 = 0$, $2x + y + z - 2 = 0$ and $x^2 + y^2 + z^2 + 5x - 4y - 5z = 0$, $x - 3y - 2z + 1 = 0$ lies on the same sphere and find its equation. (15)
- (c) Find the equation of a sphere for which the circle $x^2 + y^2 + z^2 + 7y - 2z + 2 = 0$, $2x + 3y + 4z = 8$ is a great circle. (10)

Khulna University of Engineering & Technology
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B. Sc. Engineering 1st Year 2nd Term, Regular Examination, 2017
Hum 1223
(Sociology)

Full Marks: 210

Time: 3 hrs

- N.B.** i) Answer any three questions from each section in separate script.
ii) Figures in the right margin indicate full marks.

Section – A

1. (a) What is sociology? Describe contributing factors behind origin and development of sociology as a distinct science. (15)
- (b) Define sociological perspective. Critically explain major sociological perspectives with example from your own society. (20)
2. (a) Distinguish between association and institution. (05)
- (b) What do you mean by society? Discuss the evolutionary phases of development of society. (15)
- (c) Define community. Explain key elements of community with example. (15)
3. (a) What is custom? "Social customs often starts out of habit" – explain it in the light of your own society. (10)
- (b) Define culture. Critically explain role of culture in shaping everyday behavior. (15)
- (c) What is civilization? Describe the carriers of civilization. (10)
4. (a) What is socialization? Explain role of agencies of socialization in constructing reality. (15)
- (b) What is marriage? Discuss changing trends of marriage with example. (10)
- (c) "Functions of family is lost or modified" – what do you think? Give reason in favor of your answer with example from real life. (10)

Section – B

5. (a) What is social stratification? Why are human societies stratified? (15)
 - (b) What are the types of stratification? Where does class system differ from caste system? (20)
 6. (a) What is collective behavior? What are the different expressions of collective behavior? (15)
 - (b) What is Deviant behavior? Explain the elements of social bonding for social control. (10)
 - (c) Distinguish between crime and deviant behavior. (10)
 7. (a) What is urbanization? How can you measure degree or level of urbanization? (10)
 - (b) Explain that "Pace of life in urban is faster than rural". (15)
 - (c) Explain the empirical consequences of urban living. (10)
 8. (a) Describe the concentric zone model of a city. (15)
 - (b) How will population growth affect global ecology? (20)
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