University of Asia Pacific
Department of Civil Engineering
Mid Semester Examination Fall 2015

Course No: CE 201 (B) **Time: 1 Hour**
Course Title: Engineering Materials **Full Marks: 60**

Answer any <u>THREE</u> questions (3 x 20=60) including Question No. 1. and Question 2.
<u>Question No. 1 and Question No. 2 are compulsory</u>.

1. The Sieve analysis data of a sand sample for a building construction project are summarized below: **(20)**

ASTM Sieve	Amount Retained (g)
3 inch	0
1.5 inch	0
¾ inch	0
3/8 inch	0
#4	0
#8	50
#16	100
#30	100
#40	80
#50	40
#100	40
#200	45
Pan	45

(i) Calculate the FM of the sand sample,
(ii) Draw the grading curve for the sand sample,
(iii) Make a brief discussion on the FM, sieve analysis data, and grading curve,
(iv) What measures are necessary to improve the grading of the sand sample?

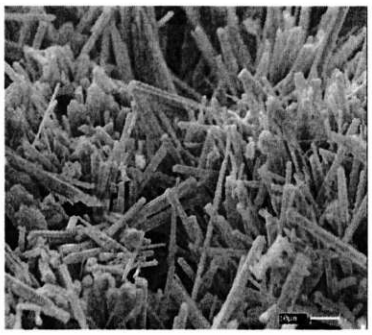
[Sieve opening: #12- 1.7 mm, #40-0.425 mm, #200- 0.075 mm]

2. **(a)** Discuss the reasons for formation of efflorescence on brick surface. **(3)**

(b) Identify the hydration product name from the following images. **(6)**

(i)

(ii)



(iii)

(c) Draw stress-strain curve for the following materials: **(4)**

(i) Concrete

(ii) Steel

(iii) Rubber

(iv) Glass

(d) Explain different possible moisture condition of aggregates. **(3)**

(e) Write down the composition of cement commonly used in Bangladesh according to BDS EN-197. **(4)**

3. **(a)** Explain different field tests of brick. **(4)**

(b) Explain the cement manufacturing process in wet process. **(4)**

(c) What is hydration of cement? What are the functions of various ingredients of cement? **(6)**

(d) Write short note on the following: **(6)**

(i) Slag cement

(ii) Sulphate resisting cement

(iii) Air-entraining cement

4. Mix design of mortar is necessary for plastering work of a brick wall of 20 ft long and 6 ft height. The following data are provided: **(20)**

Sand to cement ratio (weight basis) = 3.5,

W/C = 0.45,
Cement type = CEM II A/M,
Specific gravity of sand = 2.50,
Air content = 2%,

Mortar thickness = 6 mm (on one side of the wall).

(i) Calculate the unit contents of sand, cement, and water,

(ii) Calculate the unit weight of mortar,

(iii) Estimate the amount of each ingredient (in weight and volume) of mortar necessary for the plastering work of the both surface of the wall. Assume 15% extra volume of material is necessary due to the loss of mortar during application on the wall. Unit weight of cement (with void) = 1410 kg/m^3 and unit weight of sand (with void) = 1500 kg/m^3.

(iv) What adjustment in sand volume is necessary, if bulking of sand is 15%?

University of Asia Pacific
Department of Civil Engineering
Mid Semester Examination Fall 2015
Program: B. Sc. Engineering (Civil)

Course Title: Engineering Materials | Course Code: CE 201
Time: 1 Hours | Full Marks: 35

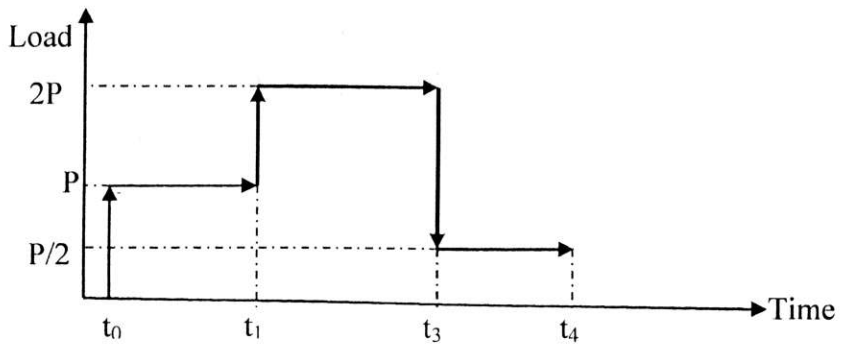
There are **FOUR** questions. **Question No. 1 is compulsory**. Answer any **TWO** from the rest.

1. (a) For a bridge construction project, a sand sample is collected from a nearby market. The sample was sent to the concrete laboratory of UAP for sieve analysis. The sieve analysis data are given below. (15)

Sieve No.	Materials Retained (gm)
3/4 inch	842
3/8 inch	2089
#4	1678
#8	460
#12 (1.68 mm)	0
#16	25
#30	0
#40 (0.425 mm)	0
#50	0
# 100	0
PAN	6

i) Determine the FM of the sample.
ii) Draw the grading curve of the sample.
iii) Comment on the grading of sample based on sieve analysis and gradation curve.

2. (a) Draw the predicted strain response curve of the elasto-plastic material for the following loading history. (5)



(b) Durability of bricks depends largely on proper proportioning of alumina and silica- Explain. (3)

(c) What is vitrified brick? (2)

3. (a) Refer to the following data associated with a batch of sand. (7)

Dry rodded bulk density of sand = 1800 kg/m^3
Bulk Specific Gravity (O.D Basis) of sand=2.20
OD Weight of sand = 770 kg
Total moisture content of stockpiled sand = 5%
Mixing water = 150 kg

Calculate the following:

(i) Amount of inter-particle void in the sample
(ii) Adjusted mixing water when the sand is in wet condition.

(b) Define hydraulic and non-hydraulic cement with examples. (3)

4. (a) What are the causes of flash and false setting of cement? Explain. (2+2=4)

(b) Compare fat lime, hydraulic lime and poor lime. (4)

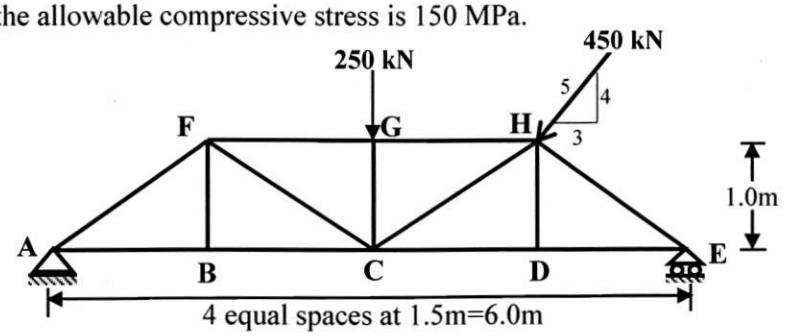
(c) Define creep and stress relaxation. (2)

University of Asia Pacific
Department of Civil Engineering
Mid Term Examination Fall-2015
Program: B.Sc. Engineering (Civil)

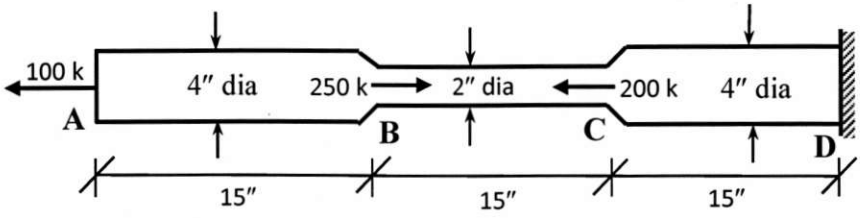
Course Title: Mechanics of Solids I | Course Code: CE 211
Full Marks: 30 (=3×10) | Time: 1 hour

Answer all of the **THREE(3)** question. Each question has equal marks.

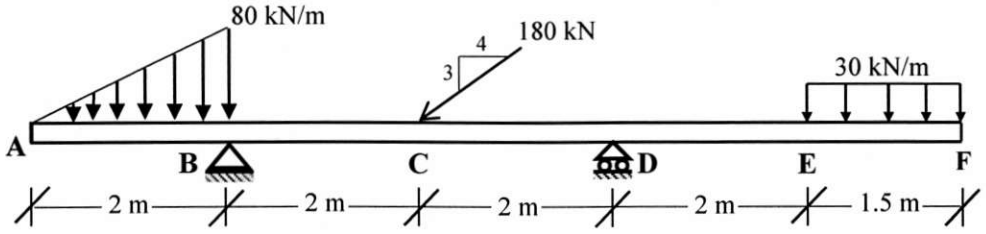
1. Calculate **area of members FC and GH** in the truss shown below to carry an inclined force of 450 kN at H and a concentrated load of 250 kN at G. Given the allowable tensile stress is 130 MPa and the allowable compressive stress is 150 MPa.



2. Determine **the relative displacement** of point D from A for the elastic steel bar of variable cross section shown below caused by the application of concentrated forces. Let E = 29000 ksi. Also draw the axial strain and axial displacement diagram.



3. Draw **axial force, shear force and bending moment diagrams** for the beam loaded as shown below.



University of Asia Pacific

Department of Civil Engineering

Mid-Semester Examination, Fall-2015

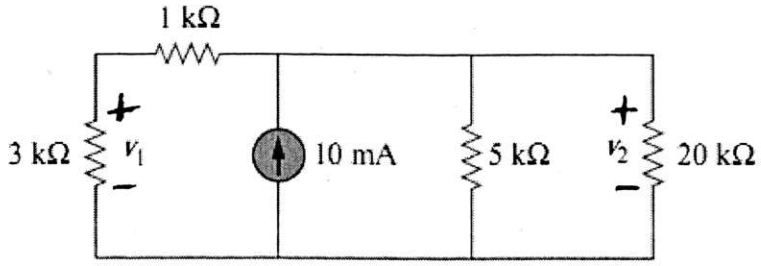
Program: B. Sc Engineering (2nd Year / 1st Semester)

Course Title: Basic Electrical Engineering Course No. ECE (CE) 201 Credits: 3.00

Time: 1.00 Hour. Full Marks: 60

There are **Four** Questions. Answer any **Three**. Figures in the right margin indicate marks.

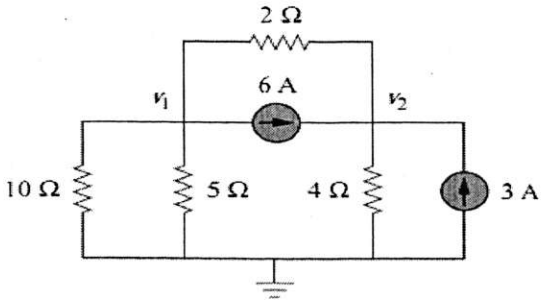
1. (a) For the following circuit, find (i) v_1 and v_2 (ii) the power dissipated in 3-kΩ and 20-kΩ resistors (iii) the power supplied by the current source (10)



Circuit diagram for question 1(a)

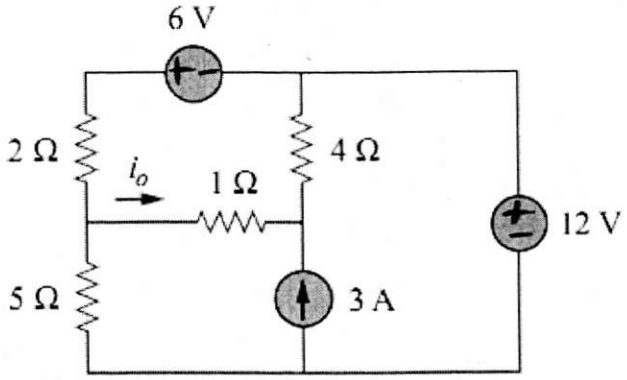
(b) State and prove Maximum Power Transfer Theorem (10)

2. (a) For the following circuit, obtain v_1 and v_2 using nodal analysis. (10)



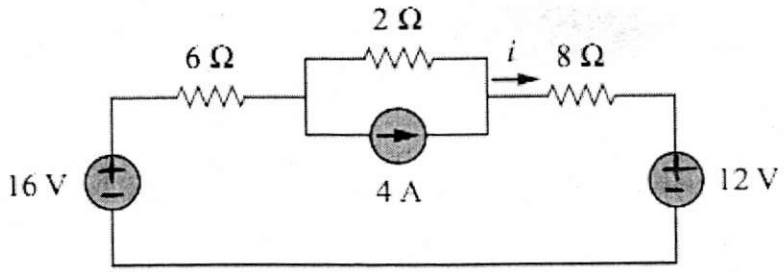
Circuit diagram for question 2(a)

(b) Use mesh analysis to obtain i_o in the following circuit. (10)



Circuit diagram for question 2(b)

3. (a) Find i in the following circuit using superposition principle. (15)

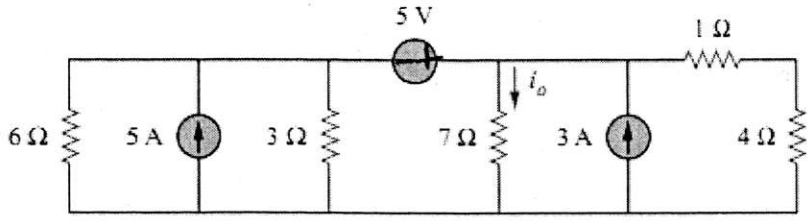


Circuit diagram for question 3(a)

(b) Write short notes on the following terms (5)

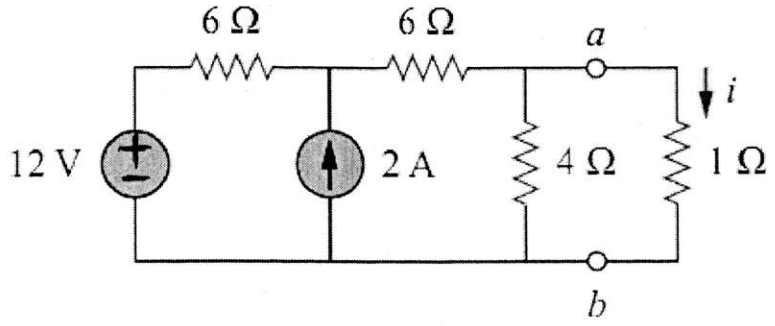
(i) Ohm's law
(ii) Superposition Theorem

4. (a) Use source transformation to find i_o in the following circuit. (10)



Circuit diagram for question 4(a)

(b) Using Thevenin's theorem finds the equivalent circuit to the left of the terminals in the following circuit. Then find i. (10)



Circuit diagram for question 4(b)

University of Asia Pacific

Department of Basic Sciences and Humanities

Mid Semester Examination, Fall 2015

Programme: B. Sc. Engineering (Civil)

(2nd Year 1st Semester)

Course Title: Bangladesh Studies: Society and Culture **Course Code: HSS 211(a)**

Credit: 2.00

Time: 1 Hour **Full Marks: 40**

There are **FIVE** questions. Answer **ANY FOUR** (4x10)

1. Define sociology. State the relationship of Sociology with Anthropology? 3+8
2. Describe the subject matter of Sociology. 10
3. Define society. What are the characteristics of a society? 2+8
4. Define association and institution. What are the differences between association and institution? 4+6
5. What is social research? Discuss the steps of sociological research. 3+7

University of Asia Pacific

Department of Basic Sciences and Humanities

Mid Semester Examination, Fall 2015

Program: B.Sc. Engineering (Civil)

2nd year 1st semester

Course Title: Bangladesh Studies: History Course Code: HSS 211(b) Credit: 2.00

Total Time: 1 Hour Full Marks: 40

There are **Five** Questions. Answer any **Four.** All questions are of equal value (4 x 10)

1. What were *janapadas*? Identify some *janapadas* of ancient Bengal and their present location.
2. Who was the first known king of Bengal? Analyze his activities.
3. Which dynasty ruled Bengal for long 400 years? Who was the founder of this dynasty? How did he come to power?
4. Who united the territories of Satgaon, Lakhnauti and Sonargaon? Do you think he used religion as a political strategy?
5. Who defeated *Bara Bhuiyans* and how?

University of Asia Pacific
Department of Basic Sciences & Humanities
Mid Semester Examination, Fall-2015
Program: B.Sc. Engineering (Civil)
2nd Year / 1st Semester

Course Title: Mathematics III | Course Code: MTH 201 | Course credit:3.00
Time: 1 hr | Full Marks: 60
Answer any **three** of the followings: | 3×20 = 60

1. (a) The profits earned by 100 companies are given below. Calculate the 3rd quartile (Q_3) for the following distribution. **10**

Profits (lakhs)	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
No. of companies(f_i)	4	8	18	30	15	10	8	7

(b) Based on the following distribution below calculate mean deviation. **10**

x_i	10	68	90	40	49	55	54
f_i	3	2	5	15	20	1	2

2. Explain skewness and kurtosis. For the following data calculate Pearson's co-efficient of skewness and comment on the result **20**

Profits	100-120	120-140	140-160	160-180	180-200	200-220	220-240
No. of companies(f_i)	17	53	199	194	327	208	2

3. (a) Solve the following equation by Gaussian elimination method. **10**

$$x + 5y - 3z = 2$$
$$7x - 4y + 2z = 5$$
$$4x + y + z = 9$$

(b) Show that the vectors $V_1 = (1, 1, -1)$, $V_2 = (2, 1, 0)$ and $V_3 = (-1, 1, 1)$ are linearly independent. **10**

4. (a) Define inverse matrix. Find the inverse of A, where $A = \begin{bmatrix} 7 & 2 & 1 \\ 0 & 3 & -1 \\ -3 & 4 & -2 \end{bmatrix}$ **2+8**

(b) Define subspace. Consider $V = R^3$,
$W = \{(a, b, c) |\ a, b, c \in R \ \ and \ \ b = a + c\}$. Show that W is a subspace. **2+8**