

**Khulna University of Engineering & Technology**  
**Department of Building Engineering and Construction Management**  
**B. Sc. Engineering 4<sup>th</sup> Year 1<sup>st</sup> Term Regular Examination, 2017**  
**BECM 4101**  
**(Project Financing and Construction Marketing)**

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) Describe briefly the main features of the project financing technique used for the implementation of infrastructure investments projects under the Public-Private Partnership (PPP) scheme. (10)
- (b) Write down the factors that would be critical for the successful implementation of infrastructure projects under the PPP scheme. (10)
- (c) Define Debt Service Cover Ratio (DSCR) of a financial model. Explain the importance of DSCR to an infrastructure project developer in evaluating the risk and viability of an infrastructure project in a developing country. (10)
- (d) Describe the project finance cash flow waterfall steps for a typical PPP project. (05)
2. (a) Define Public Private Partnership (PPP). Write down the objectives of PPP from the Government and private sectors perspective. (12)
- (b) Define BOT. Write down the advantages and disadvantages of BOT structure. (12)
- (c) Describe briefly the roles of each of the 3 stakeholders involved in bidding of PPP-BOT infrastructure project - SPV, the contractor and operating company. (11)
3. (a) Identify the different forms of risk exposure for an infrastructure project under the PPP scheme with a brief description of what is included under each risk exposure heading. (15)
- (b) Explain how the degree of risks associated with PPP project varies with respect to the phases of project? (07)
- (c) Distinguish between "Solicited" and "Unsolicited" PPP proposal. (08)
- (d) What are the phases for selection of solicited PPP project in the context of Bangladesh? (05)
4. (a) What is foreign exchange risk? Describe the techniques to mitigate the foreign exchange risks associated with PPP project. (18)
- (b) What is sustainable development? Describe the roles of Public-Private Partnership (PPP) scheme for sustainable development in developing country. (12)
- (c) What are the important roles and responsibilities of PPP project manager? (05)

## Section – B

5. (a) Define Construction marketing. (15)
- (b) Discuss the steps in the marketing process. And how to enter into new markets? (15)
- (c) What is market place and why marketplace and customer needs are important? Discuss. (15)
6. (a) Assessing Marketing Information Needs is essential for construction marketing. Why state your arguments? (15)
- (b) Write short note on (i) International organization (ii) Multinational organization and (iii) Global organization. (09)
- (c) How to develop construction marketing information? Discuss. (11)
7. (a) Why should understand the importance and need for a good construction marketing plan? Explain. (10)
- (b) Discuss the key components of a constructing marketing plan and its details. (15)
- (c) What is a strategic alliance? Write down the benefits of international construction alliance. (10)
8. (a) Define construction organization with relevant example. (08)
- (b) Define construction product costs. (07)
- (c) What are the internal and external considerations that affect construction price decisions? Describe. (10)
- (d) What is SWOT analysis? Write down the procedure of SWOT analysis in construction marketing. (10)
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**B. Sc. Engineering 4<sup>th</sup> Year 1<sup>st</sup> Term, Regular Examination, 2017**  
**BECM 4105**  
**(Health and Safety in Construction)**

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) Write short notes on: (i) Near miss (ii) Hazard (iii) Risk. Why safety program is needed in the construction industry? (09)
- (b) Sketch the Bird's well-known accident triangle. Describe the basic accident causing factors those are related to construction site. (07)
- (c) Describe briefly the physical forms of fall protection systems with neat sketch. (12)
- (d) What is fire explosion? Write down the environmental impact of fire in construction workplace. (07)
2. (a) What is critical lift in crane safety? State the key hazards for crane safety operation. (07)
- (b) Define the term grounding. Explain shortly the methods of grounding. (06)
- (c) Describe the common electrical hazards those are associated with construction workplace. (10)
- (d) Write down the key planning tools in structural steel erection. How do managing risk at the steel erection stage? (12)
3. (a) How can employers protect workers from hazardous atmospheres inside excavations? (06)
- (b) Point out the major excavation hazards in the workplace. (07)
- (c) Distinguish between scaffolding and scaffold. What are the requirements for safe scaffold erection and use? (07)
- (d) State the demolition sequence of a structure. (07)
- (e) What are the key elements of a safe design system of work for a confined space? (08)
4. (a) Briefly describe the basic principles of fire safety design. (12)
- (b) How can fire safety engineering and structural engineering work in one platform to reduce the hazard of fire in a building? (05)
- (c) What is "PFP" system in fire engineering? Briefly discuss about the "PFP" system of a building structure. (11)
- (d) Discuss about the risk assessment methods of fire safety. (07)

## Section – B

5. (a) Write down the planning about health and safety in a building pre-construction phase. (6)
- (b) Define personal protective equipment (PPE). Write down the elements that should be considered for selecting the most suitable eye and face protection. (06)
- (c) Briefly describe the different types of fall protection systems that should be used in building construction works. (12)
- (d) Write short notes on head protection and foot protection. Describe the types of protective gloves used as hand protection. (10)
6. (a) Define workers compensation. Write down the objectives of work injury compensation. (05)
- (b) What is workers compensation insurance? Write down the workers compensation rate according to Bangladesh Labour Law. (07)
- (c) Briefly describe the different types of health and safety training that should be conducted in building construction projects. (11)
- (d) Define job safety analysis. Why is job safety analysis important in building construction works? (06)
- (e) Describe the parts of job safety analysis. (06)
7. (a) Write down the purposes of accident investigation from health and safety point of view. Describe the types of accident investigation. (09)
- (b) When should an accident investigation be conducted? Write down the typical contents of an accident investigation report. (08)
- (c) Define safe work permit. Describe the different types of safe work permits. (08)
- (d) Write down the general procedure of safe work permit. (04)
- (e) A workman was employed in a building construction project on a monthly wage of Taka 15000. While working he met with an accident and died on September, 2010. His date of birth is July 20, 1980. Calculate the amount of compensation payable to his dependent. Consider the relevant factor of age 30 is 207.98. (06)
8. (a) Prepare a typical emergency response procedure. (08)
- (b) Briefly describe the multi-employer work site issues in building construction. (09)
- (c) Write down the responsibilities of subcontractor in case of building construction works. (08)
- (d) Briefly describe the common practices for subcontractor management in construction. (10)
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Khulna University of Engineering & Technology  
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 B. Sc. Engineering 4<sup>th</sup> Year 1<sup>st</sup> Term Regular Examination, 2017  
**BECM 4109**  
 (Green Building and Environmental Technology)

Full Marks: 210

Time: 3 hrs

- N.B.** i) Answer any three questions from each section in separate script.  
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**Section – A**

1. (a) Define 'Green Building'. What are the objectives of green building? (10)  
 (b) What are the LEED impact categories which are expected to make a positive impact for building construction? (07)  
 (c) Write down the LEED V4 BD & C rating system credit matrix for a new construction project including credit name and credit points. (18)
  
2. (a) Define building science. What are the requirements for comfortable, safe and energy efficient building? (10)  
 (b) Describe the driving force of air leakage in a building enclosure. (18)  
 (c) What are the factors required to consider for a site assessment? (07)
  
3. (a) Define clean air. What are we breathing? (05)  
 (b) Write down the significance and strategies of indoor water efficiency in a green building. (10)  
 (c) How smoking can be controlled in a residential building improve indoor air quality? (05)  
 (d) Define air quality index (AQI). Calculate the AQI of the following data collected from air quality monitoring station in Khulna, Bangladesh and mention the status of air quality. (15)

Air Pollutants	Unit	Concentration
CO	mg/m <sup>3</sup>	3.6
NO <sub>x</sub>	µg/m <sup>3</sup>	82
SO <sub>2</sub>	µg/m <sup>3</sup>	105
PM <sub>10</sub>	µg/m <sup>3</sup>	190
PM <sub>2.5</sub>	µg/m <sup>3</sup>	115

4. (a) Write short notes on (any five): (35)
  - (i) Life cycle impact reduction of buildings
  - (ii) Optimization of building energy performance
  - (iii) Outdoor water efficiency
  - (iv) Heat island reduction
  - (v) Light pollution reduction
  - (vi) Renewable energy sources
  - (vii) Construction waste management plan
  - (viii) Integrative process of green building

## Section – B

5. (a) What are the impurities present in water? Write down their effects. (10)
- (b) Show that the efficiency of a settling tank is dependent on surface area, not depth of tank. (08)
- (c) Mention the important characteristics of slow and rapid sand filtration. (08)
- (d) Calculate the dimension of a rectangular settling tank to treat  $100 \text{ m}^3$  of water per hour, when the overflow rate is  $0.75 \text{ m/hr}$  and the detention time is 2 hours. (09)

6. (a) Define the functional elements of solid waste management system. What are the effects of solid waste mismanagement? (09)
- (b) Explain the following terms with examples: (i) Reuse (ii) Recycle (iii) Resource recovery. (09)
- (c) What are the solid waste collection methods? Describe briefly, which method is the best for a green building? (10)
- (d) What is the diversion rate of solid waste for a community which produces the following waste on an annual basis? (07)

Waste Type	Tons/Year	Remarks
Mixed household waste	210	Landfilled
Recyclable (Paper & Plastic)	25	Recycled
Commercial waste	50	Landfilled
C and D waste	120	Used to fill a low land

7. (a) What is waste water? What are the pollutants in waste water? What problems are created by these pollutants? (06)
- (b) Prepare a schematic diagram showing various components of a septic tank. What are the important processes that take place in a septic tank? (14)
- (c) Design a septic tank to serve a household of ten persons who produce  $90 \text{ lpcd}$  of waste water. The tank is to be desludged every three years. (15)
8. (a) Define 'Environmental Impact Assessment (EIA)'. What are the objectives and applications of EIA? (07)
- (b) What is the structure of an EIA report? (09)
- (c) Write short notes on the following terms: (10)
- (i) Functions of EIA (ii) Relationship of EIA to project planning and implementation.
- (d) Calculate average per capita water requirement (including fire-fighting demand) of a six storied building having 2200 population. It is an ordinary structure and each floor area is  $1000 \text{ m}^2$ . (09)

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**B. Sc. Engineering 4<sup>th</sup> Year 1<sup>st</sup> Term Regular Examination, 2017**  
**CE 4123**  
**(Foundation Engineering)**

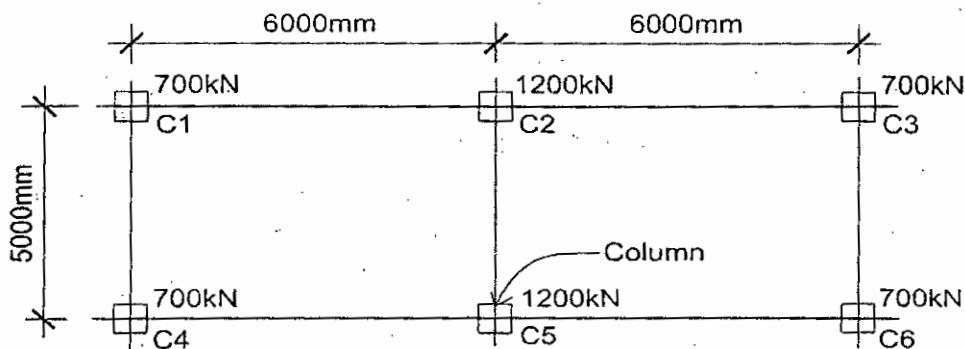
Full Marks: 210

Time: 3 hrs

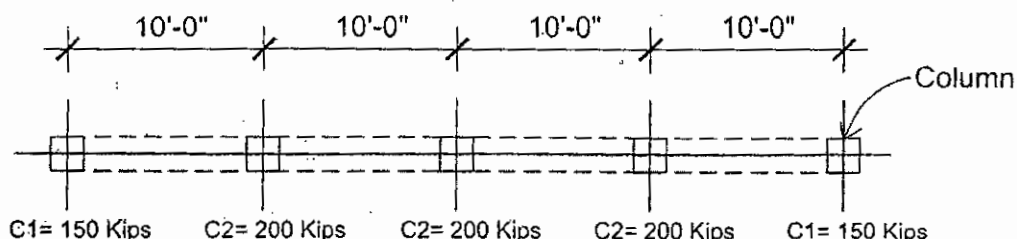
- N.B. i) Answer any three questions from each section in separate script.  
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**Section – A**

1. (a) What are the causes of failure of foundations? (05)
  - (b) Design a combined footing for two columns C1 and C2 located at a centre to centre distance of 15 ft. Column C1 is 15 inch X 15 inch in size and carries a load of 175 kips. Column C2 is 18 inch X 18 inch in size and carries a load of 225 kips. The safe bearing capacity of soil is 1.25 tsf. Use  $f'_c = 3000$  psi and  $f_s = 24000$  psi. Show the reinforcement details. (30)
2. A structure is supported on six columns arranged as shown in figure below. All columns are 350mm X 350mm in size. The load on each column is shown in Figure. Design the suitable raft foundation (slab-beam type) of the column. The allowable bearing capacity of soil is 75 kN/m<sup>2</sup>. Use M15 grade of concrete and mild steel. Show the reinforcement details. (35)



3. Design a continuous footing with foundation grade beam as shown in figure below. All column sizes are 15"x15" and the allowable bearing capacity of soil is 1 tsf. Given:  $f'_c = 3000$  psi and  $f_s = 24000$  psi. Show the reinforcement details. (35)



4. (a) Design a pile cap for a column 20 inch square exerting a load of 300000 lb. Each pile has the bearing capacity of 85000 lb and 20 inch in diameters. Take the usual stresses  $f_s = 24000$  psi and  $f'_c = 3500$  psi. Show the reinforcement detailing. (17)
- (b) Design a pre-cast pile among three piles under a column. Total superimposed load on the column is 750 kips. The piles are to be driven to hard a strata which is available at a depth of 30ft and the size of pile 16 inch X 16 inch. Take the usual stresses  $f'_c = 3500$  psi and  $f_s = 24000$  psi. Show the reinforcement details. (18)

## Section – B

5. (a) Which boring method do you think suitable for Bangladesh? Discuss the method briefly. (10)
- (b) State the guide rules to explain the depth of different types of foundation. (10)
- (c) Discuss the effect of "area ratio" on sample disturbance. Find out the area ratio of split spoon sampler and a typical shelby tube. (07)
- (d) Write down the general requirements of machine foundation that should be satisfied and checked prior to the reinforcement detailing of the foundation. (08)
6. (a) What is caisson? Discuss about the essential parts of a pneumatic caisson? Why construction of pneumatic caisson is costly? (10)
- (b) Distinguish between open and box caisson. (08)
- (c) Define cofferdam. Write down the uses of cofferdam. (07)
- (d) What is machine foundation? Discuss the different types of machine foundation with neat sketches. (10)
7. (a) Define soil reinforcement. Describe its contribution in ground improvement. (06)
- (b) Write down short notes on: (i) Smear zone (ii) Soil Nailing (iii) Sand compaction pile (09)
- (c) What is Geo-textile? What are the major functions of Geosynthetics those should be evaluated for the proper design of Geosynthetics based building engineering structures? (10)
- (d) Describe different types of Geosynthetics with neat sketches. (10)
8. (a) What is the difference between disturbed and undisturbed soil samples? How can you collect undisturbed sample? (03)
- (b) Name the different types of boring, sampling and testing. (05)
- (c) What do you mean by vertical drains? State the working principles of sand drain and prefabricated vertical drain. What are the advantages of using vertical drains? (12)
- (d) What is Blasting? For which type of soil condition the blasting technique is suitable. Give the reason behind your answer. (10)
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