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Name of the Program: B. Sc. in Civil Engineering
Semester: 8th Semester

Date: 12 March, 2024
Time: 10:00 am –11:30 am

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

Semester Mid Semester Examination
Course Number: HUM 4851
Course Title: Practice, Communication, and Professional Ethics

Summer Semester: 2022 - 2023
Full Marks: 75
Time: 1.5 Hours

There are **4 (Four)** questions. Answer any 3 (**Three**) questions. Do not write on this question paper. Marks of each question and corresponding CO and PO are written in the brackets.

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1. (a) Explain the types of project proposals referred in the following scenario. **(15) (CO1) (PO11)**
"Two years ago, the Expressway Authority (EA) had received a proposal from a private organization, Rish PLC for construction of a four-lane tunnel under Meghna river. EA did not request for this project; rather Rish had submitted the proposal to EA. After detail appraisal, EA had decided to go with the project and appoint Rish as the contractor for the project. The project consists of a 10km four-lane tunnel, two toll plazas and 3Km approach road and it was scheduled to be completed within five years. In current time, while reviewing the existing project situation, the EA found that on the north side approach road of the tunnel, a new rural road is being constructed by local government office. This new rural road will create congestion and also will be a concern form road safety perspective. After assessment of the situation, the EA opted to build an underpass on that location. Now project proposal is needed to be prepared to accommodate the new scope i.e. underpass.

(b) Explain the roles of Employer, Engineer and Contractor in a building construction project. Show the relationship among them while providing your answer. **(10) (CO2) (PO11)**

2. (a) It is said that most of the time in construction project, the project lifecycle curve looks like a 'S-curve'. Illustrate a scenario in a construction project where the project lifecycle curve may not look like a 'S-curve'. Support your answer with examples of different phases of project lifecycle. **(15) (CO1) (PO11)**

(b) Find out the types of procurement (Goods, Works, Physical service or Professional and Intellectual Service) that are referred in the following scenarios. Provide justification to your answer. **(10) (CO2) (PO11)**

i. The AB University has decided to construct a new 10-storied academic building. The university's Engineering Department (ED) floated an Invitation for Tender to select a suitable company for the construction of the building.
ii. Public Utility Department decided to recruit a third-party company to provide 24 hours customer support service for its customer over phone. The support will be regarding replying to the customer queries related to billing and tariff issues.
iii. Xen is a real estate company specialized in building construction. It has recently completed construction of a new multistoried shopping complex. Now it wants to buy a generator which will act as a backup for electricity for the shopping complex.

3. **(a)** The phases of project cycle are- identification, preparation, appraisal, presentation, implementation, monitoring and evaluation. **(15) (CO1)**
   i. Illustrate one scenario when a project may need to move from appraisal phase to preparation phase; **(PO11)**
   ii. Also illustrate another scenario when a project may need to move from presentation phase to preparation phase.

   (b) Explain the role of "Proof Consultant" in a Design-build contract with relevant example. **(10) (CO2) (PO11)**

4. **(a)** "A project is temporary endeavor undertaken to create a unique product, service or result" **(15) (CO1)**
   Explain the above definition of project with relevant example. While explaining, compare the characteristics of project with that of the operational activities. **(PO11)**

   (b) Explain the pre-conditions for a situation to be considered as 'Force Majeure' in a construction contract with relevant example. **(10) (CO2) (PO11)**

TABLE 4.6.5.1.1A Recommended Values of α and f_{si} for Estimation of Drilled Shaft Side Resistance in Cohesive Soil Reese and O'Neill (1988)

Location Along Drilled Shaft	Value of α	Limiting Value of Load Transfer, f_{si} (ksf)
From ground surface to depth along drilled shaft of 5 ft*	0	–
Bottom 1 diameter of the drilled shaft or 1 stem diameter above the top of the bell (if skin friction is being used)	0	–
All other points along the sides of the drilled shaft	0.55	5.5

* The depth of 5 ft may need adjustment if the drilled shaft is installed in expansive clay, or if there is substantial groundline deflection from lateral loading.

TABLE 4.6.5.1.4A Recommended Values of q_T* for Estimation of Drilled Shaft Tip Resistance in Cohesionless Soil after Reese and O'Neill (1988)

Standard Penetration Resistance N (Blows/Foot) (uncorrected)	Value of qT (ksf)
0 to 75	1.20 N
Above 75	90

*Ultimate value or value at settlement of 5 percent of base diameter.

Correlations between consistency, N-value and unconfined compressive strength of cohesive soils (Terzaghi and Peck, 1948 and 1967)

Consistency	N-value	Unconfined compressive strength, q_u (kPa)
Very soft	0-2	<25
Soft	2-4	25-50
Medium stiff	4-8	50-100
Stiff	8-15	100-200
Very Stiff	15-30	200-400
Hard	>30	>400

Table 6.4 Bearing capacity factors, k_c (Bustamante and Gianselli, 1982)

Nature of soil	q_c (MPa)	Factors k_c Group I	Group II
Soft clay and mud	< 1	0.4	0.5
Moderately compact clay	1 to 5	0.35	0.45
Silt and loose sand	≤ 5	0.4	0.5
Compact to stiff clay and compact silt	> 5	0.45	0.55
Soft chalk	≤ 5	0.2	0.3
Moderately compact sand and gravel	5 to 12	0.4	0.5
Weathered to fragmented chalk	> 5	0.2	0.4
Compact to very compact sand and gravel	> 12	0.3	0.4

Table 6.5 Friction coefficient, α (Bustamante and Gianeselli, 1982)

Nature of soil	q_c (MPa)	Category: Coefficients, α I A	I B	II A	II B	Maximum limit of f_p (MPa) I A	I B	II A	II B	III A	III B
Soft clay and mud	< 1	30	90	90	30	0.015	0.015	0.015	0.015	0.035	
Moderately compact clay	1 to 5	40	80	40	80	0.035 (0.08)	0.035 (0.08)	0.035 (0.08)	0.035	0.08	≥ 0.12
Silt and loose sand	≤ 5	60	150	60	120	0.035	0.035	0.035	0.035	0.08	–
Compact to stiff clay and compact silt	> 5	60	120	60	120	0.035 (0.08)	0.035 (0.08)	0.035 (0.08)	0.035	0.08	≥ 0.20
Soft chalk	≤ 5	100	120	100	120	0.035	0.035	0.035	0.035	0.08	–
Moderately compact sand and gravel	5 to 12	100	200	100	200	0.08 (0.12)	0.035 (0.08)	0.08 (0.12)	0.08	0.12	≥ 0.20
Weathered to fragmented chalk	> 5	60	80	60	80	0.12 (0.15)	0.08 (0.12)	0.12 (0.15)	0.12	0.15	≥ 0.20
Compact to very compact sand and gravel	> 12	150	300	150	200	0.12 (0.15)	0.08 (0.12)	0.12 (0.15)	0.12	0.15	≥ 0.20

Category – IA: plain bored piles; mud bored piles; hollow auger bored piles; micropiles (grouted under low pressure); cast screwed piles; piers; barrettes. IB: cased bored piles; driven cast piles. IIA: driven precast piles; prestressed tubular piles; jacket concrete piles. IIB: driven metal piles; jacked metal piles. IIIA: driven grouted piles; driven rammed piles. IIIB: high pressure grouted piles of large diameter > 250 mm; micropiles (grouted under high pressure).
Note: Maximum limit unit skin friction, f_p: bracket values apply to careful execution and minimum disturbance of soil due to construction.