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

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

Semester Final Examination

Summer Semester: 2022 - 2023

Course Number: HUM 4851

Full Marks: 150

Course Title: Practice, Communication, and Professional Ethics

Time: 3.0 Hours

There are 7 (Seven) questions. Answer any 6 (Six) 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) i. Explain when the 'Ex-post Evaluation' of a project is undertaken. Provide relevant example with your answer. (7.5) (CO1) (PO11)
- ii. Explain why the 'Meta Evaluation' is undertaken. Provide relevant example with your answer. (10) (CO2) (PO11)
- (b) Explain, with justification, what type of specifications are referred in the following scenarios-
- i. An NGO is recruited by the International Development Organization (IDO) for implementing a 1-year hygiene awareness project in a remote rural area. Currently there are average 20 reported incident of diarrhea per month in that area. In the specification of the contract, it is written that the NGO will get its final payment which is around 30% of the contract price after 2 years of completion of the project. IDO will pay the final payment to the NGO if the number of reported diarrhea patient decreases by 50% at the end of 2 years. (7.5) (CO3) (PO8)
- ii. A space agency, Bangla Space Explorer (BSE) is preparing for a space journey to the planet, Mars. For that it needs to develop a material which can withstand heavy temperature. BSE wants to select a supplier for this material. In the specification, BSE writes that the material needs to withstand 3000-degree Fahrenheit temperature and its density should be less than 1.0 g/cm³.
- (c) With relevant example explain the practical implications of the following ethical responsibility of ASCE code of ethics 2020 for professional Engineers – "Engineer should act as faithful agents of their clients and employers with integrity and professionalism" (7.5) (CO3) (PO8)
2. (a) Using relevant examples, explain the similarities and differences between 'formative evaluation' and 'summative evaluation'. (7.5) (CO1) (PO11)
- (b) Identify and explain the type of integrity violation issues that are referenced in the following scenarios- (10) (CO2) (PO11)
- i. In a reimbursable cost contract, a contractor purchased a GPS device for conducting survey of the area under construction. The contractor purchased a relatively more expensive and imported device made by Brand M despite a locally available and cheaper device of Brand N. The Bid Document does not specify any brand, it only specifies the required specification. Products of both Brand M and Brand N qualifies the required specification.
- ii. As per the bidding document, the successful contractor must provide performance security amounting to 10% of the contract price. Before contract signing, the contractor requested the procuring entity to waive this condition. The contractor insisted that this performance security will add financial burden on the contractor, and it may hamper the progress of the work. The procuring entity that accepted the contractor's request.

- (c) Raina is working as a senior environmental specialist in a large consulting firm. Recently she has recruited a junior environmental consultant, Mr. Adwih for her team. She recruited the consultant solely based on the evaluation of the received CVs against advertisement. At the first inception meeting of the project, Raina found that Adwih was not that conversant with the terms related to environmental science. After the meeting, she met with Adwih individually and try to understand the situation. After some time Adwih confessed that the he had wrote fake experiences related to the environmental works in his CV. He also confessed that though some of the assignment he has mentioned his CV were submitted with his credentials, he had not performed those assignment by himself, rather he put his signature on other people's work and took credit of the works.
- Please analyze the above situation with reference to appropriate Code of Ethics for professional Engineers.
3. (a) The Bridge Construction Department (BCD), a government organization, has decided to construct a 2.0 km road cum rail bridge over the river Myre. The bridge will connect the remote coastal district Dorkepur with the capital city of the country. The bridge will be constructed on the existing road alignment. Currently ferry service is used there for transportation purpose. Dorke is socio-economically significantly lagging compared to other districts of the country. BCD hopes that with the bridge this issue can be addressed to a great extent.
- Prepare an outline of project proposal encompassing the objective, scope, methodology, major activities, risks and assumptions, expected output/outcome/goal etc. for this project.
- (b) Give ONE situational example for each for the following integrity related issues in the context of procurement and contract management. Provide justification to your answer.
- (i) Abuse, (ii) Coercive practice
- (c) Explain the practical implications of the following ethical responsibility of ASCE code of ethics 2020 for professional Engineers – "Engineers: Educate the public on the role of civil engineering in society"
4. (a) Construct a scenario to illustrate the 'Five Whys' technique as a tool for root cause analysis.
- (b) Explain, with justification, what type of specifications are referred in the following scenarios-
- i. A university decided to buy 100 computers for its structural simulation lab. It has prepared a specification for that. The specification includes provisions like 8 core processor, 21 inch LED display, 500 GB Hard drive, 16 GB RAM and 1200VA UPS. It also specifies that the booting time (i.e. the time required to start a computer) should be less than 20 seconds.
- ii. In the specification of a high-rise building construction the concrete strength for column casting is mentioned as 35 MPa. Also, the specification mentions that the water cement ratio should be 0.42.
- (c) A university has decided to recruit a lecturer in its Biomedical Engineering Department. Three candidates are shortlisted based on their academic and research background. A five-member viva board will finally select the suitable candidate for the position. The viva board will comprise the head of the respective department, the registrar of the university, a biomedical engineering faculty from another university, representative of University Regulatory Commission and Pro Vice-chancellor of the university. Some days before the viva, the Pro Vice-chancellor found that one of the candidate is a nephew of his.
- Explain how you can assess whether there is a potential for conflict of interest in a scenario. Also explain how the pro vice-chancellor can address the situation mentioned above.
5. (a) Find out the types of evaluation that are mentioned in the following scenario-
- The university had embarked a transformation project 2 years ago. The objective of the project was to update the course contents to align it with the requirement of Outcome-based education. Several course contents were updated based on recommendation of the project.

The project was completed 1 year ago. Now, the university wants to find out the impact of the project. For that the university's evaluation department is tasked to evaluate the outcome of the project. Also, university decides to hire an expert for this as a cross check measure. The university is also formulating a mechanism to obtain the students' feedback on the performance of the project.

- (b) i. Explain the similarities and differences between 'Fixed Budget Selection (FBS)' and 'Quality Based Selection (QBS)' method for consultant selection. (10) (CO2) (PO1)
- ii. Discuss a scenario where you will suggest using FBS rather than LCS method. (7.5)

- (c) Rishia has been working in SOUR PLC for the last 3 years. She is working as one of seven Junior Design Engineers for bridge structural design division. Recently Human Resources (HR) division of her office has requested the Design Department to nominate one Junior Structural Design Engineer for a 1-week advance training on large span bridge design. The training will be conducted by world renowned bridge design engineers and the office will fund the expense of the training. The HR division informed that the head of the design department can also attend the training as it will work as a refresher learning for him. (7.5) (CO3) (PO8)

In the next month, the design department has to submit a complete design for the Rial bridge. The head of the design department, fearing he may miss the submission deadline, declines the request of the HR department and don't nominate any Junior Design Engineer. He also opted not to attend the training himself. He expressed that his utmost priority is the performance of his department. The Rial bridge design assignment was started 8 months ago and it is in the process to be completed within due time. The service part of the Junior Engineers for this bridge design is already completed last month.

Please analyze the above situation with reference to appropriate Code of Ethics for professional Engineers.

6. (a) The government is going to initiate a project to construct an eight lane elevated expressway between the capital and southern seaport city. The project will need detail studies including geotechnical investigation, topographic survey, traffic survey, hydrological & morphological study, financial & economical modelling, preliminary design, geometric design, detail structural design, HSES (health, safety, environmental and social) impact study, road safety audit etc. Prepare a list of critical success factors for this specific project to become successful. (7.5) (CO1) (PO11)

- (b) There are several methods for procurement of Intellectual services e.g. Quality & Cost Based Selection (QCBS), Least Cost Selection (LCS), Quality Based Selection (QBS), Fixed Budget Selection (FBS), and Single Source Selection (SSS) etc. Find out suitable procurement method for the scenarios mentioned below- (10) (CO2) (PO11)

- i. Revenue Department (RD) wants to procure an advanced software for online income tax return submission system. This system will work as a central database which will provide all the functions required by the department. RD found out that Xenza PLC, a software company is providing this type of software. There are other companies who produces this type of software. But, those software will not be compatible with RD's existing system. As producer of the software, Xenza has patent on the software. After review, RD opted to select the software of Xenza. RD also wants some customized functions that need to be incorporated into the Xenza's existing software.
- ii. Due to lack of uninterrupted road transport, the Rory district is significantly lagging economically than its peer districts. The main reason is the presence of a wide river between Rory and the capital city. Central Highways Department (CHD) is pondering to solve this issue. Due to the meandering nature of the river, CHD is not sure whether they would go for bridge or tunnel construction. Though tunnel may require higher cost, but it will not disturb the water flow of the river significantly. Again if they construct cable-stayed type or suspension type bridge with long span, it may hamper the water flow less than other types of bridge. There is also the question of keeping provision for rail track with the road bridge. Now, CHD wants to select a consultant who will study

and provide suggestions to CHD regarding this issue.

- (c) Explain the practical implications of the following ethical responsibility of ASCE code of ethics 2020 for professional Engineers – “Engineers: Promote and exhibit inclusive, equitable, and ethical behavior in all engagements with colleagues.” (7.5) (CO3) (PO8)

7. (a) Omta Cement PLC is one of the renowned cement manufacturing companies in the country. Now a days the construction companies are increasing using ready-mix concrete for their construction works. The CEO of Omta is assessing the required steps it will require to enter the read-mix concrete production business. Cement is one of the major ingredients to produce ready-mix concrete. The customer base will be mostly same for both cement and ready-mix concrete. Through Omta can use its existing factory space to establish ready-mix plant, it will still need to acquire some land for the plant. Omta will be able to provide the ready-mix concrete in comparatively economic price due to being a cement manufacturer itself as most of the competitors will have to procure cement from the market. The CEO is specially concern about one of the ingredients of ready-mix concrete i.e. stone chips. If any customer requires high strength ready-mix concrete, then Omta has to source them from overseas which will add risk and cost to the production. The CEO heard that another large cement company Zeon PLC may also go for this business too. Moreover, due to recent devaluation of local currency against other major currencies, the import cost of raw materials may also rise significantly. Assess TWO strengths, TWO weaknesses, TWO opportunities and TWO threats for this endeavor of the company i.e. producing ready-mix concrete. (7.5) (CO1) (PO11)
- (b) The Road Construction Department (RCD) decided to recruit a consulting firm to prepare a road master plan for the Asgard city. The RCD shortlisted four consulting firms and afterwards received proposals from these firms. Based on proposal evaluation, the firms' technical score is as follows: (10) (CO2) (PO11)

Name of the Consulting firm	Technical Evaluation (Technical Score 100)				
	Specific experience of consulting firm related to the assignment (out of 10)	Adequacy of the proposed methodology and work plan			Qualifications and competence of the key staff (out of 55)
		Technical approach and methodology (out of 20)	Work plan (out of 10)	Organization and staffing (out of 5)	
A	8.00	15.00	9.00	4.00	48.00
B	9.00	16.00	8.00	4.00	50.00
C	7.00	13.00	7.00	3.00	42.00
D	5.00	14.00	7.00	3.00	39.00

The Minimum Qualifying Mark for passing in Technical Evaluation is 70. Total prices offered by the consulting firms are:

Firm	A	B	C
Price quote (Taka)	13,000,000.00	19,000,000.00	10,000,000.00

The formula indicated in the Request for Proposal (RFP) document for determining the financial scoring is: $S_f = 100 \times F_n/F$; where S_f is the financial score, F_n the lowest price, and F the price of the proposal under consideration.

Considering QCBS (Quality and Cost Based Selection) method for consultant selection, please find out the 1st ranked consultant with Quality: Cost ratio of 80:20. Also find out who would be 1st ranked if the Quality: Cost ratio is 90:10.

- (c) Write down the fundamental principles of ASCE code of ethics 2020. (7.5) (CO3) (PO8)