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Programme: BSc.Eng (IPE)
Semester: 7th

Date: 9 December 2023 (Saturday)
Time: 1:30-4:30 pm

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
DEPARTMENT OF MECHANICAL AND PRODUCTION ENGINEERING

Semester-Final Examination
Course No. IPE 4725
Course Title: Supply Chain Management

Winter Semester, A.Y. 2022-2023
Time : 3 hours
Full Marks : 150

All 6 (Six) are compulsory questions.
COs/POs and marks are indicated in the right-side columns.

- 1 a) Recognize the distinguishing characteristics of stores and warehouse in a table (point forms). CO4 PO1 8
- b) Specify at least 10 design features of a warehouse layout and draw a dream layout of a warehouse you would like to use to manage raw materials and components of automotive parts manufacturing for several nearby plants within 20 km. Do labelling for all. 17
- 2 a) Justify the relevance of verification and counting of materials and supplies in supply chain management (SCM). Write more than five specific and clear points. CO4 PO1 8
- b) Write an essay on Methods and principles of materials coding using diagrams. 17
- 3 a) Illustrate producer's and consumer's surplus using clearly labelled diagrams, geometric formulas for calculations and probable numerical calculations for an electronic product in a supply chain. Use any data you like. CO5 PO7 13
- b) Waste elimination or reduction is always a big issue in any manufacturing or supply chain or in our daily life. It is a philosophical issue at the first place. With reference to Toyota production system (TPS) and The Qur'an and Ahadeeth, demonstrate the importance of waste elimination. CO1 PO8 12
- 4 Consider the nodes (A, B, ... F, G) described below, and note that the depot is located at node O. Suppose we would like to solve this vehicle routing problem (VRP) using the Clarke and Wright's savings algorithm, for the constraint that each vehicle has a capacity of 30 units. CO5, PO5 25

Node	O	A	B	C	D	E	F	G	Demand
distance									
O (depot)									0
A	4								12
B	4	5.6							12
C	2.8	6.3	2.8						6
D	4	8	5.6	2.8					16
E	5	8.5	8.1	5.4	3				15
F	2	4.5	6	4.5	4.5	4.1			10
G	4.2	3.2	7.6	7.1	7.6	7	3.2		8

- i. State the main purpose and specific objectives of vehicle routing problem (VRP/TSP). (3 marks)
- ii. Mention the logical steps along with the mathematical notations to be followed to solve a VRP using the Clarke and Wright's savings algorithm. (4 marks)
- iii. Apply these steps to come up with a heuristic solution of the VRP tabled above. Show the solution/s in tabular form (node-to-node savings and route-demand-distance tables) and comment on it/them. (18 marks)

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| 5 | a) Differentiate between inventory models (EOQ/EPQ) in make-or-buy decision making and distributive inventory in SCM. | CO4
PO5 | 6 |
| | b) An industrial engineer in his/her profession is an indispensable partner of SCM. Relate the scope of legal aspects in various steps of this profession. | | 7 |
| | c) Describe the British meanings of law, morality, and ethics towards framing legal aspects and contrast them with Islamic views. Give reasons why the Creator's laid down everlasting ethical and moral grounds for mankind through the Prophets since the day one of man on the earth. | CO1
PO8 | 12 |
| 6 | a) Signify the relevance of transportation and logistics in supply chain management with respect to efficiency, scalability, robustness, visibility, and innate quality to work seamlessly. | CO5
PO5/
PO8 | 8 |
| | b) The world adopted a food safety protocol in the early 2000s called the Hazard Analysis and Critical Control Points (HACCP) system. Referring to that elucidate the key issues and specific points to an audience for ensuring safe food or medicine transportation. | | 12 |
| | c) Argue the necessity of green SCM and relate the concept of circular supply chain. | | 5 |

-End of the question paper-