Programme: B.Sc. Eng in IPE
Semester: 4th

Date: 16 February 2023
Time: 10.00 a.m. to 11.30 a.m.

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

Mid-Semester Examination
Course Number: IPE 4405
Course Title: Industrial Law and Management

Summer Semester: 2021 - 2022
Full Marks: 75
Time: $1\frac{1}{2}$ hours

There are **3 (Three)** Questions. Answer **all of them**. The symbols have their usual meanings. Marks of each question and corresponding CO and PO are written in brackets. Assume reasonable values, if necessary.

1.	(a)	State the four categories of an individual behavior. Briefly describe them with examples on practical applications.	(8) (CO1) (PO1)
	(b)	Explain group dynamics with its meaning, importance and practical implication.	(6) (CO1) (PO1)
	(c)	Briefly describe the various power processes in a modern group based on their practical applications.	(7) (CO1) (PO1)
	(d)	Explain the relevance and significance of sustainable manufacturing and environment.	(6) (CO1) (PO1)
2.	(a)	Briefly describe powers and conflicts in a modern organization.	(6) (CO2) (PO2)
	(b)	Differentiate among a firm, company, factory and industry in the context of modern technology. Give practical examples	(10) (CO2) (PO2)
	(c)	Illustrate the significant steps to utilize the sustainable manufacturing indicators.	(8) (CO2) (PO2)
	(d)	Analyze the industrial pollution in terms of its causes, effects and ways of control in the context of present practical interpretations.	(9) (CO2) (PO2)

3. (a) The maximum ground level concentration of pollutants, C_{max}, $mg \cdot m^{-3}$, is calculated by the following formula: (15) (CO3) (PO4)

$$C_{max} = \frac{A.M.F.m.n.\eta}{H^2.\sqrt[3]{V_1.\Delta T}}$$

Where,

M = the average emission efficiency of each pollutant from the source of air pollutant, $g.s^{-1}$, for 20 to 30 minutes;
$= C_{pe}.V_1.10^{-3}$

C_{pe} = the concentration of pollutants in the measuring section of the exhaust duct, $mg.m^{-3}$;

10^{-3} = conversion constant mg in g;

ΔT = temperature difference of the effluent gas and atmospheric air, °C;

H = height of the source of air pollutant, m;

V_1 = seconds volume flow rate of effluent gas, $m^3.s^{-1}$;

F = non-dimensional coefficient that takes into account the sedimentation rate of the considered pollutant in the atmospheric air and depends on the particle size and the emission cleaning factor;

A = coefficient depending on the distribution of air temperature over the height of the troposphere;

m and n = coefficients that take into account the emission conditions from the source;

η = coefficient that takes into account the influence of the local landscape.

The volume flow of effluent gas, $V_1, m^3.s^{-1}$, is calculated by the following formula:

$$V_1 = \frac{\pi D^2}{4} w_o$$

Where,

D = diameter of the outlet of the source of air pollutant, m;

w_0 = the average speed of the effluent gas output from the mouth of the source of air pollutant, $m.s^{-1}$.

(i) Evaluate the maximum ground level concentration of pollutants, C_{max} in $mg \cdot m^{-3}$ in a modern city; where, $C_{pe} = 20\ mg.m^{-3}$, $D = 25$ cm, $W_0 = 15\ m.s^{-1}$, $A = 15$, $F = 15$, $m = 15$, $n = 15$, $\eta = 15$, $H = 15$ m, $T_\infty = 30$°C, $T_s = 75$°C.

(ii) Evaluate the maximum ground level concentration of pollutants, C_{max} in $mg \cdot m^{-3}$ when all the parameters are taken as double.

(iii) Comments on your answer in the context of the environmental pollution and sustainability.

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