Ref. No.: Ex/PG/IlluTD/T/121A/2018

M.TECH ILLUMINATION TECH. AND DESIGN FIRST YEAR SECOND SEMESTER – 2018

LIGHTING ECONOMICS, AUDIT & MANAGEMENT

Time 3 hrs **Full Marks: 100**

Part I (Each part carrying 50 marks)

Use Separate Answer scripts for each part

Answer Question No. 1 and any two questions from rest.

1.

a. Mention the different parameters to be considered while selection of luminaires in view of lighting economics for different lighting needs 3

b. Write short note on.. 3 X 5 = 15

I. Lighting cost comparison methods

II. Measurement and verification plan for lighting retrofits and its importance.

III. Importance of lighting in energy audit and economic analysis view point.

2.

a. A 12 hrs per day working farmhouse of space 20,000 Sq meter is having 300 nos. of 150 W luminaires with Sodium vapour lamp inside it and electromagnetic ballast. If all the luminaires are to be replaced by 50 W LED luminaires then calculate lighting power density in each case, Pay back period and comment on the viability of the project. Consider cost of the Sodium vapour luminaire and LED Luminaire are Rs. 4175/- & Rs. 10500/- respectively, ballast loss for each types of the luminaires are 25 W & 10 W respectively and Lamp life of each types of lamps are 10,000 hrs & 50,000 hrs respectively. Cost of Sodium vapour lamp is Rs. 450/- and energy cost is @ Rs. 8/- per unit. All the values given are hypothetical. 2+9+2

b. What do you mean by Life cycle cost analysis? 3

3.

a. Mention the benefits of good lighting on an organisational working environment and their importance; also mention the factors to be remembered while improving energy efficiency in an existing lighting environment

b. Diagrammatically show how total cost of ownership changes between two or more alternative lighting installation solutions over a period of time & locate break even point.

c. Write down the differences between walk through audit and intermediate audit.

8+4+4

4.

a. Briefly explain the procedure of survey in a building for assessing opportunities for improvements and different types of datas to be collected while filling area by area survey worksheet.
b. Explain about the different types of measuring, accessing and recording instruments used during lighting survey.
c. Write in brief about free audit. 7+5+4

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SUBJECT: - LIGHTING ECONOMICS, AUDIT & MANAGEMENT

Full Marks 100
Time: Three hours (50 marks for this part)

Use a separate Answer-Script for each part

No. of Questions	PART - II Question number 1 is compulsory and answer any two	Marks
1A)	Describe various parameters needed to consider for quality of lighting design and explain in brief.	8
B)	Match the pair : (i) Colour rendering requirement may be relaxed . (ii) Illumination needed at Floor level as well as bed level with adjustable illumination level. (iii) Luminaires may be subjected to a warm , humid atmosphere and Illuminance values may be varied to suit circumstances. (iv) Vertical illumination is required . (v) Care should be taken for stroboscopic effect. (a) Laundries (b) Book shelves (c) Grinding machine shop (d) High bay in workshop (e) Hospital	5
C)	Make a plan for Museum Lighting .	7
2(A)	Explain why handling of Fluorescent lamp need to be done very cautiously. Explain how the ionizing metal involved can affect human health and environment too.	7
(B)	From Fluorescent lamp we are moving to LED technology . Explain the biological effect of substrate product of say Red coloured LED.	5
(C)	Name any International Agency and explain their role in this field.	3

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Use a separate Answer-Script for each part

No. of Questions	PART - II Question number 1 is compulsory and answer any two	Marks
3.A	In a whole sell market there are three separate areas as given in Table – I.	10

Table - I

Area No.	Items deals with	Existing type of lamp	Wattage	Qty of lamp (Nos.)
1	Potatoes & Ginger	GLS	40	40
2	Green Vegetables	GLS	60	60
3	Tomatoes & Onions	GLS	100	30

Same areas have to be retrofitted with LED lamps of almost equal light output of preferred colour temperatures.

Table –II

Lamp type	Approx Lumen output	Driver loss (W)	Approx.Price of Bulb (Rs.)
GLS -40W	425	-	10
GLS -60W	720	-	12
GLS -100W	1350	-	15
LED – Tube 15W	1425	1W	190
LED –Bulb 8W	720	0.5W	81
LED –Bulb 5W	450	0.4W	52

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Full Marks 100
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Use a separate Answer-Script for each part

No. of Questions	PART - II Question number 1 is compulsory and answer any two	Marks
	CESC Tariff as follows :	

First	60U	628P
Next	40U	695P
Next	50U	764P
Next	150U	820P
Above	300U	897P

	Find the payback period and check the viability of these retrofit operation. Recommend CCT of the lamp for each area of application.	
(B)	Make a comparative analysis of various types of LEDs	5

4.(A)	What are the drawbacks of installation of higher capacity power plant?	2
(B)	Specify the apprehended problems of Distributed Generation while uploading in the grid.	6
(C)	Specify various factors which affect the maintenance factor of lamp and luminaire system.	4
(D)	Describe Ultra Sonic method of Cleaning of lamp/luminaire . =x=x=x=x=x=x=x=x=x=x=x=x=x=x=x=x=x=x=x=x=x=x=x=x=x=x=	3