Form A: Paper-setting Blank *Ref. No. Ex* **PG/ILLU TD/T/122A/21/2018**

M Tech in Illumination Tech. & Design, 2nd sem **EXAMINATION, 20** 18

(~~1~~st/2nd Semester/~~Repeat/Supplementary/Spl. Supplementary/Old/Annual/Bi-Annual~~)

SUBJECT Renewable Energy based lighting Systems
(Name in full)

PAPER

Full Marks ~~30~~/ 100

Time : ~~Two hours/Three hours/Four hours/Six hours~~ **(~~15~~/50 marks for each part)**

Use a separate Answer-Script for each part

No. of questions	Part I Answer any three from the following. Two marks for neatness.	Marks
Q1		
a)	What is the importance of MPPT in an SPV system? Explain various strategies used for operation of an MPPT.	10+6
b)	Write briefly about aerodynamics in case of wind turbine, with elaborations about Lift & Drag in case of a typical airfoil.	
Q2		
a)	Write in brief about maximizing the solar output and load mismatch.	6+6+4
b)	With neat block diagram explain a Stand – alone solar PV system	
c)	Define the following term i) solidity ii) angle of attack or angle of incidence in case of Wind Turbine	
Q3		
a)	Sketch the diagram of a VAWT and explain the functions of its main components.	10+6
b)	A HAWT is installed at a location having free wind velocity of 15 m/s. The 80- m diameter rotor has three blades attached to the hub. Find the rotational speed of the turbine for optimal energy extraction.	
Q4		8+8
a)	With neat diagram explain the process of gasification in a Fluidized-Bed type gasifier.	
b)	Derive the expression for power developed due to wind	
Q5	Explain in details the following I) Down Draft Gasifier with neat diagram II) V-I and P-V Characteristic Solar Photo Voltaic System.	8+8

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M.TECH. IN ILLUMINATION TECHNOLOGY & DESIGN EXAMINATION, 2018
(1st Year, 2nd Semester)

RENEWABLE ENERGY BASED LIGHTING SYSTEM

Time: Three Hours | Full Marks: 100

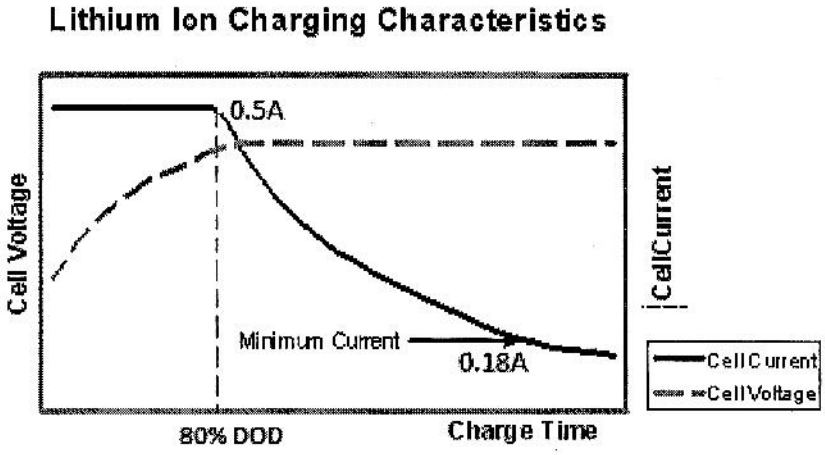
Use a separate Answer-Script for each part
PART – II(50 marks)

Answer any three questions. Question no. 2 carries the highest marks.

1.(a) What are the factors should we consider when we'll choose a battery for a particular purpose? 6

(b) What is shedding in Lead-acid batteries? 3

(c)



A smart phone has a 3.8V, 1600mAh Li-ion battery. Calculate the total charging time to charge the battery to its full from 20% DOD. The constant voltage phase takes 1 hour. Assume the current profile in the constant voltage phase to be linear. 7

2.	**a)**	Why inductive ballasts are required for all discharge lamps?	5
	b)	Discuss the starting phenomenon of the mercury vapor lamp.	5
	c)	Explain with neat diagram – the working of electronic ballast for HID lamps.	8
3.	**a)**	Draw and explain the principle of operation of a Buck-Boost Chopper.	8
	b)	A step-up chopper has input of 110V and output of 200V. If the non- conducting time of the thyristor-chopper is 100 μs, compute the pulse width of output voltage.	8
4.	**a)**	Describe the operation of single pulse PWM Inverter.	
	b)	A single phase bridge inveter, fed from 110 V DC, is connected to a lamp of 20 Ω. Determine the power factor and power delivered to the load in case the inverter is operating at 50 Hz with square wave output.	8
5.	**a)**	Explain different charge termination processes for rechargeable batteries.	8
	b)	What is the near unity power factor rectifier?	8