

Time: Three Hours

Full Marks: 100 (50 each part)

Use a separate Answer-Script for each part

Question No.	PART - I	Marks
1.	Answer question no. 1 and any two from the rest Correct and/or justify the following statements (any six)	6x3
(a)	Reactors in an arc furnace used only to stabilize the arc.	
(b)	An LC tuned filter (for particular harmonics) offers capacitive effect at the line frequency.	
(c)	Low voltage and high current is good for an arc furnace.	
(d)	If the voltage is purely sinusoidal, then the power contributed by the current harmonics is zero.	
(e)	In direct arc furnace any external means of stirring the charge is not required.	
(f)	Temperature compensation is required for a reliable and long life battery/charger system.	
(g)	dT/dt charge termination method is employed for Li-ion batteries.	
2. i)	Give an example of direct resistance heating.	2+6+8
ii)	Compare different types of electrodes used for arc furnace.	
iii)	We got the following data from a 3 phase EAF. (Y-connected electrodes) Current drawn : 5kA Arc voltage : 50V Total resistance including electrode : 0.005Ω Total reactance including electrode : 0.02Ω Calculate the kVA and kW drawn from the supply, its p.f. and electrical efficiency.	

[Turn over

Use a separate Answer-Script for each part

Question No.	PART - I	Marks
3. i)	Highlight different battery characteristics.	8+5+3
	ii) Write down some merits of lead-acid batteries.	
	iii) What is Shedding in Lead acid batteries?	
4. i)	Show how a non linear load injects harmonics in line current?	8+8
	ii) Explain the terms % THD, displacement factor and current distortion factor with an example.	
5.	Write short notes on (any two)	8x2
a)	Advantages of electric heating.	
b)	Choice of frequency for induction heating.	
c)	Applications of Dielectric heating.	

B.E.E.(Evening) 4th Year 1st Semester Examination 2018
Subject: Electrical Utilization & Illumination Engineering

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Full Marks:100

Part-II

ANSWER ANY THREE QUESTIONSQuestion No. 1 carries 18 marks

- Q.1. A) State and explain the Planck's radiation law related to blackbody radiation.
 B) A 32W LED lamp system is suspended over center of a circular table (radius 0.75m) at a height of 1.25 m. The luminous efficacy of the LED lamp system is 87 lumen/watt. Calculate
 i) its Mean Spherical Luminous Intensity(MLSI), if emitted lumen is confined only within down hemisphere.
 ii) illuminance at the center and at the edge of the table
 C) Define the following parameters with corresponding SI unit-
 i) Luminous flux ; ii) Luminous efficacy ; iii) Illuminance

6x3=18

- Q.2. A) Write down the differences between the Photopic and the Scotopic vision.
 B) Calculate the luminous efficacy of a 60W filament lamp using the following spectral power distribution data –

λ (nm)	<400	400-450	450-500	500-550	550-600	600-650	650-700	>700
M_λ (W/nm)	0.82	0.51	0.64	0.78	1.32	1.19	1.67	73.1
V_λ	0.000	0.008	0.110	0.780	0.910	0.320	0.020	0.000

- D) Derive the general expression for Inverse Square Cosine law of illuminance with suitable diagram.

6+5+5 =16

- Q.3. A) Draw circuit diagram of pre-heat fluorescent lamp with magnetic ballast.
 B) Briefly discuss on electrical and photometric parameters of an electric lamp.

8+8=16

- Q.4. A) Define Light output ratio(LOR) of a luminaire. How upward and downward components of LOR are computed?

- B) Compute the light output of a luminaire from the following data using zonal lumen method-

Angular zone (degree)	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90
Average I (candela)	956	823	788	713	633	502	315	121	34

6+10=16

- Q.5. Write down short notes on any two from the followings-

8x2=16

- Construction and working of an Integrating sphere
- Working principle of white LEDs
- Lumen formula and Indoor general lighting design
- Indoor lighting design parameters.