

University of Mumbai
Examinations Summer 2022

Time: 2 hour 30 minutes

Max. Marks: 80

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	What is a load factor?
Option A:	The ratio of average load to maximum demand.
Option B:	The ratio of maximum demand to average load.
Option C:	The product of maximum demand and average load
Option D:	The ratio of average load to the plant capacity.
2.	Power plan doesn't show
Option A:	Physical location of the loads
Option B:	Cable sizes
Option C:	Conduit sizes
Option D:	Fault levels
3.	In CUSUM chart, line moving up indicates
Option A:	Improved performance
Option B:	Declined performance
Option C:	Independent of performance
Option D:	Constant performance
4.	What is the use of Gang operated disconnector in substation
Option A:	To disconnect Transformer from HT line.
Option B:	To provide fuse on HT side
Option C:	To isolate Lightning Arrester from HT line
Option D:	To isolate CT and PT from HT line for maintenance.
5.	Which one is the example of energy substitution
Option A:	Replacement of coke by coal
Option B:	Replacement of coal by LPG
Option C:	Replacement of coal by CNG
Option D:	Replacement of electrical heater by solar heater
6.	Energy savings potential of variable torque applications compared to constant torque application is:
Option A:	Higher
Option B:	Equal
Option C:	Lower
Option D:	Does not depend on Torque
7.	With reference to existing HT tariff, energy consumption is billed
Option A:	Per KVAH
Option B:	Per KWH
Option C:	Per KVARH
Option D:	Per VAH
8.	In radial distribution system, voltage at the far end of a loaded feeder is
Option A:	Equal to rated voltage of distribution transformer

Option B:	Less than rated voltage of distribution transformer
Option C:	Greater than rated voltage of distribution transformer
Option D:	It is constant irrespective of load.
9.	What is specific energy consumption
Option A:	Total annual energy consumption
Option B:	Monthly energy consumption
Option C:	Energy consumption per unit production
Option D:	Energy consumption per unit Electricity.
10.	Which is the voltage for primary distribution
Option A:	415V
Option B:	230V
Option C:	33KV
Option D:	430V

Q2	(20 Marks Each)					
A	Solve any Two				5 marks each	
i.	<i>Explain with a neat diagram elementary drawing.</i>					
ii.	<i>Explain soft starters.</i>					
iii.	<i>Define Installed Load Efficacy Ratio (ILER). Illustrate its significance towards analyzing the energy performance of lighting system.</i>					
B	Solve any One				10 marks each	
i.	<i>Explain main features of energy conservation act 2001.</i>					
ii.	<i>The details of the load which are connected to a distribution transformer in a plant are as follows.</i>					
	<i>Type of load</i>	<i>Load in KW</i>	<i>Efficiency</i>	<i>Power factor</i>	<i>Load factor</i>	<i>Diversity Factor</i>
	<i>Washing Plant</i>	<i>500</i>	<i>0.8</i>	<i>0.75</i>	<i>0.8</i>	<i>0.7</i>
	<i>Cutting shop</i>	<i>250</i>	<i>0.85</i>	<i>0.7</i>	<i>0.6</i>	<i>0.5</i>
	<i>Misc load</i>	<i>200</i>	<i>0.85</i>	<i>0.85</i>	<i>0.5</i>	<i>0.5</i>
	<i>Machine shop</i>	<i>300</i>	<i>0.8</i>	<i>0.75</i>	<i>0.75</i>	<i>0.7</i>
	<i>Calculate the capacity of a distribution transformer feeding a plant and draw SLD showing relevant metering and protections and find compensating KVAR required for the Plant.</i>					

Q3	(20 Marks Each)				
A	Solve any Two				5 marks each
i.	<i>What is Benchmarking. Explain its types.</i>				
ii.	<i>Explain maximum demand controller.</i>				
iii.	<i>List and explain in brief elements of monitoring and targeting.</i>				
B	Solve any One				10 marks each
i.	<i>Explain tendering process in detail.</i>				
ii.	<i>Explain 10 step methodology for energy audit.</i>				

Q4	(20 Marks Each)				
A	Solve any Two				5 marks each
i.	<i>Explain the process of Energy Performance Assessment in motors.</i>				
ii.	<i>Explain improvements made in Energy Efficient motor over standard motors</i>				
iii.	<i>Explain features of BMS in brief.</i>				

B	Solve any One	10 marks each
i.	<i>Explain different types of distribution systems</i>	
ii.	<p><i>Design a lighting system for a reading room which measures 20m*10m*4m in dimensions. Assume and justify suitable assumptions. Find number of fixtures required to maintain average lux level of 200lux in the room.</i></p> <p><i>T5 tubelight of 28W gives 2850 lumen output.</i></p> <p><i>CFL of 18W gives 1200 lumen.</i></p> <p><i>For $R_c=0.7$ and $R_w=0.5$, COU for different Room Index are 1-0.51, 1.25-0.55, 1.5-0.57, 2-0.61, 2.5-0.63, 3-0.65</i></p>	

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Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	Two methods of shunt compensation are -
Option A:	resistance and inductance
Option B:	capacitance and resistance
Option C:	impedance and admittance
Option D:	capacitance and inductance
2.	Ideal midpoint shunt compensator maintains a voltage _____ the busbar voltage.
Option A:	equal to
Option B:	less than
Option C:	more than
Option D:	double
3.	The maximum applicable voltage and the corresponding current are limited by-
Option A:	length of transmission line
Option B:	the impedance of TSC module
Option C:	the ratings of the TSC components (capacitor and thyristor valve)
Option D:	time constant of capacitor
4.	AC to AC switching converters are also known as -
Option A:	frequency changers or cyclo-converters
Option B:	Synthesizers
Option C:	frequency adapters
Option D:	The reactive power rating of the compensator greater than Q_{lmax} .
5.	Decreasing E below V (i.e., operating under-excited) results in a _____ current, that is, the machine is seen as a reactor (inductor) by the AC system.
Option A:	Lagging
Option B:	Leading
Option C:	in phase
Option D:	180° apart
6.	List of Static Shunt compensators.
Option A:	TCR, TSR, TSSC, TSC
Option B:	TSSC, TCSC, SVG, SVS
Option C:	SVG, SVC, TCR, TSR
Option D:	GCSC, TCSC, TSSC
7.	STATCOM is _____ regulating device.
Option A:	Current
Option B:	Voltage
Option C:	Current and Voltage
Option D:	Power factor
8.	The main Objective of series compensation

Option A:	It improve the power factor
Option B:	It reduces the fault currents
Option C:	Reduce the voltage drop over long distance
Option D:	It increases the fault currents
9.	SSSC is a
Option A:	Series compensation device
Option B:	shunt compensation device
Option C:	combined compensator
Option D:	loss reduction device
10	The basic concept of voltage and _____ is the addition of an appropriate in-phase or a quadrature component to the prevailing terminal voltage in order to change its magnitude or angle to the value specified.
Option A:	Phase angle regulation
Option B:	Phase angle rectification
Option C:	Power angle regulation
Option D:	Power angle rectification

Q2 (20 Marks)	Solve any Two Questions out of Three	10 marks each
A	Explain TSSC in series compensation with circuit diagram and V-I characteristics.	
B	Explain load compensation and the objectives of load compensation.	
C	Explain the methods of controllable var generation.	
Q3	Solve any Two Questions out of Three	10 marks each
A	Explain switching converter type series compensation SSSC.	
B	Explain thyristor controlled reactor (TCR) in detail and condition to obtain thyristor switched reactor (TSR) from TCR.	
C	Explain the objective of Shunt compensation.	
Q4	Solve any Two Questions out of Three	10 marks each
A	Explain thyristor controlled voltage regulator (TCVR)	
B	Explain the basic operating principle of UPFC	
C	Explain midpoint voltage regulation of line segmentation.	

University of Mumbai
Examination 2022

Program: Electrical Engineering
Curriculum Scheme: Rev 2016
Examination: BE Semester VIII

Course Code: EEDLO8401 and Course Name: Illumination Engineering

Time: 2 hour 30 minutes

Max. Marks: 80

Q1.	Choose the correct option for following questions. All the Questions are compulsory and each question carry equal marks. 40 marks
1.	Which of the following lamp gives highest lumens/watt?
Option A:	Sodium vapor lamp
Option B:	LED lamp
Option C:	Mercury Vapour lamp
Option D:	GLS Lamp
2.	What is correlated color temperature (CCT)?
Option A:	It depends on how many colors are shown when the light is on
Option B:	It is characteristics of a light source to accurately reveal the true colors of objects, people, clothing, etc. when compared to how colors are shown in daylight
Option C:	The hue and tone of white light emitted from a specific bulb or fixture
Option D:	The absence of color from a light bulb
3.	What percentage of the energy consumed is used to create visible light in LEDs?
Option A:	0%
Option B:	40%
Option C:	80%
Option D:	100%
4.	Which of the following lighting standard is applicable to indoor lighting
Option A:	IS-16101
Option B:	IS-16103
Option C:	IS-16105
Option D:	IS-3646
5.	The Lumen method in exterior lighting design is used to calculate
Option A:	Wattage of Lamps
Option B:	Area to be illuminated
Option C:	Uniformity of illumination
Option D:	Number of Lamps and Poles
6.	For a building construction site, typical range of CRI required is
Option A:	80-90
Option B:	60-70
Option C:	40-50
Option D:	20-30

7.	In street lighting, the luminaire with
Option A:	symmetrical lighting distribution is preferred
Option B:	asymmetrical lighting distribution is preferred
Option C:	uniform lighting distribution is preferred
Option D:	upward lighting distribution is preferred
8.	Typical energy saving achievable with Indoor lighting control is in the range of
Option A:	1-2 %
Option B:	5-10%
Option C:	20-40%
Option D:	50-80%
9.	Lighting Intensity control in interior lighting applications is simplest in
Option A:	Sodium Vapor Lamp
Option B:	Metal Halide Lamp
Option C:	LED Lamp
Option D:	Fluorescent lamp
10.	Solar powered LED street lighting system incorporates
Option A:	Solar PV Panel and LED street lamp only
Option B:	Solar PV, Battery and LED street lamp only
Option C:	Solar PV, Battery, charge controller and LED street lamp only
Option D:	Light sensor and LED street lamp only

Q2.	
A	Solve any Two out of Three 5 marks each
i.	Illustrate principle of operation of basic photometer with neat sketch. What is photo-electric photometer?
ii.	Explain the Circadian Rhythm and Human Centric lighting considerations.
iii.	Illustrate different means and ways to minimize the glare in indoor lighting design.
B	Solve any One 10 marks each
i.	Consider an industrial workshop with dimensions 50m X 30m X 7.5m to be illuminated with an average illumination of 200 Lux. Assume utilization factor 0.65 and maintenance factor 0.6. Calculate number of lamps and luminaires required. Draw the lighting layout indicating spacing between luminaires. Specify assumptions with justification.
ii.	With neat diagram, explain construction and working of High Intensity Discharge (HID) lamp. Compare features and applications of HID lamps.

Q3.	Solve any Two 10 marks each
A.	Design the lighting scheme for a major road having two-way light traffic. The specifications are as follows: Total width of the road = 16 meters; width of the divider = 1 meters and straight stretch of the road = 2.0 km. Use 150 W LED streetlights with 14000 lumen output. Clearly specify the selection and justification for: (i) Type of arrangements of poles (ii) Pole height and spacing (iii) Number of poles and lamps (iv) Electrical load per km of lighting scheme.
B	Describe lighting design considerations for an outdoor swimming pool with proper justification.
C	What are the qualitative and quantitative requirements for road lighting design? Explain the pole arrangements in road lighting.

Q4.	Solve any Two	10 marks each
A.	What are the recent trends in lighting control schemes design? Describe with reference to particular examples. What is their role in achieving energy efficient lighting design?	
B	Illustrate with suitable examples and schemes, how the daylight integration leads to significant energy efficient lighting design.	
C	Explain the basic schematic of LED lamp driver and dimming control used in it. State the advantages and applications of LED lighting system.	

Data for Illumination Design problems

Coefficient of Utilization Chart									
K	Rc=0.7			Rc=0.5			Rc=0.3		
	Rw=0.5	Rw=0.3	Rw=0.1	Rw=0.5	Rw=0.3	Rw=0.1	Rw=0.5	Rw=0.3	Rw=0.1
0	0	0	0	0	0	0	0	0	0
0.6	0.43	0.39	0.36	0.42	0.38	0.36	0.41	0.38	0.36
0.8	0.45	0.41	0.38	0.44	0.40	0.38	0.43	0.40	0.38
1.00	0.51	0.47	0.44	0.55	0.47	0.44	0.49	0.46	0.40
1.25	0.55	0.51	0.49	0.53	0.50	0.48	0.52	0.50	0.48
1.50	0.57	0.54	0.52	0.56	0.53	0.51	0.54	0.52	0.50
2.00	0.61	0.58	0.56	0.59	0.57	0.55	0.57	0.56	0.54
2.50	0.63	0.61	0.59	0.61	0.59	0.57	0.59	0.58	0.56
3.00	0.65	0.63	0.61	0.63	0.61	0.59	0.61	0.59	0.58
4.00	0.67	0.65	0.63	0.64	0.63	0.62	0.62	0.61	0.59
5.00	0.68	0.67	0.65	0.65	0.64	0.63	0.63	0.62	0.61

Lamp Data			
Sr.No	Type of Lamp	Wattage	Lumen output
1	GLS	60	710
		100	1340
2	Tungsten Halogen	50 (Miniature Dichroic)	900
		1000	22000
3	Fluorescent (T8/ T5)	18 (82/84/86)	1300
		36(82/84/86)	3250
		28(T5)	2800
4	CFL	11	760
		18	1200
		26	1800
5	HPMV	80	3600
		250	12700
		400	22000
6	Metal Halide	70	5500
		150	12100
		250	20000
		400	36000
7	HPSV	70	5800
		150	13500
		250	25000