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EX/EE/ T /415.6/ 2017(S)

BACHELOR OF ELECTRICAL ENGG.4TH YEAR 1ST SEM. SUPPLE EXAM.- 2017

(4th Year, 1st Semester)

ELECTIVE-I (ADVANCED ILLUMINATION ENGG.)

Time : Three hours

Full Marks : 100

(50 marks for each part)

Use separate Answer-script for each part

PART – I

Answer any Two

- 1.(a) Describe the production of radiation in High Pressure Sodium Vapour lamp with necessary Spectral Power Distribution Diagram. 4
- (b) Explain the Dynamic V-I characteristic of a low pressure gas discharge lamp with necessary curves . 6
- (c). Write short notes on (any five) : 5×3=15
- Resonance radiation of Hg , Glass- Metal Seal, Ambipolar Diffusion, Sodium-resistant glass, Penning mixture , Buffer Gas, Filament materials.
2. (a) Show the circuit diagrams of fluorescent lamp connected with magnetic ballasts and electronic ballasts.
- A 36W fluorescent lamp and a magnetic choke are connected in series across a 230 V r.m.s, 50 Hz supply. Find out the inductance of the ballast when the following r.m.s. measurements were obtained : $V_{\text{lamp}} = 105 \text{ V}$, $I = 412 \text{ mA}$, $P_{\text{lamp}} = 36 \text{ W}$, $P_{\text{ballast}} = 9 \text{ W}$. Draw necessary vector diagrams. What capacitor will be used to obtain unity power factor? 13
- (b) "The effective cavity reflectance of a particular shaped ceiling (other than flat) does not depend on its dimension."-Justify this statement with a hemispherical shaped ceiling example. 6
- (c)Why do you need Cylindrical and Spherical Illuminance Calculation? 6
- Explain them with necessary drawings.
3. (a)Describe the method of selection of the illuminance value of a particular place from the ranges of values given in IS 3646.Explain this with necessary Tables and justify with any one practical example. 7
- (b) Name different types of low pressure mercury vapour lamps. What are their similarities? 3
- (c) Name different types of high pressure mercury vapour lamps. What are their differences? 3

b) A room of 28' length and 20' width is illuminated with suspended direct type retrofit LED luminaire. The reflectances of ceiling surface is 80% , wall surface of the ceiling cavity is 90%, wall surface below the luminaires is 50%, wall from floor to working plane is 10% and floor reflectance is 30%. If the distance of the lamp to ceiling is 2ft. 8 inches, the distance of the lamp to working plane is 7ft. 6 inches, and the distance between the working plane and floor is 2ft. 6 inches,

- i) Find out the effective ceiling and effective floor cavity reflectances.
- ii) Choose the correct luminaire from the given Table and find out the CU value of the luminaire.
- iii) How many luminaires are required to illuminate the room with average 100 lux? (Use 15W LED with 90 lm/W efficacy.)
- iv) Show their spacing arrangement.

Given: Lamp lumen depreciation factor=0.8, Lumen dirt depreciation factor=0.75, Room surface dirt depreciation factor=0.8

(Use the given charts)

TABLE 1
Coefficients of Utilization



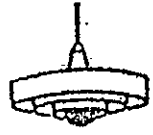
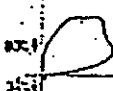



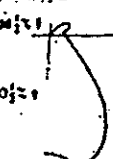
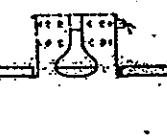
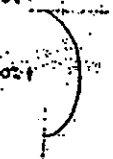
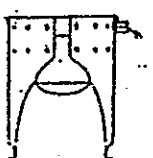
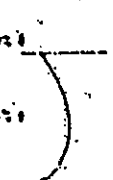
Typical Luminaires	Typical Intensity Distribution and Per Cent Lamp Lumens		Foot-candle	80			70			50			30			10			0	WDR	Foot-candle		
	Mainl. Cat.	SC		RCR	Coefficients of Utilization for 20 Per Cent Effective Floor Cavity Reflectance (ρ _{fc} = 20)									RCR									
			Foot-candle		Foot-candle	Foot-candle	Foot-candle	Foot-candle	Foot-candle	Foot-candle	Foot-candle	Foot-candle	Foot-candle		Foot-candle	Foot-candle	Foot-candle	Foot-candle	Foot-candle	Foot-candle	Foot-candle		
 Pendant diffusing sphere with incandescent lamp	V	1.5		0	.87	.87	.87	.81	.81	.81	.70	.70	.70	.50	.50	.50	.40	.40	.40	.45			
				1	.71	.65	.62	.65	.61	.58	.55	.52	.49	.46	.44	.42	.36	.36	.34	.30	.368		1
				2	.60	.53	.48	.55	.50	.45	.47	.42	.39	.39	.36	.32	.31	.29	.29	.23	.279		2
				3	.52	.44	.38	.48	.41	.36	.40	.35	.31	.33	.29	.26	.27	.24	.21	.18	.227		3
				4	.45	.37	.32	.42	.35	.29	.35	.30	.25	.28	.23	.21	.22	.20	.17	.14	.192		4
				5	.40	.32	.27	.37	.30	.25	.31	.25	.21	.28	.21	.18	.21	.17	.14	.12	.166		5
				6	.35	.28	.23	.33	.26	.21	.28	.22	.18	.23	.19	.15	.19	.15	.12	.10	.148		6
				7	.32	.25	.19	.29	.23	.18	.25	.20	.16	.21	.18	.13	.17	.13	.11	.09	.130		7
				8	.29	.22	.17	.27	.20	.16	.23	.17	.14	.19	.15	.12	.15	.12	.09	.07	.117		8
				9	.26	.19	.15	.24	.18	.14	.21	.16	.12	.17	.13	.10	.14	.11	.08	.07	.107		9
10	.24	.17	.13	.22	.16	.12	.19	.14	.11	.16	.12	.09	.13	.10	.08	.06	.096		10				
 Concentric ring unit with incandescent silvered bowl lamp	R	N.A.		0	.83	.83	.83	.72	.72	.72	.50	.50	.50	.30	.30	.30	.12	.12	.12	.03			
				1	.72	.69	.66	.62	.60	.57	.43	.42	.40	.28	.25	.25	.10	.10	.10	.03	.018		1
				2	.63	.58	.54	.54	.50	.47	.38	.35	.33	.23	.22	.20	.09	.08	.08	.02	.015		2
				3	.55	.49	.45	.47	.43	.39	.30	.29	.29	.20	.19	.17	.08	.07	.07	.02	.013		3
				4	.46	.42	.37	.42	.37	.33	.29	.28	.23	.18	.18	.15	.07	.06	.06	.02	.012		4
				5	.43	.38	.32	.37	.32	.28	.28	.23	.20	.16	.14	.12	.06	.05	.05	.01	.011		5
				6	.38	.32	.27	.33	.28	.24	.23	.20	.17	.14	.12	.11	.06	.05	.04	.01	.010		6
				7	.34	.28	.23	.30	.24	.21	.21	.17	.15	.13	.11	.09	.05	.04	.04	.01	.009		7
				8	.31	.25	.20	.27	.21	.18	.19	.15	.13	.12	.10	.08	.05	.04	.03	.01	.008		8
				9	.28	.22	.18	.24	.19	.16	.17	.14	.11	.10	.08	.07	.04	.03	.03	.01	.006		9
10	.25	.20	.16	.22	.17	.14	.16	.12	.10	.10	.08	.06	.04	.03	.03	.01	.007		10				
 Porcelain-enamelled vented standard dome with incandescent lamp	IV	1.3		0	.99	.99	.99	.87	.87	.87	.83	.83	.83	.66	.66	.66	.45	.45	.45	.83			
				1	.87	.84	.81	.85	.82	.79	.62	.79	.77	.79	.76	.74	.76	.74	.72	.71	.323		1
				2	.78	.70	.65	.74	.69	.65	.71	.67	.63	.66	.63	.62	.66	.63	.60	.59	.311		2
				3	.68	.59	.54	.65	.59	.55	.62	.57	.53	.60	.56	.52	.58	.54	.51	.49	.298		3
				4	.58	.51	.45	.57	.50	.45	.55	.49	.44	.53	.46	.44	.51	.47	.43	.41	.264		4
				5	.52	.44	.39	.51	.44	.38	.49	.43	.38	.47	.42	.37	.46	.41	.37	.35	.241		5
				6	.46	.39	.33	.46	.38	.33	.44	.38	.33	.43	.37	.30	.41	.34	.32	.31	.221		6
				7	.42	.34	.29	.41	.34	.29	.40	.33	.29	.39	.33	.29	.36	.32	.28	.27	.203		7
				8	.38	.31	.26	.37	.31	.26	.36	.30	.26	.35	.30	.26	.34	.29	.25	.24	.187		8
				9	.36	.28	.23	.34	.28	.23	.33	.27	.23	.32	.27	.23	.32	.28	.23	.21	.173		9
10	.32	.25	.21	.32	.25	.21	.31	.25	.21	.30	.24	.21	.29	.24	.20	.19	.161		10				
 Prismatic square surface drum	IV	0.6		0	.97	.97	.97	.84	.84	.84	.77	.77	.77	.60	.60	.60	.43	.43	.43	.60			
				1	.84	.83	.81	.85	.81	.77	.60	.77	.75	.77	.74	.72	.74	.71	.69	.50	.264		1
				2	.76	.73	.69	.76	.71	.67	.59	.73	.71	.73	.70	.68	.71	.68	.65	.62	.224		2
				3	.68	.63	.58	.68	.63	.58	.59	.66	.63	.66	.63	.60	.64	.61	.57	.54	.197		3
				4	.61	.55	.50	.61	.55	.50	.54	.60	.56	.59	.54	.50	.57	.53	.49	.47	.176		4
				5	.54	.48	.43	.54	.48	.42	.48	.53	.49	.54	.49	.45	.51	.46	.42	.40	.158		5
				6	.49	.42	.38	.47	.41	.37	.43	.48	.43	.46	.40	.36	.43	.37	.33	.31	.145		6
				7	.44	.38	.33	.43	.37	.32	.39	.44	.39	.41	.36	.32	.39	.34	.30	.27	.133		7
				8	.40	.34	.30	.39	.33	.29	.36	.41	.36	.37	.32	.29	.36	.31	.27	.25	.123		8
				9	.37	.31	.27	.36	.30	.26	.33	.38	.33	.34	.29	.26	.33	.28	.25	.21	.114		9
10	.34	.28	.24	.33	.27	.24	.31	.36	.31	.32	.27	.24	.31	.26	.23	.19	.115		10				
 R-40 Hood without shielding	IV	0.6		0	1.19	1.19	1.19	1.16	1.16	1.16	1.11	1.11	1.11	1.06	1.06	1.06	1.02	1.02	1.02	1.00			
				1	1.06	1.05	1.03	1.06	1.03	1.01	1.02	1.00	.96	.96	.97	.95	.95	.93	.92	.90	.241		1
				2	.99	.94	.89	.97	.92	.86	.93	.90	.84	.90	.87	.84	.88	.85	.83	.81	.238		2
				3	.90	.84	.79	.88	.83	.78	.86	.81	.77	.83	.79	.76	.81	.77	.74	.73	.227		3
				4	.82	.75	.70	.81	.75	.70	.79	.73	.69	.77	.72	.68	.75	.71	.67	.66	.215		4
				5	.76	.68	.63	.76	.69	.63	.73	.67	.62	.71	.65	.62	.69	.65	.61	.59	.202		5
				6	.70	.62	.57	.69	.62	.57	.67	.61	.57	.66	.60	.56	.64	.60	.56	.54	.191		6
				7	.65	.57	.52	.64	.57	.52	.62	.56	.52	.61	.56	.52	.60	.55	.51	.50	.180		7
				8	.60	.53	.48	.59	.53	.48	.58	.52	.48	.57	.52	.47	.56	.51	.47	.46	.169		8
				9	.56	.49	.44	.55	.49	.44	.54	.48	.44	.53	.48	.44	.52	.47	.44	.42	.160		9
10	.52	.46	.41	.52	.45	.41	.51	.45	.41	.50	.45	.41	.49	.44	.41	.39	.152		10				
 R-43 hood with specular anodized reflector skirt, 45° cutoff	IV	0.7		0	1.01	1.01	1.01	.99	.99	.99	.94	.94	.94	.90	.90	.90	.87	.87	.87	.85			
				1	.95	.93	.91	.93	.91	.89	.89	.88	.87	.86	.85	.84	.83	.82	.82	.80	.315		1
				2	.88	.86	.83	.87	.84	.82	.85	.82	.80	.82	.80	.79	.80	.78	.77	.76	.315		2
				3	.83	.80	.77	.82	.79	.76	.80	.77	.75	.78	.76	.74	.76	.74	.72	.71	.313		3
				4	.79	.74	.71	.78	.74	.71	.76	.73	.70	.74	.71	.69	.73	.70	.68	.67	.310		4
				5	.74	.70	.67	.74	.69	.66	.72	.68	.66	.71	.68	.65	.69	.67	.65	.63	.307		5
				6	.70	.66	.62	.70	.65	.62	.68	.65	.62	.67	.64	.61	.66	.63	.61	.60	.304		6
				7	.67	.62	.59	.66	.62	.59	.65	.61	.58	.64	.61	.58	.63	.60	.58	.57	.300		7
				8	.63	.59	.56	.63	.58	.55	.62	.58	.55	.61	.58	.55	.60	.57	.55	.54	.297		8
				9	.60	.56	.53	.60	.56	.53	.59	.55	.52	.58	.55	.52	.58	.54	.52	.51	.294		9
10	.57	.53	.50	.57	.53	.50	.56	.52	.50	.56	.52	.50	.55	.52	.49	.48	.291		10				

Table 1 - Continued
Coefficients, Luminaire Spacing Criterion and Maintenance Categories of Typical Luminaires.

80									70									50									30									10								
50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10
Wall Exitance Coefficients for 20 Per Cent Effective Floor Cavity Reflectance ($\rho_{cc} = 20$)																		Ceiling Cavity Exitance Coefficients for 20 Per Cent Floor Cavity Reflectance ($\rho_{cc} = 20$)																										
328	187	059	311	178	056	280	161	051	252	145	047	226	131	042	423	423	423	361	361	361	246	246	246	142	142	142	045	045	045	423	423	423	361	361	361	246	246	246	142	142	142	045	045	045
275	150	046	259	143	044	231	129	040	205	115	036	181	102	032	417	379	347	357	327	300	245	226	229	141	131	123	045	044	042	417	379	347	357	327	300	245	226	229	141	131	123	045	044	042
240	128	038	226	121	036	200	108	033	176	097	030	154	085	025	412	367	332	353	317	287	242	220	232	140	128	119	045	045	042	412	367	332	353	317	287	242	220	232	140	128	119	045	045	042
214	111	033	201	105	031	177	094	028	155	083	025	135	073	022	406	358	321	348	309	279	233	215	196	138	126	116	045	041	038	406	358	321	348	309	279	233	215	196	138	126	116	045	041	038
193	098	028	181	093	027	160	083	024	139	073	022	120	064	019	400	350	314	343	303	273	228	212	193	137	124	114	044	041	038	400	350	314	343	303	273	228	212	193	137	124	114	044	041	038
176	088	025	165	084	024	145	074	022	126	066	019	109	057	017	394	344	309	338	298	269	224	209	190	135	123	113	044	040	037	394	344	309	338	298	269	224	209	190	135	123	113	044	040	037
162	080	023	152	076	022	133	067	019	116	059	017	101	051	015	388	339	305	334	294	266	221	206	188	134	122	112	043	040	037	388	339	305	334	294	266	221	206	188	134	122	112	043	040	037
150	073	021	140	069	020	123	062	018	107	054	018	92	047	014	381	335	302	330	291	264	219	204	187	133	120	111	043	039	037	381	335	302	330	291	264	219	204	187	133	120	111	043	039	037
138	067	019	131	064	018	115	057	016	99	050	017	86	043	013	374	328	295	326	288	262	217	202	186	131	119	111	043	039	037	374	328	295	326	288	262	217	202	186	131	119	111	043	039	037
134	062	017	122	059	016	107	052	015	93	046	013	80	040	011	377	328	296	322	285	260	215	201	185	130	118	110	042	039	037	377	328	296	322	285	260	215	201	185	130	118	110	042	039	037

Table 2 Per Cent Effective Ceiling or Floor Cavity Reflectances for Various Reflectance Combinations

Per Cent Basal Reflectance	90										70										60										50									
	60	65	70	75	80	85	90	95	100	105	60	65	70	75	80	85	90	95	100	105	60	65	70	75	80	85	90	95	100	105	60	65	70	75	80	85	90	95	100	105
0.2	59	58	57	56	55	54	53	52	51	60	59	58	57	56	55	54	53	52	51	60	59	58	57	56	55	54	53	52	51	60	59	58	57	56	55	54	53	52	51	
0.4	60	59	58	57	56	55	54	53	52	61	60	59	58	57	56	55	54	53	52	61	60	59	58	57	56	55	54	53	52	61	60	59	58	57	56	55	54	53	52	
0.6	61	60	59	58	57	56	55	54	53	62	61	60	59	58	57	56	55	54	53	62	61	60	59	58	57	56	55	54	53	62	61	60	59	58	57	56	55	54	53	
0.8	62	61	60	59	58	57	56	55	54	63	62	61	60	59	58	57	56	55	54	63	62	61	60	59	58	57	56	55	54	63	62	61	60	59	58	57	56	55	54	
1.0	63	62	61	60	59	58	57	56	55	64	63	62	61	60	59	58	57	56	55	64	63	62	61	60	59	58	57	56	55	64	63	62	61	60	59	58	57	56	55	
1.4	64	63	62	61	60	59	58	57	56	65	64	63	62	61	60	59	58	57	56	65	64	63	62	61	60	59	58	57	56	65	64	63	62	61	60	59	58	57	56	
1.6	65	64	63	62	61	60	59	58	57	66	65	64	63	62	61	60	59	58	57	66	65	64	63	62	61	60	59	58	57	66	65	64	63	62	61	60	59	58	57	
1.8	66	65	64	63	62	61	60	59	58	67	66	65	64	63	62	61	60	59	58	67	66	65	64	63	62	61	60	59	58	67	66	65	64	63	62	61	60	59	58	
2.0	67	66	65	64	63	62	61	60	59	68	67	66	65	64	63	62	61	60	59	68	67	66	65	64	63	62	61	60	59	68	67	66	65	64	63	62	61	60	59	
2.2	68	67	66	65	64	63	62	61	60	69	68	67	66	65	64	63	62	61	60	69	68	67	66	65	64	63	62	61	60	69	68	67	66	65	64	63	62	61	60	
2.4	69	68	67	66	65	64	63	62	61	70	69	68	67	66	65	64	63	62	61	70	69	68	67	66	65	64	63	62	61	70	69	68	67	66	65	64	63	62	61	
2.6	70	69	68	67	66	65	64	63	62	71	70	69	68	67	66	65	64	63	62	71	70	69	68	67	66	65	64	63	62	71	70	69	68	67	66	65	64	63	62	
2.8	71	70	69	68	67	66	65	64	63	72	71	70	69	68	67	66	65	64	63	72	71	70	69	68	67	66	65	64	63	72	71	70	69	68	67	66	65	64	63	
3.0	72	71	70	69	68	67	66	65	64	73	72	71	70	69	68	67	66	65	64	73	72	71	70	69	68	67	66	65	64	73	72	71	70	69	68	67	66	65	64	
3.2	73	72	71	70	69	68	67	66	65	74	73	72	71	70	69	68	67	66	65	74	73	72	71	70	69	68	67	66	65	74	73	72	71	70	69	68	67	66	65	
3.4	74	73	72	71	70	69	68	67	66	75	74	73	72	71	70	69	68	67	66	75	74	73	72	71	70	69	68	67	66	75	74	73	72	71	70	69	68	67	66	
3.6	75	74	73	72	71	70	69	68	67	76	75	74	73	72	71	70	69	68	67	76	75	74	73	72	71	70	69	68	67	76	75	74	73	72	71	70	69	68	67	
3.8	76	75	74	73	72	71	70	69	68	77	76	75	74	73	72	71	70	69	68	77	76	75	74	73	72	71	70	69	68	77	76	75	74	73	72	71	70	69	68	
4.0	77	76	75	74	73	72	71	70	69	78	77	76	75	74	73	72	71	70	69	78	77	76	75	74	73	72	71	70	69	78	77	76	75	74	73	72	71	70	69	
4.2	78	77	76	75	74	73	72	71	70	79	78	77	76	75	74	73	72	71	70	79	78	77	76	75	74	73	72	71	70	79	78	77	76	75	74	73	72	71	70	
4.4	79	78	77	76	75	74	73	72	71	80	79	78	77	76	75	74	73	72	71	80	79	78	77	76	75	74	73	72	71	80	79	78	77	76	75	74	73	72	71	
4.6	80	79	78	77	76	75	74	73	72	81	80	79	78	77	76	75	74	73	72	81	80	79	78	77	76	75	74	73	72	81	80	79	78	77	76	75	74	73	72	
4.8	81	80	79	78	77	76	75	74	73	82	81	80	79	78	77	76	75	74	73	82	81	80	79	78	77	76	75	74	73	82	81	80	79	78	77	76	75	74	73	
5.0	82	81	80	79	78	77	76	75	74	83	82	81	80	79	78	77	76	75	74	83	82	81	80	79	78	77	76	75	74	83	82	81	80	79	78	77	76	75	74	
4.2	77	76	75	74	73	72	71	70	69	78	77	76	75	74	73	72	71	70	69	78	77	76	75	74	73	72	71	70	69	78	77	76	75	74	73	72	71	70	69	
4.4	78	77	76	75	74	73	72	71	70	79	78	77	76	75	74	73	72	71	70	79	78	77	76	75	74	73	72	71	70	79	78	77	76	75	74	73	72	71	70	
4.6	79	78	77	76	75	74	73	72	71	80	79	78	77	76	75	74	73	72	71	80	79	78	77	76	75	74	73	72	71	80	79	78	77	76	75	74	73	72	71	
4.8	80	79	78	77	76	75	74	73	72	81	80	79	78	77	76	75	74	73	72	81	80	79	78	77	76	75	74	73	72	81	80	79	78	77	76	75	74	73	72	
5.0	81	80	79	78	77	76	75	74	73	82	81	80	79	78	77	76	75	74	73	82	81	80	79	78	77	76	75	74	73	82	81	80	79	78	77	76	75	74	73	
6.0	82	81	80	79	78	77	76	75	74	83	82	81	80	79	78	77	76	75	74	83	82	81	80	79	78	77	76	75	74	83	82	81	80	79	78	77	76	75	74	
7.0	83	82	81	80	79	78	77	76	75	84	83	82	81	80	79	78	77	76	75	84	83	82	81	80	79	78	77	76	75	84	83	82	81	80	79	78	77	76	75	
8.0	84	83	82	81	80	79	78	77	76	85	84	83	82	81	80	79	78	77	76	85	84	83	82	81	80	79	78	77	76	85	84	83	82	81	80	79	78	77	76	
9.0	85	84	83	82	81	80	79	78	77	86	85	84	83	82	81	80	79	78	77	86	85	84	83	82	81	80	79	78	77	86	85	84	83	82	81	80	79	78	77	
10.0	86	85	84	83	82	81	80	79	78	87	86	85	84	83	82	81	80	79	78	87	86	85	84	83	82	81	80	79	78	87	86	85	84	83	82	81	80	79	78	

* Values in this table are based on a height to width ratio of 1.0.
† Ceiling, 100% of total cavity.

Table III

Multiplying Factors for Other than 20 Per Cent Effective Floor Cavity Reflectance

% Effective Ceiling Cavity Reflectance, ρ_c	50				70				50				30				10			
	70	50	30	10	70	50	30	10	70	50	30	10	70	50	30	10	70	50	30	10
For 30 Per Cent Effective Floor Cavity Reflectance (20 Per Cent = 1.00)																				
Room Cavity Ratio	1.062	1.067	1.075	1.083	1.077	1.070	1.064	1.059	1.049	1.044	1.040	1.038	1.028	1.026	1.023	1.022	1.012	1.010	1.008	1.006
1	1.079	1.068	1.055	1.047	1.068	1.057	1.048	1.039	1.041	1.033	1.027	1.024	1.024	1.021	1.017	1.012	1.014	1.010	1.009	1.005
2	1.070	1.054	1.042	1.033	1.051	1.040	1.037	1.028	1.034	1.027	1.020	1.016	1.022	1.015	1.010	1.004	1.014	1.009	1.008	1.003
3	1.062	1.045	1.033	1.024	1.055	1.040	1.029	1.021	1.030	1.022	1.015	1.012	1.020	1.013	1.008	1.004	1.014	1.009	1.008	1.004
4	1.054	1.038	1.026	1.018	1.050	1.034	1.024	1.015	1.027	1.018	1.012	1.009	1.019	1.012	1.008	1.004	1.014	1.008	1.008	1.003
5	1.052	1.033	1.021	1.014	1.047	1.030	1.020	1.012	1.024	1.015	1.009	1.007	1.018	1.010	1.005	1.001	1.014	1.008	1.008	1.003
6	1.047	1.029	1.018	1.011	1.043	1.026	1.017	1.009	1.022	1.013	1.007	1.005	1.016	1.009	1.004	1.000	1.013	1.007	1.007	1.003
7	1.044	1.026	1.015	1.009	1.040	1.024	1.015	1.007	1.020	1.012	1.006	1.004	1.015	1.008	1.004	1.000	1.013	1.007	1.007	1.003
8	1.040	1.024	1.014	1.007	1.037	1.022	1.014	1.006	1.019	1.011	1.005	1.003	1.016	1.009	1.004	1.000	1.013	1.007	1.007	1.003
9	1.037	1.022	1.012	1.005	1.034	1.020	1.012	1.004	1.017	1.010	1.004	1.002	1.015	1.009	1.003	1.000	1.013	1.007	1.007	1.003
10																				
For 10 Per Cent Effective Floor Cavity Reflectance (20 Per Cent = 1.00)																				
Room Cavity Ratio	.929	.929	.935	.940	.933	.928	.943	.948	.955	.960	.963	.973	.973	.976	.979	.989	.989	.991	.993	.993
1	.931	.942	.950	.958	.940	.949	.957	.963	.962	.968	.974	.976	.980	.985	.988	.988	.988	.991	.991	.995
2	.939	.951	.961	.969	.945	.957	.966	.973	.967	.975	.981	.978	.983	.988	.988	.988	.988	.992	.992	.996
3	.944	.958	.969	.976	.950	.963	.973	.980	.972	.980	.986	.986	.986	.986	.986	.986	.986	.987	.987	.996
4	.949	.964	.976	.983	.954	.968	.978	.985	.975	.983	.989	.981	.988	.983	.983	.983	.983	.987	.987	.997
5	.953	.969	.980	.986	.958	.972	.982	.989	.977	.985	.992	.982	.989	.985	.985	.985	.985	.987	.987	.997
6	.957	.973	.983	.991	.961	.975	.985	.991	.979	.987	.994	.983	.990	.986	.986	.986	.986	.987	.987	.998
7	.960	.976	.986	.993	.963	.977	.987	.993	.981	.989	.995	.984	.991	.987	.987	.987	.987	.987	.987	.998
8	.963	.978	.987	.994	.965	.979	.989	.994	.983	.990	.996	.985	.992	.988	.988	.988	.988	.989	.989	.999
9	.965	.980	.989	.995	.967	.981	.990	.995	.984	.991	.997	.986	.993	.989	.989	.989	.989	.994	.994	.999
10																				
For 0 Per Cent Effective Floor Cavity Reflectance (20 Per Cent = 1.00)																				
Room Cavity Ratio	.859	.870	.873	.885	.873	.884	.893	.901	.916	.923	.929	.945	.945	.954	.960	.979	.979	.983	.987	.999
1	.871	.887	.903	.918	.886	.892	.916	.928	.926	.936	.949	.954	.963	.971	.976	.978	.983	.983	.987	.999
2	.882	.904	.915	.942	.896	.918	.934	.947	.936	.950	.964	.958	.968	.979	.979	.976	.985	.985	.987	.999
3	.883	.919	.941	.968	.908	.930	.943	.961	.945	.961	.974	.961	.974	.984	.984	.975	.985	.985	.985	.999
4	.905	.931	.963	.983	.914	.939	.968	.970	.951	.967	.983	.964	.977	.986	.986	.975	.985	.985	.985	.999
5	.911	.940	.961	.978	.920	.946	.965	.977	.955	.972	.985	.966	.979	.991	.991	.975	.986	.986	.986	.999
6	.917	.947	.967	.981	.924	.950	.970	.982	.968	.985	.995	.968	.981	.993	.993	.975	.987	.987	.987	.999
7	.922	.943	.971	.988	.928	.956	.975	.988	.980	.998	.998	.971	.983	.995	.995	.976	.988	.988	.988	.999
8	.926	.948	.975	.998	.933	.959	.980	.993	.985	.998	.998	.971	.983	.995	.995	.976	.988	.988	.988	.999
9	.933	.942	.979	.991	.937	.963	.983	.992	.985	.998	.998	.971	.983	.995	.995	.977	.989	.989	.989	.999
10																				

B.E.E. Examination 2017
[4th Year; 1st Semester, Supplementary]
Advanced Illumination Engineering

Time: 3 hours

Use Separate Answer script for each part

Full Marks:100

Part-II

ANSWER ANY THREE QUESTIONS

TWO MARKS RESERVED FOR WELL ORGANISED ANSWER

Q.1.

A) Briefly discuss on the external factors of vision?

B) Derive the expression of luminance contrast for the diffuse surface as function of reflectances of the object and the background. 10+6=16

Q.2. Explain the following terms related to the LASER

- i) population inversion
- ii) stimulated emission
- iii) Q-switching
- iv) active mode locking

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Q.3. A) Briefly discuss on non-visual effect of lighting.

B) Draw a suitable diagram to show variation of lens transmittance factor of human eye with age and explain its influence on vision. 10+6=16

Q.4. A) Discuss on the procedure to find out chromaticity coordinate (x,y) of a lamp from its spectral power distribution according to CIE 1931 Chromaticity system.

B) Derive the expression of chromaticity coordinate of the resultant colour obtained from mixture of three individual colours. 8+8=16

Q.5. Write down short note on any two from the followings– 8 x 2 = 16

- i) Planckian Locus and Isothermal lines
 - ii) Working principle and application of circular and parabolic reflectors
 - iii) 3-level and 4-level energy model of lasing medium.
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