DAV UNIVERSITY JALANDHAR

Course Scheme For

M.Tech-Illumination Engineering
(Program ID-74)

1st TO 4th SEMESTER
Examinations 2014–2015 Session Onwards

Syllabi Applicable For Admissions in 2014

Scheme of Courses M.Tech

M.Tech-Illumination Engineering

Semester 1

S. No	Paper Code	Course Title	L	T	P	Cr	% Weightage				E
							A	B	C	D	
1	ILE501	Advanced Photometry	4	0	0	4	25	25	25	25	**100**
2	ILE502	Lighting Design & Calculation	4	0	0	4	25	25	25	25	**100**
3	ILE503	Optical Radiation and Health	4	0	0	4	25	25	25	25	**100**
4	MGT551	Research Methodology	4	0	0	4	25	25	25	25	**100**
5	ILE504	Lighting Power Conditioning, Monitoring and Control	4	0	0	4	25	25	25	25	**100**
6	ILE505	Lighting Power Conditioning, Monitoring and Control Laboratory	0	0	8	4	20	80			**100**
			20	**0**	**8**	**24**					**600**

Scheme of Courses M.Tech

M.Tech-Illumination Engineering

Semester 2

S.No	Paper Code	Course Title	L	T	P	Cr	% Weightage				E
							A	B	C	D	
1	ILE511	Computer Aided Lighting System Design	4	0	0	4	25	25	25	25	**100**
2	ILE512	Daylighting Design and Analysis	4	0	0	4	25	25	25	25	**100**
3	ILE513	Analysis and Design of Lamps and Luminaires	4	0	0	4	25	25	25	25	**100**
4	ILE514	Illumination Audit and Management	4	0	0	4	25	25	25	25	**100**
5	ILE515	Indoor Lighting Design	4	0	0	4	25	25	25	25	**100**
5	ILE516	Illumination Audit and Management Laboratory	0	0	8	4	20	80			**100**
			20	**0**	**8**	**24**					**600**

A: Continuous Assessment: Based on Objective Type Tests
B: Mid-Term Test-1: Based on Objective Type & Subjective Type Test
C: Mid-Term Test-2: Based on Objective Type & Subjective Type Test
D: End-Term Exam (Final): Based on Objective Type Tests
E: Total Marks

L: Lectures T: Tutorial P: Practical Cr: Credits

Scheme of Courses M.Tech

M.Tech-Illumination Engineering

Semester 3

S.No.	Paper Code	Course Title	L	T	P	Cr	% Weightage				E
							A	B	C	D	
1	ILE621	Lighting and Biological Factors	4	0	0	4	25	25	25	25	**100**
2	SE-I	Special Elective-I	4	0	0	4	25	25	25	25	**100**
3	SE-II	Special Elective-II	4	0	0	4	25	25	25	25	**100**
4	ILE622	Advanced Simulation Laboratory	0	0	8	4	25	25	25	25	**100**
5	ILE623	Research Seminar	0	0	8	4	25	75			**100**
6	ILE624	**Dissertation-I** (Literature Survey and Problem Formulation)	0	0	8	4	20	80			**100**
			12	**0**	**24**	**24**					**600**

Note: Presentation and Viva-Voce will be conducted for the Dissertation-I at the end of semester-III and topic of Dissertation, Problem Formulation and Research Objectives along with the methodology adopted will be recommended by the committee of Supervisor(s) or Research Degree Committee (RDC).

A: Continuous Assessment: Based on Objective Type Tests
B: Mid-Term Test-1: Based on Objective Type & Subjective Type Test
C: Mid-Term Test-2: Based on Objective Type & Subjective Type Test
D: End-Term Exam (Final): Based on Objective Type Tests
E: Total Marks

L: Lectures T: Tutorial P: Practical Cr: Credits

Scheme of Courses M.Tech

M.Tech-Illumination Engineering

Semester 4

S.No.	Paper Code	Course Title	L	T	P	Cr	% Weightage				E
							A	B	C	D	
1.	ELE625	**Dissertation-II** (Analysis, Result & Discussion and Conclusion)	0	0	48	24	20	80			**600**
			0	**0**	**48**	**24**					**600**

Note: Presentation and Viva-Voce will be held for Dissertation-II at the end of the semester-IV and SATISFACTORY/UNSATISFACTORY grade will be awarded by the committee of Supervisor(s) or Research Degree Committee (RDC) after Viva-Voce of Dissertation-II.

SPECIAL ELECTIVE-I		
Sr. No.	**Course Code**	**Subject Name**
1.	ILE651	Fundamentals Of Illumination Science & Technology
2.	ILE652	Light Sources And Luminaires
3.	ILE653	Lighting Codes & Energy Efficient Lighting System
4.	ILE654	Renewable Energy based Lighting System
SPECIAL ELECTIVE-II		
Sr. No.	**Course Code**	**Subject Name**
1.	ILE655	Laser Animation & Creative Lighting
2.	ILE656	Outdoor & Landscape Lighting
3.	ILE657	Lighting Power Conditioning Monitoring & Control
4.	ILE658	Lighting & Architecture

Course Title: Advanced Photometry
Paper Code: ILE501

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective:
The objective of the course is to enable the students to understand the basic concepts related to Advanced Photometry, Photometry measurement and colorimetry.

NOTE:

- The question paper for end-semester examination will have a weightage of 25%. It will consist of 100 objective questions. All questions will be compulsory.
- Two preannounced test will be conducted having a weightage of 25% each. Each preannounced test will consist of 20 objective type, 5 short questions and one long answer type question. The student is expected to provide reasoning/solution/working for the answer. The candidates will attempt all question. Choice will be given only in long answer type. The question paper is expected to contain problems to the extent of 40% of total marks.
- Four objective/MCQ type surprise test will be taken. Two best out of Four objective/MCQ type surprise test will be considered towards final each of 12.5% weightage to the final. Each surprise test will include 20-25 questions.
- The books indicated as text-book(s) are suggestive However, any other book may be followed.

Unit-A: Radiometric and photometric standards, Choice of right detector-detector specification- construction detail of luminance, illuminance meter.
Unit-B: Construction and working principles of spectroradiometer, spectrophotometer and colorimeter, Retroreflection & its application.
Unit-C: Photometric measurement procedure-preparation of test report. Spectral power distribution data – assessment of lamp efficacy.
Unit-D: Colorimetry-Different colour specification systems and their limitations. Measurement of CRI, CRI of radiation due to multiple sources. Pigment colour and mixing of pigments in paint industries.

Suggested Books:

1. Brian D. Warner, "A Practical Guide to Lightcurve Photometry and Analysis", Second Edition, Springer publication
2. W. Romanishin, "An Introduction to Astronomical Photometry Using CCDs", University of Oklahoma
3. Milone, Eugene F., Sterken, C., Astronomical Photometry, Past, Present, and Future, Astrophysics and Space Science Library, Vol. 373, Springer Publication
4. Casimer De Cusatis, Handbook of Applied Photometry, American Inst. of Physics, AIP Press.

Course Title: Lighting Design & Calculation
Paper Code: ILE502

L	T	P	Credits	Marks
4	0	0	4	100

Objective:
The objective of the course is to enable the students to understand the basic concepts related to Illumination Engineering, Illuminance calculations, optical and exterior lighting design

NOTE:

- The question paper for end-semester examination will have a weightage of 25%. It will consist of 100 objective questions. All questions will be compulsory.
- Two preannounced test will be conducted having a weightage of 25% each. Each preannounced test will consist of 20 objective type, 5 short questions and one long answer type question. The student is expected to provide reasoning/solution/working for the answer. The candidates will attempt all question. Choice will be given only in long answer type. The question paper is expected to contain problems to the extent of 40% of total marks.
- Four objective/MCQ type surprise test will be taken. Two best out of Four objective/MCQ type surprise test will be considered towards final each of 12.5% weightage to the final. Each surprise test will include 20-25 questions.
- The books indicated as text-book(s) are suggestive However, any other book may be followed.

Unit-A: Review of fundamentals of Illumination Engineering. Lighting field of luminaire- Practical coordinate systems, Transformation of coordinate system from point, line area source,
Unit-B: Illuminance calculation- Derivation of luminous flux from luminous intensity, flux transfer and inter-reflection luminance calculations, Discomfort glare.
Unit-C: Optical design- reflector system, refractor system. Principal of lighting design- Indoor lighting design by lumen method, by point method, Designing problem and solution and designing documentation.
Unit-D: Exterior lighting system- Road lighting system and highway lighting system.

Suggested Books:

1. Prafulla C. Sorcar , Rapid lighting design and cost estimating, McGraw-Hill Publication,1979.
2. Mark Karlen, James R. Benya, "Lighting Design Basics", John Wiley & Sons publication
3. R. H. H. Simons, A.R. R. Bean, Lighting Engineering: Applied Calculations, Architechtural Press, 2001
4. Advanced Lighting Guidelines by California Energy Commission Staff, 1993
5. John Hauck, Electrical Design of Commercial and Industrial Buildings, Jones and Bartlett Publishers, Canada

Course Title: Optical Radiation and Health
Paper Code: ILE503

L	T	P	Credits	Marks
4	0	0	4	100

Objective:
The objective of the course is to enable the students to understand the basic concepts related to optical radiation, and impact of optical radiations on insects, poultry and egg production

NOTE:

- The question paper for end-semester examination will have a weightage of 25%. It will consist of 100 objective questions. All questions will be compulsory.
- Two preannounced test will be conducted having a weightage of 25% each. Each preannounced test will consist of 20 objective type, 5 short questions and one long answer type question. The student is expected to provide reasoning/solution/working for the answer. The candidates will attempt all question. Choice will be given only in long answer type. The question paper is expected to contain problems to the extent of 40% of total marks.
- Four objective/MCQ type surprise test will be taken. Two best out of Four objective/MCQ type surprise test will be considered towards final each of 12.5% weightage to the final. Each surprise test will include 20-25 questions.
- The books indicated as text-book(s) are suggestive However, any other book may be followed.

Unit-A: Optical Radiation:-UV, Visible, IR. Sources of UV radiation, sources of IR. Effects of human- eye, skin, vitamin-D and calcium metabolism, Biological rhythm, shift work and lighting photo therapy, jetlag and lighting, Effects on Microorganism-germicidal UV radiation.

Unit-B: Insect response - Decoy lamp and Insect trap.

Unit-C: Effect on poultry - Egg production, chicken growth and development. Effect on plant- plant response

Unit-D: Plant lighting, green house and growth room photoperiod lighting, maximum lighting and terrarium lighting.

Suggested Books:

1. Morris Waxler, Victoria M. Hitchins, Optical radiation and visual health, CRC Press, 1986

2. F. McKinlay, Frank Harlen, M. J. Whillock, "Hazards of optical radiation: a guide to sources, uses, and safety", Adam Hilger Publication

3. Thomas E. Johnson, Brian K. Birk , "Health Physics and Radiological Health", Lippincott Williams & Wilkins, 3rd Edition, 1998.

Course Title: Lighting Power Conditioning, Monitoring and Control
Paper Code: ILE504

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective:

The objective of the course is to enable the students to understand the basic concepts related to Lighting Power Conditioning, Monitoring and Control and their applications.

NOTE:

- The question paper for end-semester examination will have a weightage of 25%. It will consist of 100 objective questions. All questions will be compulsory.
- Two preannounced test will be conducted having a weightage of 25% each. Each preannounced test will consist of 20 objective type, 5 short questions and one long answer type question. The student is expected to provide reasoning/solution/working for the answer. The candidates will attempt all question. Choice will be given only in long answer type. The question paper is expected to contain problems to the extent of 40% of total marks.
- Four objective/MCQ type surprise test will be taken. Two best out of Four objective/MCQ type surprise test will be considered towards final each of 12.5% weightage to the final. Each surprise test will include 20-25 questions.
- The books indicated as text-book(s) are suggestive However, any other book may be followed.

Unit-A: Lighting control strategies, techniques & equipment, sensors and timers, switches versus dimming control algorithm, harmonics, EI from lighting equipment – its measurement & suppression techniques.
Unit-B: Impact of lighting control, protocols for lighting control; Lighting control by computer
Unit-C: simple multi-channel & large multi-channel control, stage & entertainment lighting control, architectural & building lighting control systems; Centralised vs. distributed system
Unit-D: Status monitoring, fault monitoring, electrical load monitoring, lamp life monitoring system, applications.

Suggested Books:

1. Energy Monitoring and Control Systems (EMCS), Technical Manual no. 5-815-2, Washington DC, 1991
2. Ron Lenk, Carol Lenk , "Practical Lighting Design with LEDs", IEEE Press.
3. Quentin Wells, "Guide to Digital Home Technology Integration", Cengage Learning, Delmar, 2009

Course Title: Research Methodology
Course Code: MGT551

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective: The course is designed to introduce the students to research methodology and application of research techniques and procedures. The primary goal of this course is to develop a sound understanding of research methods.

Learning Outcomes: The students will be able to apply the various research methods by using computerized data analysis softwares to solve the real life problems.

Unit – A

- **Introduction to Research**: Meaning of Research, Objectives of Research, Types of Research, Research Approaches, Significance of Research, Research Process, Criteria of Good Research, Problems Encountered by Researchers in India. — 2 hour
- **Defining the Research Problem**: What is a Research Problem?, Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem — 1 hour
- **Research Design**: Meaning of Research Design, Need for Research Design, Features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs, factors affecting RDs, Relation among RDs, Developing a Research Plan. — 2 hour

Unit – B

- **Sampling design and Procedures**: Sample or Census, The Sampling Design Process, A Classification of Sampling Techniques, Choosing Nonprobability Versus Probability Sampling, Uses of Non probability Versus Probability Sampling. — 2 hours
- **Measurement and Scaling**: Non-comparative Scaling Techniques, Continuous Rating Scale, Itemized Rating Scale, Non-comparative Itemized Rating Scale Decisions, Multi-item Scales, Scale Evaluation, Choosing a Scaling Technique. — 3 hours
- **Methods of Data Collection:** Collection of Primary Data, Observation Method, Interview Method, Collection of Data through Questionnaires, Collection of Data through Schedules, Some Other Methods of Data Collection, Collection of Secondary Data, Selection of Appropriate Method for Data Collection. — 3 hours
- **Questionnaire & form design**: questionnaire & observation forms, questionnaire design process. — 2 hours

Unit – C

- **Data preparation:** editing, coding, transcribing — 1 Hours
- **Data analysis**: tests of significance based on t, f and z distribution and chi-square test; cross tabulation — 3 hours
- **Multiple Regressio**n: Overview of Multiple Regression, Statistics Associated with Multiple Regression, Conducting Multiple Regression, Stepwise Regression, Multicollinearity — 3 hours
- **Discriminant Analysis**: Discriminant Analysis Model, Statistics Associated with Discriminant Analysis, Conducting Discriminant Analysis — 4 hours
- **Conjoint Analysis**: Basic Concepts in Conjoint Analysis, Statistics Associated with Conjoint Analysis, Conducting Conjoint Analysis, Assumptions & Limitations of Conjoint Analysis, Hybrid Conjoint Analysis — 4 hours

Unit – D

- **Multi Dimensional Scaling**: Basic Concepts in Multidimensional Scaling (MDS), Statistics Associated with MDS, Conducting Multidimensional Scaling, Selecting an MDS Procedure, Deciding on the Number of Dimensions, Labeling the Dimensions & Interpreting the Configuration, Assessing Reliability and Validity, Assumptions & Limitations of MDS, Scaling Preference Data — 3 hours
- **Correspondence Analysis**: Relationship between MDS, FA, & DA — 2 hours
- **Factor Analysis:** Factor Analysis Model, Statistics Associated with Factor Analysis, Conducting Factor Analysis, Applications of Common Factor Analysis — 3 hour
- **Cluster Analysis**: Statistics Associated with Cluster Analysis, Conducting Cluster Analysis, Applications of Non-hierarchical Clustering, Clustering Variables. — 5 hours
- **Research Report Writing**: Contents of Report, Executive Summary, Bibliography format. Presentation of Report. — 2 hour

Total 45 hours

Reference Books:

1. Bajpai Naval, *Business Research Methods*, Pearson Publications.
2. Malhotra, Naresh K. (2007), *Marketing Research: An Applied Orientation*, 5th Edition. Pearson/Prentice-Hall.
3. Proctor Tony, *Essentials of Marketing Research*, Prentice Hall, 4th Edition
4. Beri G. C., *Marketing research*, Mcgrawhill, 4th Edition
5. C.R Kothari, *Research Methodology*, New Age Publishers

L	T	P	Credits	Marks
0	0	8	4	100

Course Title: Lighting Power Conditioning, Monitoring and Control Laboratory
Paper Code: ILE505

Course Objective:

The objective of the course is to enable the students to understand the basic concepts related to Lighting Power Conditioning, Monitoring and Control and their applications.

List of Experiments

1. To study the Lighting control strategies, techniques & equipment, sensors and timers, switches versus dimming control algorithm, harmonics,
2. To Study the status monitoring of Light
3. Fault monitoring in Lighting Power Systems
4. Electrical load monitoring in Lighting Power Systems
5. To Calculate the life of Lighting Lamp.
6. Simple multi-channel & large multi-channel control of Light
7. To Study the control of Lighting by computer
8. Measurement of EI from lighting equipment

Course Title: Computer Aided Lighting System Design
Paper Code: ILE511

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective:
The objective of the course is to enable the students to understand the basic concepts related to Computer Aided Lighting System Design and their applications.

NOTE:

- The question paper for end-semester examination will have a weightage of 25%. It will consist of 100 objective questions. All questions will be compulsory.
- Two preannounced test will be conducted having a weightage of 25% each. Each preannounced test will consist of 20 objective type, 5 short questions and one long answer type question. The student is expected to provide reasoning/solution/working for the answer. The candidates will attempt all question. Choice will be given only in long answer type. The question paper is expected to contain problems to the extent of 40% of total marks.
- Four objective/MCQ type surprise test will be taken. Two best out of Four objective/MCQ type surprise test will be considered towards final each of 12.5% weightage to the final. Each surprise test will include 20-25 questions.
- The books indicated as text-book(s) are suggestive However, any other book may be followed.

Unit-A: Luminaires–types & performance, effects of luminaire photometry, specifying and using luminaire, optical design of luminaire, construction, software design of luminaire optics. Advanced interior lighting design calculations, apparent brightness, cubic illuminance, illumination solid, CSP(Comfort, Satisfaction, Performance) index, software design on interior lighting.

Unit-B: Conventions for road lighting installation geometry, calculation of road surface luminance, calculation of TI (Threshold increment), glare control mark, measure of visibility, tabular & graphical methods, isoluminance diagram and templates, software design on road lighting.

Unit-C: Use of flood lighting diagrams, illuminance in complex situation, floodlighting of playgrounds, buildings and statues, analysis of the lighting parameters, optimisation of lighting parameters, simulation of visual environment with different lighting fittings

Unit-D: Software design on flood lighting, Software tools in lighting design.

Suggested Books:

1. Advanced Lighting Guidelines by California Energy Commission Staff, 1993
2. Bob Martens, Andre Brown, "Computer Aided Architectural Design Futures 2005, Springer publication

Course Title: Daylighting Design and Analysis
Paper Code: ILE512

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective:
The objective of the course is to enable the students to understand the basic concepts related to Daylighting Design and Analysis.

NOTE:

- The question paper for end-semester examination will have a weightage of 25%. It will consist of 100 objective questions. All questions will be compulsory.
- Two preannounced test will be conducted having a weightage of 25% each. Each preannounced test will consist of 20 objective type, 5 short questions and one long answer type question. The student is expected to provide reasoning/solution/working for the answer. The candidates will attempt all question. Choice will be given only in long answer type. The question paper is expected to contain problems to the extent of 40% of total marks.
- Four objective/MCQ type surprise test will be taken. Two best out of Four objective/MCQ type surprise test will be considered towards final each of 12.5% weightage to the final. Each surprise test will include 20-25 questions.
- The books indicated as text-book(s) are suggestive However, any other book may be followed.

Unit-A: The daylight and sunlight resource. Day-lighting concepts- designing side-lighting concepts, designing top-lighting concepts-designing atria

Unit-B: Light courts and sun control – planning for daylight. Daylight availability data

Unit-C: Daylighting analysis- lumen input method, daylight factor method, flux transfer method, physical scale model study.

Unit-D: Lighting integration- daylighting/electric lighting integration.

Suggested Books:

1. Mohamed Boubekri, "Daylighting, Architecture and Health: Building Design Strategies", Architectural Press, UK
2. Christopher Cuttle, "Lighting by Design", 2nd Edition, Architectural Design
3. Gary Steffy, "Architectural Lighting Design", 2nd edition, John Wiley and sons, New York, 2002
4. Daylight Design of Buildings - Nick Bakes, Koen Stemers , Pub – James & James (Science Publishers) Ltd.
5. Daylight Performance of Buildings – Edited by Marc Fontoynout
6. Daylighting – Natural Light in Architecture, Derek Philips – Architectural Press
7. Dynamic Daylighting Architecture : Basics, Systems, Projects – Helmut Koster
   Daylight Science & Daylighting Technology – Kitter, Richard, Koafay, Miroslow, Springer.

Course Title: Analysis and Design of Lamps and Luminaires
Paper Code: ILE513

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective:
The objective of the course is to enable the students to understand the basic concepts related to Daylighting Design and Analysis.

NOTE:

- The question paper for end-semester examination will have a weightage of 25%. It will consist of 100 objective questions. All questions will be compulsory.
- Two preannounced test will be conducted having a weightage of 25% each. Each preannounced test will consist of 20 objective type, 5 short questions and one long answer type question. The student is expected to provide reasoning/solution/working for the answer. The candidates will attempt all question. Choice will be given only in long answer type. The question paper is expected to contain problems to the extent of 40% of total marks.
- Four objective/MCQ type surprise test will be taken. Two best out of Four objective/MCQ type surprise test will be considered towards final each of 12.5% weightage to the final. Each surprise test will include 20-25 questions.
- The books indicated as text-book(s) are suggestive However, any other book may be followed.

Unit-A: Lighting Field of Luminaires, Practical Coordinate System, Concept of Coefficients of Utilization (COU) in different luminaries,Calculation of COU by using COU table, Algorithm for development of COU tables, problems of COU calculations, Average illuminance calculations by Zonal Cavity Method, Determination of effective Cavity

Unit-B: Reflectances and COU, Determination of effective Cavity Reflectance for non-horizontal ceilings & coffered ceilings, calculation of illuminance at a point from point source, linear source, area source , calculation of vertical surface illuminance at a point- ,reflected illuminance calculation; introduction to basic lighting layout,Spacing Criteria,Problems on layout , Glare Calculation, Non-planar illuminance & its application in indoor lighting design.

Unit-C: Luminaire- its function, mechanical stability and requirements,its enclosure and electrical, thermal, marking, luminaire photometry, luminaire materials and manufacturing process.

Unit-D: Design of luminaire optics, basic optical contour, faceted reflector- steps of design, refracting elements- lens, prisms etc.

Suggested Books:

1. Applied Illumination Engineering, Second Edition, Jack L Lindsey, Prentice Hall
2. Lighting Engineering Applied Calculations – R. H. Simons & A.R. Bean, Architectural Press
3. Philips Lighting Manual
4. Principles of Lighting Course 2000 – Julian (Department of Architecture & Design Science) University of Sydney
5. Interior Lighting – Boer, Fischer, Pub – Philips Technical Library

6. James Paul Stefanis, “An Analysis of High Intensity Discharge Lighting Systems, Costs and Returns, Rooting and Vegetative Growth of Chrysanthemum Morifolium Ramat. in a Controlled Environment”, 1981
7. Lamps and Lighting – Edited by J.R.Coaton and A.M.Marsden, 4th Edition

Course Title: Illumination Audit and Management
Paper Code: ILE514

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective:

The objective of the course is to enable the students to understand the basic concepts related to Illumination Audit and Management.

NOTE:

- The question paper for end-semester examination will have a weightage of 25%. It will consist of 100 objective questions. All questions will be compulsory.
- Two preannounced test will be conducted having a weightage of 25% each. Each preannounced test will consist of 20 objective type, 5 short questions and one long answer type question. The student is expected to provide reasoning/solution/working for the answer. The candidates will attempt all question. Choice will be given only in long answer type. The question paper is expected to contain problems to the extent of 40% of total marks.
- Four objective/MCQ type surprise test will be taken. Two best out of Four objective/MCQ type surprise test will be considered towards final each of 12.5% weightage to the final. Each surprise test will include 20-25 questions.
- The books indicated as text-book(s) are suggestive However, any other book may be followed.

Unit-A: Cost estimation of lighting systems-initial cost, running cost; economic analysis,pay back method, life cycle cost; cost-benefit analysis of lighting system.

Unit-B: Fundamentals of lighting surveys and audits, measuring tools & instruments, types of surveys and audit, techniques of collecting building information, design and use of software of lighting survey and analysis.

Unit-C: Energy management in illumination, Energy efficient illuminating system components, energy oriented new and retrofit installations, Power Quality, Demand side management (DSM).

Unit-D: Maintenance of lighting system-indoor and outdoor, maintenance schedule, scheme, Relamping-spot and group, Equipment and materials used for maintenance job, General guidelines on disposal of burnt out lamps.

Suggested Books:

1. Energy Management in Illumination Systems – Kao Chen,CRC Press.
2. The Hand Book of Lighting Surveys and Audits – John L. Fetters, CRC Press.
3. Managing Energy from the Top down Christopher Russell, C.E.M., CRC Press.
4. Handbook on Energy Audit & Environment Management – P.Abbi, S. Jaia, Teri
5. The Lighting Management Hand book – Craig DiLouie

Course Title: Indoor Lighting Design
Paper Code: ILE515

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective:

The objective of the course is to enable the students to understand the basic concepts related to Illumination Audit and Management.

NOTE:

- The question paper for end-semester examination will have a weightage of 25%. It will consist of 100 objective questions. All questions will be compulsory.
- Two preannounced test will be conducted having a weightage of 25% each. Each preannounced test will consist of 20 objective type, 5 short questions and one long answer type question. The student is expected to provide reasoning/solution/working for the answer. The candidates will attempt all question. Choice will be given only in long answer type. The question paper is expected to contain problems to the extent of 40% of total marks.
- Four objective/MCQ type surprise test will be taken. Two best out of Four objective/MCQ type surprise test will be considered towards final each of 12.5% weightage to the final. Each surprise test will include 20-25 questions.
- The books indicated as text-book(s) are suggestive However, any other book may be followed.

Unit-A: Lighting Field of Luminaires, Practical Coordinate System, Concept of Coefficients of Utilization (COU) in different luminaries, Calculation of COU by using COU table, Algorithm for development of COU tables, problems of COU calculations, Average illuminance calculations by Zonal Cavity Method, Determination of effective Cavity

Unit-B: Reflectances and COU, Determination of effective Cavity Reflectance for non-horizontal ceilings & coffered ceilings, calculation of illuminance at a point from point source, linear source, area source, calculation of vertical surface illuminance at a point
Unit-C: Reflected illuminance calculation; introduction to basic lighting layout, Spacing Criteria, Problems on layout, Glare Calculation

Unit-D: Non-planar illuminance & its application in indoor lighting design.

Suggested Books:

1. Applied Illumination Engineering, Second Edition, Jack L Lindsey, Prentice Hall
2. Lighting Engineering Applied Calculations – R. H. Simons & A.R. Bean, Architectural Press.
3. Philips Lighting Manual
4. Principles of Lighting Course 2000 – Julian (Department of Architecture & Design Science) University of Sydney
5. Interior Lighting – Boer, Fischer, Pub – Philips Technical Library

Course Title: Illumination Audit and Management Laboratory
Paper Code: ILE516

L	T	P	Credits	Marks
0	0	8	4	100

Course Objective:

The objective of the course is to enable the students to understand the practical aspects related to Illumination Audit and Management.

List of Experiments

1. Introduction to design and use of software of lighting survey and analysis.
2. Introduction to techniques of collecting building information
3. Cost estimation of lighting systems
4. Cost-benefit analysis of lighting system.
5. Energy management in illumination
6. Power Quality Management for lighting systems
7. Demand side management (DSM) for lighting systems
8. To Study the Energy efficient illuminating system components

Course Title: Lighting and Biological Factors
Paper Code: ILE621

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective:

The objective of the course is to enable the students to understand the basic concepts related to Lighting, Optical Radiation and Biological Factors related to radiation

NOTE:

- The question paper for end-semester examination will have a weightage of 25%. It will consist of 100 objective questions. All questions will be compulsory.
- Two preannounced test will be conducted having a weightage of 25% each. Each preannounced test will consist of 20 objective type, 5 short questions and one long answer type question. The student is expected to provide reasoning/solution/working for the answer. The candidates will attempt all question. Choice will be given only in long answer type. The question paper is expected to contain problems to the extent of 40% of total marks.
- Four objective/MCQ type surprise test will be taken. Two best out of Four objective/MCQ type surprise test will be considered towards final each of 12.5% weightage to the final. Each surprise test will include 20-25 questions.
- The books indicated as text-book(s) are suggestive However, any other book may be followed.

Unit-A: Optical Radiation- Ultra Violet(UV), Visible(VIS), Infrared(IR); Effects of UV,VIS and IR on human eye, skin, practical considerations; bio-optical properties of human skin; simulations in health & life sciences, phototherapy with non-lighting lamps.
Unit-B: Biological, physiological, and psychological aspects of light, the impact of light on human life-cognitive science.

Unit-C: The circadian system-its structure, characteristics, effects of light exposure on it, effect of light on human alertness, effect of dynamic lighting on productivity, shift work, jetlag. Light operating through visual system and through circadian system.

Unit-D: Effects on Microorganism- germicidal UV radiation. Insect response - Decoy lamp and Insect trap, effect on plant- plant response, plant lighting, green house and growth room photoperiod lighting, maximum lighting.

Suggested Books:

1. Human Factors in Lighting – Peter R. Boyce, Taylor & Francis.
2. Light & Skin Interactions – Gladimir V.G. Baranoski Aravind Krishna swami, Morgan Kaufun.
3. Lighting for health and safety – N.A.Smith, Butterworth-Heimann.
4. Luminescence – (Science for Every one) – N.N. Barashkov, MIR Publishers, Moscow.

Course Title: Advanced Simulation Laboratory
Paper Code: ILE622

L	T	P	Credits	Marks
0	0	8	4	100

Course Objectives: The major objectives of this course to import the practical knowledge about Fuzzy Logic, Neural Network and PID Controllers using MATLAB software.

List of Experiments

The following experiments may be implemented using MATLAB/SIMULINK environment in Advanced Simulation Laboratory.

1. Construction of Simulink model for single area and multi area Power system.
2. Implementation of Full order and minimum order Observer.
3. Implementation of Back-Propagation Algorithm.
4. Implementation of simple Fuzzy controller.
5. Implementation of storage and recall algorithm of Hopfield network model.
6. Implementation of Kalman Filter.
7. Implementation of Least squares error method.
8. Implementation of PID controller and its effects on a given system.
9. Design of Lead, Lag, Lead- Lag compensators using frequency domain analysis.
10. Construction of Simulink model for an Induction motor.
11. Solving steady state Ricatti Equation.
12. Solving an optimal control problem using Ricatti equation.
13. To implement fuzzy set operations
14. To implement fuzzy relational operations.
15. To design and implement fuzzy temperature controller
16. To design and implement Fuzzy Traffic light controller
17. To write and illustrate the concept of Fuzzy C – means Clustering
18. To design a self executable fuzzy logic controller
19. Write programs to test the learning rules of Hebb, Perceptron, Delta, and Widrow Hoff in MATLAB learning rule.
20. To implement the Back propagation algorithm
21. To write and test a program for the linear separability of the input domain
22. To write and implement a Hopfield algorithm.
23. To write a program for pattern recognition
24. To design a self executable neural classifier.
25. Implementation of Preliminary Transformations:
    (a) Transfer function to State space models vice- versa.
    (b) Conversion of Continuous to Discrete time systems vice-versa.
    (c) Verification of controllability and observability of a given system.

Course Title: Fundamentals of Illumination Science & Technology
Paper Code: ILE651

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective:

The objective of the course is to enable the students to understand the basic Fundamentals of Illumination Science & Technology

NOTE:

- The question paper for end-semester examination will have a weightage of 25%. It will consist of 100 objective questions. All questions will be compulsory.
- Two preannounced test will be conducted having a weightage of 25% each. Each preannounced test will consist of 20 objective type, 5 short questions and one long answer type question. The student is expected to provide reasoning/solution/working for the answer. The candidates will attempt all question. Choice will be given only in long answer type. The question paper is expected to contain problems to the extent of 40% of total marks.
- Four objective/MCQ type surprise test will be taken. Two best out of Four objective/MCQ type surprise test will be considered towards final each of 12.5% weightage to the final. Each surprise test will include 20-25 questions.
- The books indicated as text-book(s) are suggestive However, any other book may be followed.

Unit-A: Light and electromagnetic radiation, sources of light- thermal radiator-blackbody radiator, laws of thermal radiation, daylight and artificial light, spectral power distribution (SPD) of light sources, Visual system-structure, external factors of vision, continuous adjustment- photopic, scotopic and mesopic capabilities, perception, CIE standard observer, Glare- discomfort & disability glare.
Unit-B: Colorimetry – trichromatic vision, RGB colour specification system, CIE 1931 XYZ colour specification system, source colour & object colour specification, CIE standard illuminant.
Unit-C: Radiometric and photometric quantities, relation between Lumen and Watt, photometric standards, Photometry – measurement of luminous flux, illuminance, luminance, luminous intensity distribution. Computation of lumen output from luminous intensity distribution of a source, computation of CCT and CRI from CIE 1931 chromaticity diagram.
Unit-D: Different types of Lamps– Its characteristics & Applications, Luminaire- its function and classification, Lamp and luminaire specifications.
Basic concepts of lighting design- design objectives, design parameters, qualitative & quantitative evaluation of lighting systems.

Suggested Books:

1. J.R.Coaton and A.M.Marsden , “Lamps and Lighting”, 4th Edition, Arnold
2. P.Moon , “The Scientific Basis of Illuminating Engineering”, Dover Publications
3. Ronald N. Helms & M Clay Belcher , “Lighting for energy efficient luminous environments”, Prentice Hall.
4. V.V.Meshkov, “Fundamentals of Illumination Engineering”, Mir Publication, Russia

5. IES Lighting Handbook , IES North America.
6. V.V. Meshkov, “Fundamentals of Illumination Engineering”, MIR Publishers, Moscow
7. Rossing Chanerina, “Light Science”, Springer Publication

Course Title: Light Sources And Luminaires
Paper Code: ILE652

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective:

The objective of the course is to enable the students to understand the basic concepts related to Light Sources and Luminaires

NOTE:

- The question paper for end-semester examination will have a weightage of 25%. It will consist of 100 objective questions. All questions will be compulsory.
- Two preannounced test will be conducted having a weightage of 25% each. Each preannounced test will consist of 20 objective type, 5 short questions and one long answer type question. The student is expected to provide reasoning/solution/working for the answer. The candidates will attempt all question. Choice will be given only in long answer type. The question paper is expected to contain problems to the extent of 40% of total marks.
- Four objective/MCQ type surprise test will be taken. Two best out of Four objective/MCQ type surprise test will be considered towards final each of 12.5% weightage to the final. Each surprise test will include 20-25 questions.
- The books indicated as text-book(s) are suggestive However, any other book may be followed.

Unit-A: Theory of light generation from incandescent, discharge and solid state sources, Materials of Lamps, General classification of lamps & its electrical and photometric parameters, Variation of lamp parameters with supply voltage, temperature, humidity etc, Construction of different lamps.
Unit-B: Functions of ballast, starter/ ignitor, Different lamp circuits and their operations,Working principle of electronic ballast for FTL/CFL.
Unit-C: Luminaire- its function, mechanical stability and requirements,its enclosure and electrical, thermal, marking, luminaire photometry, luminaire materials and manufacturing process.
Unit-D: Design of luminaire optics, basic optical contour, faceted reflector- steps of design, refracting elements- lens, prisms etc.

Suggested Readings:

1. IES Lighting Handbook , IES North America.
2. J.B.Murdoch, “Illumination Engineering from Edison lamp to the laser” , Macmillion Publishing Company.
3. J.R.Coaton and A.M.Marsden , Lamps and Lighting, 4th Edition , Arnold
4. M.S.N. Swamy, “Lighting, what everyone should know”, MSN Marketing Publication
5. John F. Waymouth , “Electric Discharge Lamps”, M.I.T. Press
6. Anil Valia, “Designing With Light”

Course Title: Lighting Codes & Energy Efficient Lighting System
Paper Code: ILE653

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective:

The objective of the course is to enable the students to understand the basic concepts related to Lighting Codes & Energy Efficient Lighting System

NOTE:

- The question paper for end-semester examination will have a weightage of 25%. It will consist of 100 objective questions. All questions will be compulsory.
- Two preannounced test will be conducted having a weightage of 25% each. Each preannounced test will consist of 20 objective type, 5 short questions and one long answer type question. The student is expected to provide reasoning/solution/working for the answer. The candidates will attempt all question. Choice will be given only in long answer type. The question paper is expected to contain problems to the extent of 40% of total marks.
- Four objective/MCQ type surprise test will be taken. Two best out of Four objective/MCQ type surprise test will be considered towards final each of 12.5% weightage to the final. Each surprise test will include 20-25 questions.
- The books indicated as text-book(s) are suggestive However, any other book may be followed.

Unit-A: Indian Standards & Codes on lighting products and lighting designs, Testing of lamp, control gear & luminaire- type test, performance test, acceptance test; electrical and photometric test of lamps and luminaries

Unit-B: Luminaire Testing-IP test, mechanical test & photometric test, IEC standards on lamps and ballasts, CIE standards on lighting applications, electronic file format of luminaire intensity database-.ies file format.

Unit-C: National Lighting Code, Energy Conservation Building Code, Bureau of Energy Efficiency star- rating for lamps, Basics of lighting control devices, their principles of operation, Concept of energy efficient lighting system design, design approaches & options, Lighting energy conservation measures

Unit-D: Concepts of daylight integrated artificial lighting design, different design considerations-thermal, colour, visual comfort, assessment of energy saving with daylight.

Suggested Readings:

1. Robert J.Alonzo , P.E., “Electrical Codes, Standards, Recommended Practices and Regulations”, Elsevier.
2. IES Lighting Handbook, IES North America.
3. National Lighting Code, Published by Govt of India, 2011

Course Title: Renewable Energy based Lighting System
Paper Code: ILE654

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective:

The objective of the course is to enable the students to understand the basic concepts related to Renewable Energy based Lighting System

NOTE:

- The question paper for end-semester examination will have a weightage of 25%. It will consist of 100 objective questions. All questions will be compulsory.
- Two preannounced test will be conducted having a weightage of 25% each. Each preannounced test will consist of 20 objective type, 5 short questions and one long answer type question. The student is expected to provide reasoning/solution/working for the answer. The candidates will attempt all question. Choice will be given only in long answer type. The question paper is expected to contain problems to the extent of 40% of total marks.
- Four objective/MCQ type surprise test will be taken. Two best out of Four objective/MCQ type surprise test will be considered towards final each of 12.5% weightage to the final. Each surprise test will include 20-25 questions.
- The books indicated as text-book(s) are suggestive However, any other book may be followed.

Unit-A: Different Renewable Sources of Energy - Solar, Wind, Tidal, Biomass, Geo thermal, fuel cell, human - powered etc - Its Principles & Technical Description, Induction

Unit-B: Generator Principle , Charging methods from different sources – Storage Battery Technologies, Charge control techniques, Principles of inverter, dc to dc converter, Load management - energy efficient discharge lamp and different types of electronic ballasts, LED lamps & its drivers, Wiring & Fittings

Unit-C: Lightning Protection, Installing, Managing

Unit-D: Maintaining & Servicing off-grid systems, Sustainability & Building Design & Lighting, Integration of different sources of Energy, Inter connection of Renewable Energy Sources with the grid.

Suggested Readings:

1. H.P. Gary, “Fundamentals of Solar Energy”, John Wiley & Sons.
2. F.A. Farret, M. G. Simoes, “Integration of Alternative Sources of Energy”, IEEE Press
3. S.P. Sukhatime, “Solar Energy”, Tata Mc. Graw Hill
4. M. Kaltschmitt, W. Streicher and A. Wiese , “Renewable Energy–Technology, Economics & Environment”, Springer
5. Catler J. Cleveland & C. Morris, “Dictionary of Energy”
6. M. Dayal, “Energy Today & Tomorrow”, Ministry of Information & Broadcasting, Govt. of India
7. George Wood Vinal, “Storage Batteries”, John Wiky & Sons, Inc.

8. K. E. Aifantis, S. A. Hackney, R.V. Kumar , “High Energ Density Lithium Batteries”
9. Tapan Bhattacharya , “Terrestrial Solar Photovoltaics”, Narosa.
10. Fereidoon P. Sioshansi, “Generating Electricity in a Carbon Constrained World”, Academic Press.
11. Mark Hankins, “Stand Alone Solar Electric System”, Earthscar
12. T. Minami , “Solid state Ionics for Batteries”, Springer
13. Simon Roberts, NicoloGuariento , “Building Integrated Photovoltaics a handbook”, Birkhauser.
14. “Sustainable Building” , Design Manual, 1 & 2 ICAEN
15. S. Roof, M. Fuentes & S. Thomas , “Ecohouse : A Design Guide”, Elseveir
16. Dr. P. Gevorkian, M.C. Graw , “Sustainable Energy Systems Engg.”
17. M. Kutz , “Environmentally conscious Alternative Energy Production”, John Wiley & San Inc
18. S. Sinha, A. Shukla, N. Hazarika , “Prom Sunlight to Electricity”, Winrock International
19. P. Malhotra, S. Dutta, V. Ramana, “Participatory Rural Energy Planning”, P. Teri
20. M. Broussely, G. Pistoia and D. Meschede , “Industrial Applications of Batteries”, Elseveir
21. G.W. Vinal , “Storage Batteries”, John Willey & Sons, N.Y.

Course Title: Laser Animation & Creative Lighting
Paper Code: ILE655

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective:

The objective of the course is to enable the students to understand the basic concepts related to Laser Animation & Creative Lighting

NOTE:

- The question paper for end-semester examination will have a weightage of 25%. It will consist of 100 objective questions. All questions will be compulsory.
- Two preannounced test will be conducted having a weightage of 25% each. Each preannounced test will consist of 20 objective type, 5 short questions and one long answer type question. The student is expected to provide reasoning/solution/working for the answer. The candidates will attempt all question. Choice will be given only in long answer type. The question paper is expected to contain problems to the extent of 40% of total marks.
- Four objective/MCQ type surprise test will be taken. Two best out of Four objective/MCQ type surprise test will be considered towards final each of 12.5% weightage to the final. Each surprise test will include 20-25 questions.
- The books indicated as text-book(s) are suggestive However, any other book may be followed.

Unit-A: Fundamentals of Laser & its application , Laser Hazards , General Rules for Laser Safety, Laser Classifications , Laser Projection Systems

Unit-B: Connecting Laser for Projection , Power Unit Connection , Water Connection , Connecting Laser to Animation Program , Laser Art, Animation and Atmospheric , Selecting a Theme, Building a Storyboard , Drawing Art – Graphics – Animation , Recording with Music or Sound Effects , Adding Atmospherics , Projecting on Flat Screen , Projecting on Water Screen , Diffraction Gratings , Projecting with Live Action , Water as Rear Projection 3D Screen , Projecting with Video Images , Laser Safety During Running a Show , Laser Maintenance.

Unit-C: Concepts and techniques of Creative Lighting ,Light & Perception , Conventional Lighting – Moving Luminaires, Lighting Consoles, Lighting Trusses & Grids ,Color Mixing,

Unit-D: Practical Application of Colored Light , Style in lighting -Conceptualization, Design Research, Image of light & Lighting Key , Lighting System setup Procedure ,Plotting the Design.

Suggested Readings:

1. Csele, Mark , “Fundamentals of Light Sources and Lasers”, ISBN 0-471-47660-9, Wiley, 2004
2. Koechner, Walter , “Solid-State Laser Engineering”, ISBN 0-387-53756-2, 3rd edition, Springer, Verla, 1992
3. Siegman, Anthony E. , “Lasers”, ISBN 0-935702-11-3, University Science Books, 1986.
4. Silfvast, William T. , “Laser Fundamentals”, ISBN 0-521-55617-1, Cambridge University Press, 1996

5. Wilson, J. & Hawkes, J.F.B. , “Lasers: Principles and Applications”, Prentice Hall International Series in Optoelectronics, ISBN 0-13-523697-5 , Prentice Hall, 1987
6. Thomas Erneux & Pierre Glorieux , “Laser Dynamics”, Cambridge.
7. Ian R. Kenyon , “The Light Fantastic - A Modern Introduction to Classical and Quantam Optics” , Oxford.
8. J. M. Gillette , “Designing with Light”, Mayfield Publishing Company.
9. John Vasey, “Concert Sound and Lighting Systems”, Focal Press.
10. Richard Dunham, “Stage Lighting”, Allyn & Bacen.
11. Dr. James L. Moody, ED. D. , “Concert Lighting”, Focal Press.
12. Fancis Reid , “Discovery Stage Lighting”, Focal Press.

Course Title: Outdoor & Landscape Lighting
Paper Code: ILE656

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective:

The objective of the course is to enable the students to understand the basic concepts related to Outdoor & Landscape Lighting

NOTE:

- The question paper for end-semester examination will have a weightage of 25%. It will consist of 100 objective questions. All questions will be compulsory.
- Two preannounced test will be conducted having a weightage of 25% each. Each preannounced test will consist of 20 objective type, 5 short questions and one long answer type question. The student is expected to provide reasoning/solution/working for the answer. The candidates will attempt all question. Choice will be given only in long answer type. The question paper is expected to contain problems to the extent of 40% of total marks.
- Four objective/MCQ type surprise test will be taken. Two best out of Four objective/MCQ type surprise test will be considered towards final each of 12.5% weightage to the final. Each surprise test will include 20-25 questions.
- The books indicated as text-book(s) are suggestive However, any other book may be followed.

Unit-A: Basic Parameters required for Road Lighting Design, calculation of illuminance at a point on road surface by using computer generated Iso-lux diagram of a luminaire , evaluation of a Road lighting design by using nine-point method ,Design basics of floodlighting of buildings and areas ,Role of Computer in Lighting design, advantages and limitations of Computer Aided Lighting design.

Unit-B: Roadlighting – road classifications according to BIS, pole arrangements, terminology, lamp & luminaire selection, calculation of road surface luminance, calculation of TI(Threshold increment), glare control mark, measure of visibility, tabular & graphical methods, isoluminance diagram different design procedures , beam lumen method, point-by-point method, isolux diagram method; tunnel lighting.

Unit-C: Arealighting- selection of floodlights, NEMA classifications, design procedure, Sportslighting- special lighting requirements for football, cricket, badminton ground , BIS recommendation, selection criteria of lamp and luminaire, design considerations, design procedure. Introduction to Facade & security Lighting.

Unit-D: Landscape Lighting -principles, concepts and techniques of landscape lighting- both exterior and interior, natural light & artificial light, landscape perception, selection of lamp and lighting equipment, luminous signal, operation & maintenance, creating nocturnal landscape, elements of landscape lighting design- plant materials, sculptures etc., Lighting and response of plants, terrarium lighting, environmental concerns in outdoor lighting.

Suggested Readings:

1. Kohei Narisada & Duco Schreuder , “Light Pollution Handbook (Part-I & II)”, Springer

2. Peter R. Boyce , “Lighting for Driving: Roads, Vehicles, Signs and Signals”, CRC Press
3. Philips Lighting Manual
4. J.L. Moyer , “The Landscape Lighting Book”, John Wily & Sons
5. R. Narboni , “Lighting the Landscape”, Birkhanser
6. C. V. Santen , “Lighting zone city”, Birkhanser
7. U. Brandi & G. Brandi , “Light for Cities”, Birkhanser
8. H.E. Schwarj , “Light Pollution : The global view”, Kluber Academy, C Publisher
9. B. Wordonweber, J. Walla – schek, P. Boyee, D.D. Hoffmen , “Automotive Lighting & Human Vision”, Springer
10. Narisada, Schreuder , “Light Pollution Hand book(Part – I) & (Part – II)" , Springer Publisher

Course Title: Lighting Power Conditioning Monitoring & Control
Paper Code: ILE657

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective:

The objective of the course is to enable the students to understand the basic concepts related to Lighting Power Conditioning Monitoring & Control

NOTE:

- The question paper for end-semester examination will have a weightage of 25%. It will consist of 100 objective questions. All questions will be compulsory.
- Two preannounced test will be conducted having a weightage of 25% each. Each preannounced test will consist of 20 objective type, 5 short questions and one long answer type question. The student is expected to provide reasoning/solution/working for the answer. The candidates will attempt all question. Choice will be given only in long answer type. The question paper is expected to contain problems to the extent of 40% of total marks.
- Four objective/MCQ type surprise test will be taken. Two best out of Four objective/MCQ type surprise test will be considered towards final each of 12.5% weightage to the final. Each surprise test will include 20-25 questions.
- The books indicated as text-book(s) are suggestive However, any other book may be followed.

Unit-A: Lighting Control Strategies, Techniques & Equipments; Sensors & Timers; Switching Controls, Lighting Panels, Dimmable ballast – Dimming Methods & Controls, Switches vs dimming control algorithm , Impact of Lighting Control
Unit-B: Protocols for Lighting Control (Analog, DALI, DMX, ACN, RDM) and Ancillary Enablers, Lighting Control Consoles, Lighting Control by computer, simple multichannel control and large multichannel control, Architectural Building lighting Control System
Unit-C: Centralized vs Distributed system, Status monitoring, fault monitoring, electrical Load monitoring and Lamp Life monitoring system , Applications
Unit-D: Daylight Harvesting Control System, Harmonics, Electromagnetic Interference in Lighting Systems, its measurement & suppression techniques

Suggested Readings:

1. Richard Cadena , "Electricity for the Entertainment Electrician & Technician", Focal Press.
2. Richard Cadena , "Automated Lighting", Focal Press.
3. Craig Dilovie , "Lighting Control Hand book", CRC Press.

Course Title: Lighting & Architecture
Paper Code: ILE658

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective:

The objective of the course is to enable the students to understand the basic concepts related to Lighting and Architecture, Lighting pattern and forms.

NOTE:

- The question paper for end-semester examination will have a weightage of 25%. It will consist of 100 objective questions. All questions will be compulsory.
- Two preannounced test will be conducted having a weightage of 25% each. Each preannounced test will consist of 20 objective type, 5 short questions and one long answer type question. The student is expected to provide reasoning/solution/working for the answer. The candidates will attempt all question. Choice will be given only in long answer type. The question paper is expected to contain problems to the extent of 40% of total marks.
- Four objective/MCQ type surprise test will be taken. Two best out of Four objective/MCQ type surprise test will be considered towards final each of 12.5% weightage to the final. Each surprise test will include 20-25 questions.
- The books indicated as text-book(s) are suggestive However, any other book may be followed.

Unit-A: Functional and aesthetic aspects of lighting - Offices, Residences, Hotels, Hospitals, Restaurants, Malls, Museum Lighting, Heritage buildings and sensitive areas like artifacts and fragile paintings, Project scope, Spatial factors, Psychological & Psychological factors, Task factors

Unit-B: Lighting patterns and forms, Human reaction to light, Color application, Environmental impression, Daylight Technology, Task–Ambient lighting,

Unit-C: Systems of Lighting Guidance, New Retro Technology, Night time Architecture, Design Tools

Unit-D: Schematic Layout for the typical cases.

Suggested Readings:

1. Prafulla C. Sorcar , "Architectural Lighting-For Commercial Interiors", A Wiley - Interscience Publication, John Wiley & Sons
2. Jeremy Myerson , "International Lighting Design", Lawrence King (Jennifer Hudson)
3. Gary Steffy , "Architectural Lighting Design" - 2nd Edition.
4. Derek Phillips, "Lighting Modern Buildings", Architectural Press
5. M. Major, J. Speirs, A. Tischhanser , "The Art of Light & Architecture", Birkhanser
6. U. Brandi, C.G. Brandi , "Light book", Birkhanser
7. H. Koster , "Dynamic Day lighting Architecture – Basics, Systems Projects", Birkhanser.

Course Title: Research Seminar
Paper Code: ILE623

L	T	P	Credits	Marks
0	0	8	4	100

Course Objectives: To assess the debating capability of the student to present a technical topic. Also to impart training to a student to face audience and present his ideas and thus creating in him self esteem and courage that are essential for an engineer.

Individual students are required to choose a topic of their interest from energy related engineering topics preferably from outside the M.Tech syllabus and give a seminar on that topic about 30 minutes followed by a 10 minutes session for discussion/question and answers. A committee consisting of at least three faculty members (preferably specialized in Solar Power Engineering) shall assess the presentation of the seminar and award marks to the students. Each
student shall submit two copies of a write up of his / her seminar topic. One copy shall be returned to the student after duly certifying it by the Chairman of the assessing committee and the other will be kept in the departmental library. Internal continuous assessment marks are awarded based on the relevance of the topic, presentation skill, quality of the report and participation.

Note: (i) The seminar topic selected by the student must be approved by the authorized faculty of the department at least two weeks in advance.
(ii) Each student has to submit to the department a seminar report at least three days before the day of seminar.
(iii) Each student has to make the Power Point presentation with multi-media projector.

Course Title: Dissertation-I
Paper Code: ILE624

L	T	P	Credits	Marks
0	0	8	4	100

Course Objectives: To improve the professional competency and research aptitude by touching the areas which otherwise not covered by theory or laboratory classes. The dissertation work aims to develop the work practice in students to apply theoretical and practical tools/techniques to solve real life problems related to industry and current research.

The dissertation work can be a design project / experimental project and or computer simulation project on engineering or any of the topics related with Illumination Engineering. The dissertation work is allotted individually on different topics. The students shall be encouraged to do their dissertation work in the parent institute itself. If found essential, they may be permitted to continue their dissertation work outside the parent institute as per regulations of M.Tech of DAV University, Jalandhar. Department will constitute an Evaluation Committee to review the dissertation work. The Evaluation committee consists of at least three faculty members of which internal supervisor and another expert in the specified area of the project shall be two essential members. The student is required to undertake the Dissertation-I during the third semester and the same is continued in the 4^{th} semester.(Dissertation-II).

Dissertation-I consists of preliminary thesis/dissertation work, two reviews of the work and the submission of preliminary report. First review would highlight the topic, objectives, methodology and expected results. Second review evaluates the progress of the work, preliminary report and scope of the work, which is to be completed in the 4^{th} semester.

Course Title: Dissertation-II
Paper Code: ILE625

L	T	P	Credits	Marks
0	0	48	24	600

Course Objectives: To improve the professional competency and research aptitude by touching the areas which otherwise not covered by theory or laboratory classes. The dissertation work-II aims to develop the work practice in students to apply theoretical and practical tools/techniques to solve real life problems related to industry and current research.

Dissertation-II is a continuation of Dissertation-I started in the 3^{rd} semester of M.Tech. Before the end of the 4^{th} semester, there will be two reviews, one at middle of the fourth semester and other towards the end. In the first review, progress of the Dissertation work done is to be assessed. In the second review, the complete assessment (quality, quantum and authenticity) of the Dissertation is to be evaluated. Both the reviews should be conducted by supervisor and Evaluation committee. This would be a pre qualifying exercise for the students for getting approval for the submission of the Dissertation. At least two research papers are to be prepared for possible publication in Referred Journal/Science Index Journals having impact factor more than 1.
The research papers are to be submitted along with the dissertation. The final evaluation of the project will be external evaluation.