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Choice Based Credit System (CBCS) in the Light of NEP-2020
Diploma (Electrical Engineering)
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COURSE CODE	CATEGORY	COURSE NAME	TEACHING &EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
DTEE401N	DCC	Power Electronics	60	20	20	30	20	3	1	2	5

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; C - Credit.
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives(CEOs):
To introduce the students with the
1. Various power electronics devices.
2. Construction and the working principle of the devices.
3. Applications of various power electronics devices.

Course Outcomes (COs):
After the successful completion of this course students will be able to
1. Identify various types of power electronics devices.
2. Adequate knowledge of operation and applications of high-power switching devices as well as of power electronics and equipment.

Syllabus

UNIT I **9 Hrs.**
Power Semiconductor Devices
Role of power electronics in the field of electric power control, Characteristics and symbols of power semiconductor devices, Types of power electronic circuits, Characteristics and applications of general-purpose diode, fast recovery diode and schottky diode.
Characteristics and application of Bipolar Junction Transistor, Power MOSFET, Performance parameter, construction, characteristics and application of SCR, GTO, DIAC, TRIAC.

UNIT II **8 Hrs.**
Uncontrolled and Controlled Rectifiers
Rectifier operation on resistive loads, Single phase and three phase uncontrolled, controlled and fully controlled bridge rectifiers, Performance parameters, Simple numerical problems on controlled rectifiers.

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UNIT III **7 Hrs.**

Choppers

Principle of chopper operation, various control techniques of chopper, Step up and Step-down chopper and its applications.

UNIT IV **8 Hrs.**

Inverters

Single phase series and parallel inverters, Output voltage and current waveforms, Principle of operation of Single phase and three phase bridge inverter, Performance parameters.

UNIT V **9 Hrs.**

Single phase (midpoint & bridge configuration) cycloconverter configuration and operating principles, Single phase full wave AC voltage controllers with R load, Dual converter.

Textbooks:

1. Bimbhra, P.S, 'Power Electronics', Khanna Publisher, 4 rd Edition, 2013 Reprint 2014.
2. M.D. Singh and K.B.Kanchandhani, 'Power Electronics', Tata McGraw-Hill Publishing Company Limited, 2nd Edition, 2017.

References:

1. Rashid, M.H, 'Power Electronics - Circuits, Devices and Applications', Prentice Hall Publications, 4thEdition, 2017.
2. Vedam Subramaniam, 'Power Electronics', New Age International (P) Ltd Publishers, 2nd edition2018.
3. V. R. Moorthi, 'Power Electronics- Devices, Circuits and Industrial Applications', Oxford University Press, 1st Edition, 2005.

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List of Experiments:

1. V-I characteristics of SCR.
2. V-I characteristics of DIAC.
3. V-I characteristics of TRIAC.
4. Study of Power Diode as a switch
5. Study of Power MOSFET as a switch.
6. Study of Power Transistor as a switch.
7. Study of SCR as a switch.
8. Fabrication and testing of Half Controlled Bridge Rectifier circuit.
9. Fabrication and testing of SCR Chopper Circuit.
10. Fabrication and Testing of Inverter circuit.

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DTEE302	DCC	DC Machines	60	20	20	30	20	3	0	2	4

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***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

The objective of this course is -

1. To acquaint students with concept of D.C machine.
2. To understand D.C machines performance.
3. To apply the knowledge about testing and controlling D.C machines.

Course Outcomes (COs):

Upon completion of the course, the student shall be able to

1. To get the knowledge of energy conversion process.
2. To comprehend the construction, operations and working of D.C generator.
3. To understand the characteristics of D.C generator.
4. To comprehend the construction, operations and working of D.C motor.
5. To representation of distinguish testing of D.C motor.
6. To acquaint knowledge of Speed control of motor.

Syllabus

UNITI

D.C. Generator **9 Hrs.**

Principle of D.C. generator, Construction- yoke, pole cores and pole shoes, pole coil, armature core, armature winding, brushes, pole-pitch, Conductor-coil and winding element, Coil pitch, Pitch of winding, Back pitch, Front pitch, Commutator pitch, One and two layer winding, Multiplex winding, Lap and wave winding, Simplex lap and wave winding, Types of generators, E.M.F. equation, Losses and power stages, Condition for maximum efficiency, Total losses in DC Generator, Commutation and Armature reaction, Demagnetizing and magnetizing, Demagnetizing and cross magnetizing.

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UNIT II **9 Hrs.**

Generator Characteristics

Characteristics of D.C. Generators: separately-excited Generator,no-load, Curve for self excited generator, Critical resistance, O.C.C. at different speeds, Critical speed, Voltage buildup of ashunt generator, Factors affecting voltage building of a D.C. generator, External characteristic, Voltage regulation, Internal ortotal characteristic, Series generator, Compound-wound generator, Uses of D.C. generators.

UNIT III **8 Hrs.**

D.C. Motor

Motor principle, Comparison of generator and motor action, Significance of the back e.m.f., Voltage equation of a motor, Conditions for maximum power, torque, armature torque of a motor, Shaft torque, Motor characteristics, Characteristics of series and shunt Motors, Compound motors, Performance curves, Comparison of shunt and series motors, Losses and Efficiency.

UNIT IV **9 Hrs.**

Testing of D.C. Motor

Brake test, Swinburne's test, Advantages and disadvantages of Swinburne's test, Regenerative or Hopkinson's test, Merits of Hopkinson's test, Retardation or Running down test, Field's test for series motor.

UNITV **8 Hrs.**

Speed Control of D.C. Motor

Types of speed control, Speed control of shunt and series motors, Merits and demerits of rheostatic control method, electric braking, electric braking of shunt and series motors.

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***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Textbooks:

1. B. L. Thereja – "A text book of Electrical Technology – Vol - II" – S. Chand Publications.

References:

1. J. B. Gupta – "Theory and Performance of Electrical Machines", S. K. Kataria andSons.
2. S. J. Chapman - "Electric Machinery Fundamentals", Mcgraw Hill.
3. M. G. Say - "The performance and Design of Alternating Current Machines", CBSPublishers & Distributors.
4. D. P. Kothari & I. J. Nagrath - "Electrical Machines", TMH publication.
5. A. E.Fitzerald, C. Kingsley, S. D. Umans - "Electric Machinery"- 6th Edition, TataMcgraw Hill.
6. Dr. P. S.Bimbhra – "Electrical Machinery", Khanna Publisher.
7. J. J. Winders, Jr. – "Power Transformers: Principles and Applications", CRC Press.

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DTEE302	DCC	DC Machines	60	20	20	30	20	3	0	2	4

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***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

List of Experiments:

Experiments can cover any of the above topics, following is a suggestive list:

1. To study the cross sectional view of DC machines.
2. To obtain open circuit characteristics of self excited DC shunt generator and to find its critical resistance.
3. Speed control of D.C. shunt motor by Field current control method & plot the curve for speed verses field current.
4. Speed control of D.C. shunt motor by Armature voltage control method & plot the curve for speed verses armature voltage.
5. To perform Swinburne's test on a DC shunt machine and to calculate efficiency at full load.
6. To perform Hopkinson's test on a DC shunt machine and to calculate full load efficiency (a) when running as motor and (b) when running as generator.

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COURSE CODE	CATEGORY	COURSE NAME	TEACHING &EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
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DTEE305	DCC	Generation Transmission and Distribution	60	20	20	0	0	3	0	0	3

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; C - Credit.
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):
The main aim of this course is to understand:

1. Electric power generation from conventional and non-conventional energy source.
2. Analyze the performance of short, medium and long transmission lines.
3. To discuss the operation of HVAC & HVDC transmission, insulator strings, cables and different distribution schemes.

Course Outcomes(COs):
Students will be able to-

1. Understand the importance of non-conventional source of energy and different power plants like solar, wind, tidal, hydro, nuclear, thermal etc.
2. Compare A.C transmission and D.C transmission and derive the expression of transmission line parameters.
3. Determine the equivalent circuits for the transmission lines based on distance and operating voltage for determining voltage regulation and efficiency.
4. Discuss the various insulator materials & their testing and underground cable.
5. Explain the A.C and D.C distribution System and its classification.

Syllabus

UNIT-I **9 Hrs.**

Electric Power Generation

Introduction-Structure of electric power system, Conventional methods of power generations, schematic arrangement, and choice of site for Hydro, thermal, nuclear power plants, General layout & operation, Advantages and Disadvantages, comparison of these power plants.

Non-conventional Energy Source: solar energy its radiation, collection, storage, and application. Wind energy, Biomass energy, geothermal energy, and ocean energy as alternative energy sources.

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DTEE305	DCC	Generation Transmission and Distribution	60	20	20	0	0	3	0	0	3

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UNIT-II **9 Hrs.**

Electric Power Transmission

AC Transmission: Introduction-Typical Layout of A.C. Power supply scheme various of power Transmission-Advantages and Disadvantages of A.C Transmission.

Transmission Line Parameters: Parameters of single and three phase transmission lines with single and double circuits – Resistance, inductance and capacitance of conductors, skin and proximity effect.

H.V.D.C Transmission: Advantages and Disadvantages of D.C Transmission-Layout Scheme and principle of High Voltage D.C Transmission, Comparison with AC transmission.

UNIT-III **8 Hrs.**

Performance of Transmission Lines: Classification of lines – short line, medium line and long line – equivalent circuits, phasor diagram, real and reactive power flow in lines, transmission efficiency and voltage regulation, simple problems, Ferranti effect., Corona- formation and corona loss-Factors affecting Corona.

UNIT-IV **9 Hrs.**

Line Insulators and Cables: Introduction-Line Insulator Materials-Properties of Insulators-Types, causes of failure of Insulators, voltage distribution in insulator string, improvement of string efficiency, testing of insulators. Underground cables – Types of cables, Capacitance of Single-core cable, Grading of cables, Power factor and heating of cables, Capacitance of 3-core belted cable, D.C cables.

UNIT-V **8Hrs.**

Electric Distribution System: Introduction to distribution systems, Different types of supply system and their comparison, DC/AC Distribution system, their types.

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DTEE305	**DCC**	**Generation Transmission and Distribution**	60	20	20	0	0	3	0	0	3

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***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Textbooks:

1. Leonard L. Grigsby, 'Electric Power Generation, Transmission, and Distribution', CRC Press, 3rd edition, 2012.
2. S.N. Singh, 'Electric Power Generation, Transmission and Distribution', Prentice Hall of India Pvt. Ltd, New Delhi, Second Edition, 2011.

References:

1. Soni, Gupta, Bhatnagar, Electrical Power (Generation, Transmission, Distribution, Protection and Utilization), Dhanpath Rai and Sons, Delhi, 2012.
2. B. R. Gupta, S.Chand, 'Power System Analysis andDesign' New Delhi, Fifth Edition, 2008.
3. C.L. Wadhwa, 'Electrical Power Systems', New Age International Publishers, 8th2022.
4. D. P. Kothari, I.J. Nagarath, 'Power System Engineering', Tata McGraw-Hill Publishing Company Limited, New Delhi, third Edition, 2019.

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DTEE405N	DCC	Fundamentals of Microprocessor	60	20	20	30	20	3	0	2	4

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Course Educational Objectives (CEOs):
The objective of this course is to develop an understanding of the operations of microprocessors and machine language programming.

Course Outcomes (COs):
Upon completion of the course, the student shall be able to:
1. Understand and solve digital number system.
2. Recall and apply a basic concept of digital fundamentals to Microprocessor based personal computer system.
3. Analyze the Assembly language programs of 8085.

Syllabus

UNIT-I **9 Hrs.**
Introduction, Block Diagram of a Computer, Von Neuman and Harvard Architecture; **Components:** CPU, Memory, Bus, Input Device, Output Device; Word Length and Data Representation in Microprocessors; **Bus types:** Address Bus, Data Bus, Control Bus,

UNIT-II **8 Hrs.**
Introduction to 8085 Microprocessor: Architecture, Registers organization, ALU, Flag Register, Stack Pointer, Program Counter. Pin Diagram, Pin Description, Timing & Control Signals.
Instruction Cycle & Timing Diagrams: Fetch, Decode, Execute Cycle, Machine Cycle, and T-States.

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DTEE405N	DCC	**Fundamentals of Microprocessor**	60	20	20	30	20	3	0	2	4

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UNIT-III **8 Hrs.**

Memory Organization: Concept of Memory Addressing and Organization, Memory Read/Write operations; **Interfacing Basics**: Interfacing Microprocessors with Memory and I/O Devices. Memory Address Decoding. **Interrupts in 8085:** Interrupt vs Polling, Types of Interrupts and Interrupt Handling Mechanism.

UNIT-IV **8 Hrs.**

Instruction Set of Intel 8085: Instruction format, Types of Instruction, Addressing Modes. **Classification of Instructions:** Data Transfer, Arithmetic, Logical, Branching, and Control Instructions.

UNIT-V **8 Hrs.**

Assembly Language Programming: Writing simple programs for Addition, Subtraction, Multiplication, and Division. Logical Operations: AND, OR, XOR. Looping and Counting Operations. Delay programs, Branching and Conditional Execution.

Textbooks:

1. Fundamentals of Microprocessors & Microcontrollers – By – B. Ram, Revised Seventh Edition,2018.

References:

1. Digital Computer Electronics, Albert P. Malvino & Jerald A. Brown, 3rd edition, 2017.
2. Microprocessor Architecture, Programming & Applications, R. S. Gaonkar, 6th edition, 2013.

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***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

List of Experiments:

1. Write an assembly language program for data transfer among registers.
2. Write an assembly language program for transfer of data from one memory location to another.
3. Write an assembly language program to perform addition and subtraction.
4. Write an assembly language program for division of numbers.
5. Write an assembly language program for multiplication of numbers.
6. Write an assembly language program to perform logical operations
7. Write an assembly language program for generating delay.
8. Write an assembly language program to perform branching operations
9. Write an assembly language program to find the square of a number.
10. Write an assembly language program to perform addition of signed numbers.

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