PEOPLE'S UNIVERSITY, BHOPAL

(Applicable for Admitted from Academic Session 2019-20 onwards)

Programme: **Diploma in Engineering** **Semester –IV**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External (70)	Internal (30)	Total (100)	External	Internal	Total
DEE1402	Energy Conservation & Management	3	1	-			Min: 40 (D Grade)	Nil	Nil	Nil

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks:-15	Assignment/Quiz/Attendance- Max. Marks:-15
Practical Internal Max Marks: Nil	Lab work & Sessional – Max Marks:-Nil	Assignment / Quiz/Attendance - Max. Marks:- Nil

Pre-Requisite	Knowledge of environmental energy.
Course Outcome	1. Types of renewable and non renewable energy sources and Energy Management System.
	2. Advantage of waste heat recovery system.
	3. Energy conservation in various sector.

Unit	Contents (Theory)	Marks Weightage
I	**Energy Scenario**- Various types of renewable and non-renewable energy, Energy consumption and use pattern, energy consumption and environment. **Energy Management and audit**-Energy Management and its objectives, energy audit, need of energy audit, types of energy audit, energy auditing Instruments.	**14**
II	**Waste heat recovery**-Sources of waste heat, advantages of waste heat recovery, commercial waste heat recovery devices-Remunerators, Heat Regenerators, heat pumps etc. Agricultural use of waste heat. **Heating ventilation and air conditioning-**Definition of Heating, ventilation and air conditioning, Energy saving opportunities in Heating ventilation and air Conditioning, Conducting Audit in Heating ventilation and air conditioning.	**14**
III	**Role of maintenance in energy conservation-**Types of maintenance breakdown, Predictive & preventive, maintenance and energy conservation. **Demand side management** –Benefits, Demand side management, techniques, implementation of Demand side management program me, Tariff options of Demand side management.	**14**
IV	**Energy conservation in various sectors**- 1) For residential and commercial sector, 2) in transportation,3) in energy intensive industries. **Power factor improvement**-Causes of low power factor, advantages of power Factor improvement, and methods of power factor improvement.	**14**
V	**Energy intensive industries**.1) benefits, types of co-generation. Economic Analysis of energy conservation-Economic analysis of investment, Economic analysis techniques, Risk analysis.	**14**

Text Book/References Books/ Websites

1. Energy Conservation and Management by S. K. Soni and Manoj Nair, Satya Prakashan, New Delhi.
2. Energy management- W.R.Murphy & G.M. ckey, Butter worths.
3. Electrical Energy utilization & conservation – Dr. S.C.Tripathi.
4. Four books published by BEE (Bureau of Energy Efficiency) Govt. of India.

Suggested List of Laboratory Experiments :- (Expandable): Nil

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Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P			Total (100)	External (35)	Internal (15)	Total (50)
DEE1403	Power System - I	3	1	1	External (70)	Internal (30)	Min: 40 (D Grade)	Min: 14 (D Grade)	Min: Nil	Min: 20 (D Grade)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks:-15	Assignment/Quiz/Attendance- Max. Marks:-15
Practical Internal Max Marks: 15	Lab work & Sessional – Max Marks:-10	Assignment / Quiz/Attendance - Max. Marks:-05

Pre-Requisite	Knowledge of power system equipment.
Course Outcome	1. Become Familiar with the curricular structure of Transmission System
	2. Understand the quality requirements and quality testing procedures of selected Cables
	3. Acquire knowledge about various types of Conductors, Line Parameter and its Performances

Unit	Contents (Theory)	Marks Weightage
I	**Electrical Design of Lines:** Layout of different transmission and distribution systems, advantages of high voltage transmission, concept of short, medium and long lines, parameters of lines, performance of short lines (Regulation, efficiency, vector diagrams), corona formation and its effects on performance of lines	**14**
II	**Constructional Features of Transmission Lines:** Types of supports, types of conductors, types of insulators, their properties, selection and testing, voltage distribution of string insulators, equalization of potential. Vibration dampers.	**14**
III	**Economic Principle of Transmission:** Kelvin's law, limitations of Kelvin's law, Modification in Kelvin's law. Mechanical design of lines: Sag measurement, use of sag template Indian Electricity Rules pertaining to clearance, stringing of lines.	**14**
IV	**Distribution System:** Feeders distributors and service mains, radial and ring main distributors, A.C. distributors fed from one end and both ends. Simple problems on size of feeders and distributors. **Construction of Distribution Lines: E**rection of pole, fixing of insulators on conductors, testing, operation and maintenance of lines.	**14**
V	**Underground Cables:** Power cable construction, comparison of overhead lines and underground cables, laying of cables, cable jointing, use of apoxy resin kits. Fault location, Murray loop test, testing of cables. **Carrier Communication:** Principle of carrier communication over Power Lines, purposes, equipment, differences between radio transmission and carrier communication, block diagram.	**14**

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Text Book/References Books/ Websites

1. M.L. Soni, Gupta, Bhatnagar, Chakrabarthy, "A Text book on Power Systems Engineering", Danpat Rai & Sons, 2007.
2. Wadhwa, C.L., 'Electrical Power Systems', Wiley Eastern Limited India, 1985.
3. S.N. Singh, 'Electric Power Generation, Transmission and Distribution', Prentice Hall of India Pvt. Ltd, New Delhi, 2002.
4. B.R. Gupta, "Generation of Electrical Energy", Eurasia Publishing House (Pvt.) Ltd.,Ramnagar, New Delhi, 1983.

Suggested List of Laboratory Experiments :- (Expandable):

1. To study of Electrical design of transmission line.
2. To study of Mechanical design of transmission line.
3. Drawing of Tower structure.
4. Drawing of insulators.
5. To Study and Explanation of Kelvin's law with its limitations.

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Programme: **Diploma in Engineering** **Semester –IV**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P			Total (100)	External (35)	Internal (15)	Total (50)
DEE1404	Electrical Machine -II	3	1	1	External (70)	Internal (30)	Min: 40 (D Grade)	Min: 14 (D Grade)	Min: Nil	Min: 20 (D Grade)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks:-15	Assignment/Quiz/Attendance- Max. Marks:-15
Practical Internal Max Marks: 15	Lab work & Sessional – Max Marks:-10	Assignment / Quiz/Attendance - Max. Marks:-05

Pre-Requisite	Knowledge of electrical fundamentals & circuit
Course Outcome	1. Industrial application of induction motor, starting and control mechanism
	2. Operation and working of synchronous motor, load characteristics
	3. Classification and importance of special motors

Unit	Contents (Theory)	Marks Weightage
I	**Induction Motor:-** Rotating magnetic field for 3 phase concept of motors and its reversing. Construction and working of 3 phase induction motor (squirrel cage and wound rotor motor). Double squirrel cage induction motor. Rotor frequency, rotor e.m.f., rotor current and rotor power factor. Torque- slip characteristics. Methods of starting of induction motor. On line, auto transformer, star delta manual/automatic starters for induction motor. Starter for slip ring induction motor. Application of induction motor.	**14**
II	**Synchronous Machines:-** Construction, Principle of operation, Regulation of synchronous generators, Salient pole synchronous machines, Direct and quadrature axis reactances, Starting of synchronous motor, V curves, synchronous condenser, hunting and its elimination, Load and Torque angles of synchronous machines, comparison between induction motor and synchronous motor, uses of synchronous motor.	**14**
III	**F.H.P. Motors:-** Classification of F.H.P. motors, Production of rotating Magnetic field in 1 phase motors , Construction working and application of- **(i)** Capacitor motor (all types), **(ii)** Shaded pole motor, **(iii)** 1 phase synchronous motor, **(iv)** 1 phase series and universal motor, **(v)** Servo Motor (DC & AC).	**14**
IV	**Electric Drives:-** Advantages of electric drives, Characteristics of different mechanical loads., Types of motors used in electric drive, Use of fly wheels for fluctuating load (only physical concept), Types of enclosures, Methods of power transfer by devices like belt drive, gears, pulley, Examples of selection of motors for particular loads.	**14**
V	**Converting Apparatus:-** Introduction to different types of converting apparatus e.g. metal rectifier etc.	**14**

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Text Book/References Books/ Websites

1. Asfaq Hussain "Basic Electrical Engineering", Dhanpat Rai
2. Nagrath I.J., Basic Electrical Engineering, Tata McGraw Hill.
3. A.E. Fitgerald, D.E., Higginbotham and A Grabel, Basic Electrical Engineering, McGraw Hill.

Suggested List of Laboratory Experiments :- (Expandable):

1. To determine performance characteristics of a poly phase induction motor. (load v/s efficiency, load v/s power factor, load v/s slip)
2. To start a 3 phase induction motor and to determine its slip at various loads.
3. To connect and start an induction motor by using star delta starter, auto transformer starter, rotor starter and to change its direction of rotation.
4. To perform open circuit and block rotor test on a 3 ph. induction motor and to determine its efficiency.
5. Determination of performance curve and hence the core loss of a single phase series motor.
   Voltage and current ratio of metal rectifier
6. Sequential operation of motors using timers.

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Programme: **Diploma in Engineering** **Semester –IV**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P			Total (100)	External (35)	Internal (15)	Total (50)
DEE1405	General Mechanical Engineering	3	1	1	External (70)	Internal (30)	Min: 40 (D Grade)	Min: 14 (D Grade)	Min: Nil	Min: 20 (D Grade)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks:-15	Assignment/Quiz/Attendance Max. Marks:-15
Practical Internal Max Marks: 15	Lab work & Sessional – Max Marks:-10	Assignment /Quiz/Attendance - Max. Marks:-05

Pre-Requisite	Nil
Course Outcome	1. Ability to understand the basic principles of fluids and its properties.
	2. Ability to understand the basic principles of I.C.Engines and cycles of operations.
	3. Ability to understand the basic principles of power transmissions.

Unit	Contents (Theory)	Marks Weightage
I	**Thermodynamics** : Introduction, Work, Heat & Power ,Various thermodynamics properties, Thermodynamic system ,Thermodynamic 1)State of the System , 2) Process on the system ,Statement of first and second law of thermodynamic, limitations of first law of thermodynamics, Law of Ideal gases. Boyl's Law, Charles Law, Vander wall equations.	**14**
II	**Boilers**: Classification of boilers, Simple vertical boiler, Lancashire boiler , Locomotive boiler, Babcock and Wilcox boiler. **Properties of Steam** : Enthalpy of Dry and wet steam , Specific volume of dray and wet steam and Internal Energy of Dry and Wet Steam.	**14**
III	**I.C.Engine:** Differentiate I.C. Engine and External combustion Engine, Classification of I.C. Engines, two strokes and four stroke petrol engines with P-V and T-S diagram ,two strokes and four stroke diesel engines with P-V and T-S diagram, Indicated Horse Power, Brake Horse Power and Mechanical Efficiency.	**14**
IV	**Fluid Mechanics:** Classification of fluid**,** Definition of various fluid properties, Fluid pressure and its measurement, Pascal's Law, viscosity, Pressure head Absolute and gauge pressure, Bernoulli's theorem, Simple and differential U type Mano meters.	**14**
V	**Power Transmission:** Methods of Power transmission, types of drive system, flexible and rigid drive. **Belt drive**, Open and cross belt drive, Application and advantages of belt drive, Velocity ratio of pulleys. **Gear drive:** classification of gear, Velocity ratio in gear drive Merit and demerits of gear drive.	**14**

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Programme: **Diploma in Engineering** **Semester –IV**

Text Book/References Books/ Websites

1. S.B. Mathur ; "General Mechanical Engineering".
2. Mathur Mehta & Tiwari ; "Elements of Mechanical Engineering".
3. Raw & Choudhary; "Elements of Mechanical Engineering"
4. R.S. Khurmi; "Fluid Mechanics".

Suggested List of Laboratory Experiments :- (Expandable):

1. Study of Boilers a) Fire tube b) Water tube c) Bab cock & Wilcox Boiler d) Boiler mountings e) Boiler accessories.
2. I.C. Engines a) Study of I.C. Engine ,Two stoke and four stoke Petrol & Diesel Engine.
3. Study of Air Compressor, their construction and their uses.
4. Study of Centrifugal & reciprocating Compressor.
5. Study of Bernoulli's theorem.
6. Study of belt drive and gear drive in power transmission system.

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Programme: **Diploma in Engineering** **Semester –IV**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P			Total	External (35)	Internal (15)	Total (50)
DEE1406	Electrical Equipment Testing & Maintenance	-	-	1	External (Nil)	Internal (Nil)	Nil	Min: 14 (D Grade)	Nil	Min: 20 (D Grade)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks:- Nil	Assignment/Quiz/Attendance- Max. Marks:- Nil
Practical Internal Max Marks: 15	Lab work & Sessional – Max Marks:-10	Assignment / Quiz/Attendance - Max. Marks:-05

Pre-Requisite	Knowledge of electrical equipment.
Course Outcome	1. Tools and mechanism required for electrical installation, maintenance and repair works.
	2. Installation of transmission and distribution line, telecommunication line and railway line.
	3. Inspection and handling of transformer, installation of distribution and power transformer.

Unit	Suggested List of Laboratory Experiments :- (Expandable):	Marks Weightage
	All the laboratory Experiments shown below :- 1. Maintenance of Overhead Lines. 2. Maintenance of switchgear OCB. 3. Maintenance of distribution transformer in distribution system. 4. Routine / Preventive maintenance of induction motor in textile mills / industrial Establishments. (a) Shut down and energizing procedure. (b) Accident report writing. (c) Permit to work. (d) Fire extinguisher. 5. Insulation oil testing. 6. Earth resistance testing. 7. Test report of electrical installation. 8. Maintenance schedule. 9. Trouble shooting. 10. Report on hot line maintenance.	**50**

Text Book/References Books/ Websites: Nil

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Programme: **Diploma in Engineering** **Semester –IV**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P			Total (100)	External (70)	Internal (30)	Total (100)
DEE1407	Industrial Training-I	-	-	2	External (Nil	Internal (Nil)	Nil	Min: 28 (D Grade)	Nil	Min: 40 (D Grade)

Duration of Theory (Externals): -Nil

Theory Internal- Max Marks: -Nil	Best of Two Mid Semester Test – Max Marks: -Nil	Assignment/Quiz/Attendance Max. Marks: -Nil
Practical Internal Max Marks: 30	Lab work & Sessional – Max Marks: 25	Assignment / Quiz/ Attendance Max. Marks: 05

Pre-Requisite	Fundamental Engineering concepts.
Course Outcome	1. To develop general confidence, ability to communicate and attitude, in addition to basic technological concepts through Industrial visits, expert lectures, seminars on technical topics and group discussion. 2. Ability to learn actual working environment.

Unit	Contents (Theory)	Marks Weightage
I	As a part of the Diploma in Engineering curriculum, DEE1407, Industrial Training -I is a Practical course, which the students should undergo in reputed Private / Public Sector / Government organization / companies as industrial training of minimum two weeks to be undergone by the student in the semester break after III semester theory examinations. **Training period**: Minimum of two weeks or 15 (Fifteen) Days. **Companies / Areas covered**: Any field related to concern branch / discipline of Diploma in Engineering. **Grading**: As per Scheme. **Note:** Presentation will take place the following week after you complete your training. The presentation is evaluated by your class in charge. Report must be submitted during power point presentation. A Viva voce comprising comprehensive questions based on your training undergone. **Etiquette:** Dress properly, Behave well, Portray good image as a university student, Be punctual, Observe work ethics, Concern for safety, Be professional.	**100**

Text Book/References Books/ Websites: Nil

Suggested List of Laboratory Experiments :- (Expandable): Nil

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Programme: **Diploma in Engineering** **Semester –IV**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External	Internal	Total (100)	External	Internal	Total
DPE14011	E-Commerce and E- Business	3	1	-	External (70)	Internal (30)	Min: 40 (D Grade)	Nil	Nil	Nil

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 15	Assignment/Quiz/Attendance Max. Marks: 15
Practical Internal Max Marks: Nil	Lab work & Sessional – Max Marks: Nil	Assignment/Quiz/ Attendance Max. Marks: Nil

Pre-Requisite	Nil
Course Outcome	1.To understand technical aspect of E-commerce and E-Business.
	2.To describe the process of E-commerce and E-business.
	3.To understand Infrastructure design issues of E-commerce.

Unit	Contents *(Theory)*	Marks Weightage
I	**Introduction of E-Commerce**: Definition of E-Com , different types of E-com, E -commerce trade cycle , Advantages and disadvantages of E-com, Traditional commerce Vs E commerce.	**14**
II	**Overview Of Hardware and Software Technologies of E-Commerce:** Client side programming (Dream weaver , Front page), Server side programming (PHP) , Database connectivity , session tracking , middleware technologies from E- com.	**14**
III	**Payment System of E-Commerce**: Traditional payment model, Characteristics of payment, system, SET Protocol for credit card payment, E-cash, E-check, smart cards.	**14**
IV	**Introduction to E Business :** Definition of E business , Characteristics , elements of e business, roles , Impact of E business , challenges of E business .	**14**
V	**Developing E-Business-models:** E- business structure , Evolution of E – business and its business models stages , Characteristics of Internet based software and E- business solutions.	**14**

Text Book/References Books/ Websites

1.Henry Chan ;E-Commerce Fundamentals and application; Wiley publication
2.Dave Chaffey; E –business and E – commerce Management ; Pearson , 3rd edition
S. J. Joseph; E-Commerce: an Indian perspective,;PHI

Suggested List of Laboratory Experiments :- (Expandable):*Nil*

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Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P			Total (100)	External	Internal	Total
DPE14012	Rural Technology & Community Development	3	1	-	External (70)	Internal (30)	Min: 40 (D Grade)	Nil	Nil	Nil

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test - Max Marks: 15	Assignment/Quiz/Attendance - Max. Marks: 15
Practical Internal Max Marks: Nil	Lab work & Sessional Max Marks: Nil	Assignment / Quiz/ Attendance Max. Marks: Nil

Pre-Requisite	**Nil**
Course Outcome	1. To understand Rural areas problems.
	2. To describe the process by which we improve the living conditions of rural India.
	3. To understand how we help community of rural areas.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction:** Introduction to Rural Technology, Technology for Natural Resources Development and Conservation, Technology for Rural Livelihood Development, Technology for Infrastructure.	**14**
II	**Rural Energy Planning: Energy sources** - conventional, non-conventional-wind, bio-gas, solar; Energy audits: Energy conversion & conservation program, elements of energy accounting, Energy planning; demand and supply forecasting.	**14**
III	**Housing:** Housing in Rural Areas: Rural Housing Programmes, Low Cost Housing Appropriate Technologies in Rural Housing, Drinking Water Supply: Sources Problems, Programmes to Solve Drinking Water Problems; Problems of Sanitation in Rural Areas Low Cost Toilets.	**14**
IV	**Rural Community Facilities & Services:** Types of Community Facilities and Services: Water, sanitation, electricity; Provider of Community Facilities: Government, Non-Governmental Organizations, Philanthropic Organization;	**14**
V	**Various Program Under Community Facilities And Services;** Various Models in Providing Drinking Water and Sanitation in India. Rural Transportation system - modes of transportation - rural economy. Rural Health Care and Delivery Systems.	**14**

Text Book/References Books/ Websites

1. Vikram Singh ; Rural Development in India; Satyam Law International.
2. Katar Singh; Rural Development Principle Policies & Management;
3. Jerry W. Rabinson; Introduction to Community Development; SAGE.
4. Rhonda Phillips, Robert H. Pittman; An Introduction to Community Development; Taylor & Fransis

Suggested List of Laboratory Experiments :- (Expandable):Nil

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Programme: **Diploma in Engineering** **Semester –IV**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P			Total (100)	External	Internal	Total
DPE14013	Waste Management	3	1	-	External (70)	Internal (30)	Min: 40 (D Grade)	Nil	Nil	Nil

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks: 15	Assignment/Quiz/Attendance- Max. Marks: 15
Practical Internal Max Marks: Nil	Lab work & Sessional – Max Marks: Nil	Assignment / Quiz/Attendance- Max. Marks: Nil

Pre-Requisite	Nil
Course Outcome	1. Ability to understand about basic concept of waste management.
	2. Ability to understand about recycling of various wastes.
	3. Ability to understand about waste collection, handling and disposal.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction:** Definition, various sources, types of waste, problem associated with waste, effects of waste- on society, on human health, on animals. Recycling of waste.	**14**
II	**Municipal & Solid waste:** Definition-Sources of solid waste, types of solid waste, Composition of solid waste, collection methods and techniques of solid waste, industrial & agricultural waste.	**14**
III	**Hazardous & E-waste**: Definition- sources of hazardous waste, collection of hazardous waste. Medical waste & Nuclear waste, disposal method and treatment. Definition- sources of E-Waste, E-waste – non-recycling impacts, recycling of e-waste.	**14**
IV	**Collection, Treatment & Disposal:** methods of residential and commercial waste collection, collection vehicles, manpower. Segregation & composting of solid wastes. Method & techniques for treatment of solid waste.	**14**
V	**Disposal of Solid Wastes:** Refuse disposal systems, incinerations, principle features of an incinerator, site selection and plant layout of an incinerator. Sanitary landfill, advantages and disadvantages of sanitary land fill - site selection. Dumping-open & sea dumping.	**14**

Text Book/References Books/ Websites

1. Jagbir Singh, AL.Ramanathan; Solid Waste Management: Present and future challenges; I.K. International Publishing House Pvt Ltd.
2. George Tchobanoglous and Hillary theisen, Samuel Vigil; Integrated solid waste management; McGraw Hill.
3. T. V. Ramachandra; Management of Municipal Solid Waste; TERI press.

Suggested List Of Laboratory Experiments :- (Expandable): Nil