PEOPLE'S UNIVERSITY, BHOPAL

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

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

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External (70)	Internal (30)	Total (100)	External (Nil)	Internal (Nil)	Total
DEC16011	Satellite Communication	3	1	-			Min: 40 (D Grade)			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 – Nil Max Marks: Nil	Assignment/Quiz/Attendance – Max. Marks: Nil

Pre-Requisite	Basic Knowledge of communication system.
Course Outcome	1. Ability to understand satellite system.
	2. Properties and applications of TT & C system.
	3. Properties and applications of VSAT system.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction**: Frequency allocations for satellite systems, Orbits and launching methods: Kepler's three laws of planetary motion terms used for earth orbiting satellites, orbital elements, apogee and perigee heights.	**14**
II	**Satellite Parameters**: Introduction, antenna look angles, polar mount antenna, limits of visibility, near geostationary orbits, earth eclipse of satellite, sun transit outage, launching orbits, Polarization & Depolarization satellite signals.	**14**
III	**TT&C System** :Introduction, power supply units, altitude control, station keeping, thermal control, TT&C, transponders, Antenna subsystem	**14**
IV	**Unlink & Down link:** Introduction EIRP, transmission losses, link power budget, system noise, CNR, uplink, down link, effects of rain, atmospheric loss.	**14**
V	**VSAT System**: Network architecture, access control protocols, basic techniques, VSAT earth station, calculation of link margins for a VSAT star network, Introduction of Direct broadcast satellite.	**14**

Text Book/References Books/ Websites

1. D. Roddy; Satellite Communications, 4th Edition, TMH; New Delhi.

2. T. Pratt, C. Bostian and J. Allnut; Satellite Communications; Wiley India Pvt. Ltd.

3. D.C. Agrawal; Satellite Communications; Khanna Publishers.

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

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

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External (70)	Internal (30)	Total (100)	External (Nil)	Internal (Nil)	Total
DEC16012	Advance Communication System	3	1	-			Min: 40 (D Grade)			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 – Nil Max Marks: Nil	Assignment/Quiz/Attendance – Max. Marks: Nil

Pre-Requisite	Basic Knowledge of Communication System.
Course Outcome	1. Ability to understand basics of channel coding.
	2. Properties and applications of OFDM.
	3. Properties and applications of new wireless technology.

Unit	Contents (Theory)	Marks Weightage
I	**Channel coding:** Introduction, Block codes, Convolution codes, Trellis-coded modulation, Turbo-codes, Low density parity check codes, coding for the fading channels. **Speech coding:** Introduction, the sound of speech, stochastic models for speech, quantization and coding.	**14**
II	**Orthogonal Frequency Division Multiplexing (OFDM):**Introduction, principle of OFDM, frequency-selective channels, intercarrier interference, adaptive modulation and capacity, multiple access, multicarrier code division multiple access. **Multi antenna system**: smart antennas, multiple input multiple output systems.	**14**
III	**Code Division Multiple Access (CDMA 2000)**-Historical overview, system overview, the air interface, coding, spreading and modulation, logical and physical channels, handover. **Wideband Code Division Multiple Access (WCDMA)** - Historical overview, system overview, logical and physical channels.	**14**
IV	**Fourth Generation (4G):** Introduction of 4G and All-IP Network. Time delay spread, Noise figure, power limited and bandwidth-limited system, mobile and portable coverage, Ray-tracking and building block approach, coding scheme antenna down-tilt, Inter-modulation, mobile location, angle spread with antenna height and its application.	**14**
V	**New Concepts**-Channel capacity in a Rayleigh fading environment, real-time running average, link capacities versus call drops between GSM and CDMA, data transmission via cellular systems, multiuser detection for CDMA, spectrum and technology of a WLL system, wavelet representation.	**14**

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

Text Book/References Books/ Websites

1. A. F. Molisch; Wireless Communications; Wiley India Pvt. Ltd.
2. W. C. Y. Lee; Mobile Communications Engineering- theory and practices; TMH.
3. Upena Dalal; Wireless Communications; Oxford University Press.
4. Kamilo Feher; Wireless Digital Communications; PHI Learning.
5. Mullet; Introduction to Wireless Telecommunication Systems and Networks; Cengage Learning.

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

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

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External (70)	Internal (30)	Total (100)	External (Nil)	Internal (Nil)	Total
DEC16013	Cellular Mobile Communication	3	1	-			Min: 40 (D Grade)			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 – Nil Max Marks: Nil	Assignment/Quiz/Attendance – Max. Marks: Nil

Pre-Requisite	Basic Knowledge of Modulation techniques.
Course Outcome	1. Ability to understand basic properties of Cellular mobile system.
	2. Ability to understand basics of handoff mechanism.
	3. Ability to understand basics of Digital Cellular system.

Unit	Contents (Theory)	Marks Weightage
I	**Cellular Mobile System**: Introduction to cellular mobile system and concepts of GSM. A basic cellular system, performance criteria, Uniqueness of mobile radio environment, Operation of cellular systems, Planning of cellular system. Elements of Cellular Radio System Design: General description of problem.	**14**
II	**Elements of Cellular Radio System Design**: Concept of frequency reuse, Co channel interference, Hand off mechanisms, Cell splitting. Near-End-Far-End interference, Handoff, Types of Handoff. Cross-Talk, long distance interference. Effects of cell site Components.	**14**
III	**Cell coverage for signal and traffic**: General introduction, Obtaining the mobile point-to-point model, propagation in near in distance, long distance propagation. Foliage loss, Mobile-to-mobile propagation. Cell site antennas and mobile antennas.	**14**
IV	**Frequency management and Channel Assignment**: Frequency management, Frequency spectrum utilization, Setup channels, fixed channels assignment, Non-fixed channel assignment. Handoffs and Dropped Calls: Types of Handoff, Initiation of Handoff, Delaying a Handoff, Forced Handoff, Queuing of Handoff.	**14**
V	**Digital Cellular System**: GSM, Architecture, Layer Modeling, Transmission, GSM channels and Channel Modes, Multiple Access Scheme: CDMA, Terms of CDMA systems. Mobile Satellite Communication.	**14**

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

Text Book/References Books/ Websites

1. Lee; Cellular and Mobile Communication; 2nd edition, McGraw Hill.
2. D. P. Agrawal and Q. An Zeng; Wireless and Mobile Systems, Cengage Learning; 2006.
3. Faher Kamilo; Wireless Digital Communication, Prentice Hall of India; New Delhi, 2006.

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

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

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P			Total (100)			Total
DEC1602	Industrial & Consumer Electronics	3	1	-	External (70)	Internal (30)	Min: 40 (D Grade)	External (Nil)	Internal (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 – Nil Max Marks: Nil	Assignment/Quiz/Attendance – Max. Marks: Nil

Pre-Requisite	Basic Knowledge of Electronic Components.
Course Outcome	1. Ability to understand properties of a Thyristor.
	2. Ability to understand properties of Invertor & Chopper.
	3. Properties and applications of Microphones.

Unit	Contents (Theory)	Marks Weightage
I	**Power Supplies:** Power supply, rectifiers (half wave, full wave, and center tapped full wave), and performance parameters of power supplies, filters (capacitor, inductor, inductor-capacitor, and Pi filter), bleeder resistor, and voltage multipliers. Regulated power supplies (series and shunt voltage regulators, fixed and adjustable voltage regulators, Current Regulator.	14
II	**Thyristors:** Silicon controlled rectifies (SCR), constructional features, principle of operation, SCR terminology, turn-on methods, turn-off methods, triggering methods of SCR circuits.Triacs, Diacs,fast recovery diodes, Power diodes, Power transistor, Power MOSFET,IGBT.	14
III	**Inverter and Chopper:** Principle, Types and classification, Transistorized inverter and chopper, 3 Phase operation of inverter, Practical Applications of each.	14
IV	**Micro-Phone:** Microphones, Construction, working principle and applications of microphone. Carbon, moving coil, velocity, crystal, condenser type, cordless microphone.	14
V	**Sound recordings:** Sound recording on magnetic tape, its principles, block diagram and types, transport mechanism, digital sound recording on tape and disc CD system, HiFi system, Preamplifiers, Amplifiers and Equalizers, stereo amplifiers.	14

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

Text Book/References Books/ Websites

1. Bhimbra; Power Electronics; Khanna Publishers.
2. Rashid; Power Electronics- Circuits, devices and applications; Pearson Education.
3. Singh and Khanchandani; Power Electronics; TMH.
4. Bishwanath Paul; Industrial Electronics and control; PHI Learning.
5. Moorthi; Power Electronics; Oxford University Press.

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

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

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P			Total (100)			Total (50)
DEC1603	TV & RADAR Engineering	3	1	1	External (70)	Internal (30)	Min: 40 (D Grade)	External (35)	Internal (15)	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	Basic Knowledge of Communication System.
Course Outcome	1. Ability to understand basics of Television System.
	2. Ability to understand Color Television System.
	3. Properties and applications of RADAR.

Unit	Contents (Theory)	Marks Weightage
I	**Basic Television System**: Scanning principles: sound and picture transmission, scanning process, camera pick-up devices, video signal, transmission and reception of video signals, brightness perception and photometric quantities, aspect ratio and rectangular scanning, persistence of vision and flicker, vertical resolution, the Kell factor, horizontal resolution and video bandwidth, interlaced scanning.	**14**
II	**TV camera tubes:** (Monochrome), the image orthicon, vidicon and plumbicon tubes. Monochrome TV transmitter, I.F. modulation, diplexer, the sound transmitter. TV transmitter and receiving antennas, service area of a TV transmitter.	**14**
III	**TV receiver:** (Monochrome), Intercarrier sound system, R.F. tuner, Balun, video I.F. Amplifier, video detector and video amplifier, Horizontal and Vertical deflection circuit, Essential of color TV, compatibility and reverse compatibility, three color theory.	**14**
IV	**RADAR:** The Radar range equation, block diagram and operation, performance factors: prediction of range performance, minimum detectable signal, receiver noise, probability density functions, signal to noise ratios. Radar cross section of targets, transmitter power, pulse repetition frequency and range ambiguities, antenna parameters.	**14**
V	**Radar Receivers:** The radar receiver, noise figure, mixers, low noise front ends, displays- type A and PPI representations, duplexer and receiver protectors. **Other Radar systems**: Synthetic aperture radar, HF over the horizon radar, Air Surveillance Radar (ASR), Bistatic radar.	**14**

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

Text Book/References Books/ Websites

1. R.R.Gulati; Monochrome & Color Television; PHI Learning.
2. K.K Sharma; Fundamentals Of Television And Radar Engineering; Katson Publication.
3. J.J.Mohanty;Radar & TV Engineering;BK Publication.

Suggested List of Laboratory Experiments :- (Expandable):

1. To Study the Circuit Description of RF Tuner Section.
2. To Study the RF Section by Measuring Voltages at Various Test Points.
3. To Study the Fault Simulation and step by step Fault Finding Procedure for RF Section.
4. To Study of Doppler effect.
5. To Measure Speed of a fan & various other objects (Pendulum, Tuning Fork, Plate etc.)
6. To Simulate the Variable Speed of Moving Objects using Velocity Simulator.
7. To Study the Fault Simulation and step by step Fault Finding Procedure for Vertical Oscillator and vertical output Section.
8. To Study the Fault Simulation and step by step Fault Finding Procedure for sound output Section.

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

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P			Total (100)			Total (50)
DEC1604	Optical Communication	3	1	1	External (70)	Internal (30)	Min: 40 (D Grade)	External (35)	Internal (15)	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	Basic Knowledge of Communication System.
Course Outcome	1. Ability to understand basics of optical Communication System.
	2. Ability to understand basics of optical Diodes.
	3. Properties and applications of various optical Technologies.

Unit	Contents (Theory)	Marks Weightage
I	**Overview of Optical Fiber Communications (OFC)**: Generation and motivation of the Optical technologies, optical spectral bands, key elements of optical fiber systems. **Optical fibers**: basic optical laws and definitions, optical fiber modes and configurations, single mode fibers, graded-index fiber structure, fiber materials, fiber optic cables.	**14**
II	**Optical sources:** Light emitting diodes (LEDs): structures, materials, quantum efficiency, LED power, modulation of an LED. Laser diodes: modes, external quantum efficiency, resonant frequencies, single mode lasers, modulation of laser diodes. 3dB frequency concept. optical fiber connectors	**14**
III	**Photo detectors**: PIN photo detector, avalanche photodiodes. **Signal degradation in optical fibers:** Attenuation: units, absorption, scattering losses, bending losses, core and cladding losses. Signal distortion in fibers: overview of distortion origins, modal delay, factors contributing to delay, group delay, Characteristics of single mode fibers, refractive index profiles.	**14**
IV	**Optical receivers**: fundamental receiver operation, digital receiver performance, coherent detection, homodyne and heterodyne. **Optical links**: overview of analog & digital links, carrier to noise ratio, multichannel transmission techniques.	**14**
V	**Optical technologies-Wavelength division multiplexing (WDM) concepts**: operational principles of WDM, passive optical star coupler, isolators, circulators, Active optical components: MEMS technology, variable optical attenuators, tunable optical filters, basic applications and types of optical amplifiers.	**14**

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

Text Book/References Books/ Websites

1. G. Keiser; Optical Fiber Communications; TMH New Delhi.
2. J. M. Senior; Optical Fiber Communication-Principles and Practices; Pearson Education.
3. G. P. Agrawal; Fiber Optic Communication Systems; Wiley India Pvt. Ltd.
4. J. C. Palais; Fiber Optics Communications, 5th Edition; Pearson Education.
5. R.P. Khare; Fiber Optics and Optoelectronics; Oxford University Press.

Suggested List of Laboratory Experiments :- (Expandable):

1. Launching of light into the optical fiber and calculate the numerical aperture and V-number.
2. Observing Holograms and their study.
3. Optic version Mach-Zehnder interferometer.
4. Measurement of attenuation loss in an optical fiber.
5. Diffraction using gratings.
6. Construction of Michelson interferometer.
7. Setting up a fiber optic analog link and study of PAM.
8. Setting up a fiber optic digital link and study of TDM and Manchester coding.
9. Measurement of various misalignment losses in an optical fiber.

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

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P			Total			Total (250)
DEC1605	Major Project	-	-	5	External (Nil)	Internal (Nil)	Nil	External (175)	Internal (75)	Min: 100 (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: 75	Lab work & Sessional – Max Marks: -70	Assignment / Quiz/Attendance – Max. Marks: 05

Pre-Requisite	**Knowledge of Concerned Subject.**
Course Outcome	The student will be able to-An ability to utilize technical resources:
	1. Identify, analyze & define the problem.
	2. Generate alternative solutions to the problem identified.
	3. Compare & select feasible solutions from alternatives generated.
	4. Design, develop, manufacture & operate equipment/program.
	5. Acquire higher-level technical knowledge by studying recent development in Engineering field.
	6. Compare machines/devices/apparatus for performance practices.
	7. Work effectively in a team.

Unit	Contents (Theory)	Marks Weightage
-	The student should prepare a working system or some design or understanding of a complex system that he/she has selected for his project work using system analysis tools and submit the same in the form of a write-up i.e. detail project report. The student should maintain proper documentation of different stages of project such as need analysis, market analysis, concept evaluation, requirement specification, objectives, work plan, analysis, design, implementation and test plan wherever applicable. Each student is required to prepare a project report based on the above points and present the same at the final examination with a demonstration of the working system, if applicable. Evaluation will be based on his/her performance in technical work pertaining to the solution of a small size problem, project report, and presentation of work and defending it in a viva-voce.	**250**

Text Book/References Books/ Websites: Nil

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

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

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P			Total			Total (50)
DPE1606	Development of Professional Ethics	-	-	1	External (Nil)	Internal (Nil)	Nil	External (35)	Internal (15)	Min: 20 (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: 15	Lab work & Sessional – Max Marks: 10	Assignment / Quiz Max. Marks: 05

Pre-Requisite	**Nil**
Course Outcome	Ability to use of presentation aids, Presentation skills, Interview Technique and ethics

Unit	Contents (Theory)	Marks Weightage
I	**Presentation Skills** Body Language -- Dress Like The Audience Posture, Gestures, Eye Contact And Facial Expression. Presentation Skill – Stage Fright, Voice And Language – Volume, Pitch, Inflection, Speed, Pause; Pronunciation, Articulation, Language, Practice Of Speech; Use Of Aids –OHP,LCD Projector, White Board	**50**
	Group discussion and Interview technique – Introduction to group discussion, Ways to carry out group discussion, Parameters— Contact, body language, analytical and logical thinking, decision making **INTERVIEW TECHNIQUE** Necessity, Tips For Handling Common Questions.	
	Working in Teams: Understand and work within the dynamics of a groups. Tips to work effectively in teams, Establish good rapport, interest with others and work effectively with them to meet common objectives, Tips to provide and accept feedback in a constructive and considerate way, Leadership in teams, handling frustrations in group.	
	Professional Ethics: The foundations and norms of professional ethics. The need for separate code of conduct for professionals. The relation between professional and general ethics. Moral conflict and the issue of autonomy of professional ethics. Impact of Violation of Professional Ethics on Society, Remedies.	

Text Book/References Books/ Websites

1. Michael Hatton ;Presentation Skills (Canada – India Project) ;ISTE New Delhi
2. Richard Hale ,Peter;Target setting and Goal Achievement; Whilom Kogan page India
3. Chakravarty, Ajanta ;Time management ;Rupa and Company
4. Harding ham; Working in Teams;.A Orient Longman.
5. Koehn, D.; The Ground of Professional Ethics, Routledge, 1995.
6. Wuest, D.E; Professional Ethics and Social Responsibility, Rowman & Little field, 1994.

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Suggested List of Laboratory Experiments :- (Expandable):

1. Deliver a seminar for 10-12 minutes using presentation aids on the topic given by your teacher.
2. Watch/listen an informative session on social activities. **Make a report** on topic of your interest using audio/visual aids.
3. **Mini Project** on Task Management. Decide any task to be completed in a stipulated time with the help of teacher. Write a report on the group task assigned by teacher related to social and technical activities.
4. Conduct an interview of a personality and write a report on it.
5. Discuss a topic in a group and prepare minutes of discussion. **Write thorough description** of the topic discussed.
6. **Arrange an exhibition**, displaying flow-charts, posters, paper cutting, photographs etc on the topic given by your teacher.