PEOPLE'S UNIVERSITY, BHOPAL

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

Programme: Master of Technology **Specialization:** Digital Communication **Semester –II**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External	Internal	Total (100)	External	Internal	Total
MTDC12101	Satellite Communication	3	1	-	(70)	(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	To understand the basic concept in the field of Satellite Communication.
Course Outcome	1. To be able to understand the overview of satellite systems.
	2. To understand the geo stationary orbit, polarization & de-polarization.
	3. To be able to understand about space link & link design.

Unit	Contents (Theory)	Marks Weightage
I	**Satellite Orbits:** Kepler's First, second and third Law, Definitions of Terms for Earth-orbiting Satellites, Orbital Elements, Apogee and Perigee Heights, Orbital Perturbations, Effects of a Non spherical Earth, Atmospheric Drag, Inclined Orbits, Calendars, Universal Time, Julian Dates, Sidereal Time, The Orbital Plane,	**14**
II	**Satellite Link Design:** Antenna Look Angels, The Polar Mount Antenna, Limits of Visibility, Near Geostationary Orbits, Earth Eclipse of Satellite, Sun Transit Outage, Launching Orbits, Attitude Control, Spinning Satellite Stabilization, Momentum Wheel Stabilization, Station Keeping, Thermal Control, TT&C Subsystem, Transponders, Demultiplexer Power Amplifier, Antenna Subsystem.	**14**
III	**Earth Segment:** Receive-Only Home TV Systems, Master Antenna TV System Community Antenna TV System, Transmit-Receive Earth Stations, Equivalent Isotropic Radiated Power, Transmission Losses, Free-Space Transmission, Feeder Losses, Antenna Misalignment Losses, Fixed Atmospheric and Ionospheric Losses, Link Power Budget Equation, Overall System Noise Temperature	**14**
IV	**Satellite Access:** Carrier-to-Noise Ratio, Input Back Off, Combined C/N . Pre assigned FDMA, Demand-Assigned FDMA, SPADE System. Bandwidth-limited a Power-limited TWT amplifier operation, FDMA downlink analysis. TDMA: Reference Burst;.	**14**
V	**Satellite Applications:** INTELSAT Series, INSAT, VSAT, Mobile satellite services: GSM, GPS, INMARSAT, LEO, MEO, and Satellite Navigational System. Direct Broadcast satellites (DBS)-Direct to home Broadcast (DTH), Digital audio broadcast (DAB)- World space services, Business TV(BTV), GRAMSAT, Specialized services – E –mail, Video conferencing, Internet.	**14**

Approved From Academic Council

Text Book/References Books/ Websites:-

1. D. Roddy; Satellite Communication, (3/e); Mc Graw-Hill,2001.
2. T.Pratt & C.W. Bostain ; Satellite Communication; Willey 2000.
3. W L. Pritchard, HG. Suyderhoud, RA. Nelson; Satellite Communication System Engineering.

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

PEOPLE'S UNIVERSITY, BHOPAL

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

Programme: Master of Technology **Specialization:** Digital Communication **Semester –II**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External	Internal	Total (100)	External	Internal	Total
MTDC12102	Speech Processing	3	1	-	(70)	(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	To understand the knowledge of speech production & recognition.
Course Outcome	1. To get to know about the Speech production and acoustic phonetics.
	2. To be able to understand the Speech Enhancement.
	3. To understand the Speech Recognition.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction:** Speech production and acoustic phonetics, speech perception. Speech analysis: time and frequency domain techniques for pitch and formant estimation, cepstral and LPC analysis.	**14**
II	**Speech Enhancement:** Microform Codes, Source coders, and Hybrid coders. Speech Enhancement; Microphone Array processing, Noise Suppression, and Echo Canceller.	**14**
III	**Speech Recognition:** Basic pattern recognition, preprocessing, Parametric representation, Evaluating the similarity of speech patter, Accommodating both spectral and temporal variability, Network for speech recognition, Language model, Artificial neural networks.	**14**
IV	**Summary of Current Speech Recognition Design Speech Synthesis:** articulatory, formant, and LPC synthesis, voice response and text-to speech systems.	**14**
V	**Applications:** data compression, vocoders, speech enhancement, speech recognition speaker recognition, aids for the speech and hearing impairments	**14**

Text Book/References Books/ Websites:-

1. D O'shaughnessy; Speech Communication: Human and Machine; Addison Wesley.
2. L R Rabiner and R W Schaferm; Digital Processing of Speech Signals; Prentice Hall.
3. James L. Flanagan; Speech Analysis Synthesis and Perception; Springer-Verlag Berlin Heidelberg.

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

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PEOPLE'S UNIVERSITY, BHOPAL

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

Programme: Master of Technology **Specialization:** Digital Communication **Semester –II**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External	Internal	Total (100)	External	Internal	Total
MTDC12103	Artificial Intelligence	3	1	-	(70)	(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	Basic Knowledge of characteristics in artificial intelligence.
Course Outcome	1. To get to know about Introduction & problem characteristics in artificial intelligence.
	2. To understand the Game-playing.
	3. To be able to understand the Knowledge representation.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction:** Problem characteristics, issues in design of search algorithms. Searching: Uninformed search techniques, alterative deepening. Heuristics search techniques, Constraint Satisfaction; Means Ends Analysis; Alternative search techniques,	**14**
II	**Game-Playing:** Single player game, Two player game, The Minmax procedure, Minmax Procedure with alpha-beta cutoffs, Quiescent search, search efficiency	**14**
III	**Knowledge Representation:** The propositional Calculus – resolution in propositional calculus, entailment, PSAT problem, The Predicate calculus – resolution in predicate calculus, quantification, unification, horn clauses.	**14**
IV	**Expert System:** Introduction, knowledge representation in ES, reasoning with uncertain information, Bayes network, D-separation, probabilistic interfacing, inexact reasoning, representing common sense knowledge, non-monotonic and monotonic reasoning, forward and backward chaining.	**14**
V	**Introduction to ANN & Fuzzy Logic:** Feed forward and feedback networks, perceptions linearly separable and non-separable problems, supervised and unsupervised learning, back propagation algorithm, introduction to fuzzy logic and fuzzy sets, membership fuction, defuzzification methods, fuzzy arithmetic.	**14**

Approved From Academic Council

Text Book/References Books/ Websites:-

1. Nils J Nilson; Artificial intelligence: A new synthesis; Morgan Kaufmann Publishers.
2. E Rich and K Knight; Artificial intelligence;Tata MacGraw Hill Publishing.
3. Giarratano and Tiley; Expert Systems – Principal and programming; Thomson Publishing.

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

PEOPLE'S UNIVERSITY, BHOPAL

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

Programme: Master of Technology **Specialization:** Digital Communication **Semester –II**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External	Internal	Total (100)	External	Internal	Total
MTDC1202	Data Communication & Computer Network	3	1	-	(70)	(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	Basic Knowledge of Data Communication & Computer Network.
Course Outcome	1. To understand the review of synchronous and asynchronous transmission.
	2. To get to know about data link control.
	3. To understand the local area networks & various topologies.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction:** Review of synchronous and asynchronous transmission, circuit switching, message switching, packet switching and their comparison, various detector techniques, parity check, vertical and longitudinal redundancy check and CRC code and their error	**14**
II	**Data Link Control:** Data link control, point-to-point and multi-point links, flow control, sliding window protocol, various ARQ technique for error control and their comparison and performance analysis, HDLC as a bit oriented link control protocol.	**14**
III	**Communication Network:** Virtual circuit and datagram, routing algorithm, dijkstera and Bellman ford least cost, algorithm, various routing protocol, congestion control technique, deadlock and its avoidance.	**14**
IV	**Local Area Network:** Various topologies and medium access control schemes such as contention, polling, token parsing and performance analysis, various IEEE standards for LAN,UBS LANs, FDDI.	**14**
V	**Computer Communication Architecture:** Introduction to WAN packet switching technologies such as ATM and Frame relay. Introduction to TCP / IP protocols.	**14**

Text Book/References Books/ Websites:-

1. W. Stalling; Data And Computer Communication;PHI.
2. Tanenebaum; Computer Networks;PHI.
3. Keiser; Local Area Network; TMH.

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

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PEOPLE'S UNIVERSITY, BHOPAL

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

Programme: Master of Technology **Specialization:** Digital Communication **Semester –II**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External	Internal	Total (100)	External	Internal	Total
MTDC1203	Optical Communication	3	1	-	(70)	(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	To understand the knowledge of fiber optics and its phenomenon.
Course Outcome	1. To understand the concept of fiber optics and its phenomenon.
	2. To know how to do the modeling of optical cables.
	3. To understand the concept of optical switches.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction:** Propagation of light, propagation of light in a cylindrical dielectric rod, Ray model, wave model. Different types of optical fibers, Modal Analysis of a step index fiber.	**14**
II	**Optical Channel Modeling:** Signal degradation on optical fiber due to dispersion and Attenuation. Fabrication of fibers measurement techniques like OTDR.	**14**
III	**Optical Sources:** LEDs and Lasers, Photo-detectors – Pin-detectors, detector responsively noise, Optical link design – BER calculation, quantum limit, power panelities.	**14**
IV	**Optical switches:** coupled mode analysis of directional couplers, electro-optic switches.	**14**
V	**Optical Links & Amplifiers:** Nonlinear effect in fiber optic links. Concept of self-phase modulation, group velocity dispersion and soliton based communication. Optical amplifiers – EDFA, Raman amplifier and WDM systems.	**14**

Text Book/References Books/ Websites:-

1. J. Keiser; Fiber Optic Communication; McGraw-Hill
2. J. Gower; Optical Communication systems; Prentice Hall, India.
3. G. Agrawal; Fiber optic Communication systems; John Wiley and sons.
4. John M. Senior; Optical Fiber Communications Principles and Practice; Pearson Education India; 3 edition (2010).

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

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PEOPLE'S UNIVERSITY, BHOPAL

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

Programme: Master of Technology **Specialization:** Digital Communication **Semester –II**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External (70)	Internal (30)	Total (100)	External (Nil)	Internal (Nil)	Total
MTDC1204	Wireless & 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 – Max Marks: Nil	Assignment/ Quiz/Attendance – Max. Marks: Nil

Pre-Requisite	To understand mobile radio communication principles and to study the recent trends adopted in cellular systems and wireless standards.
Course Outcome	1. To get to know about the mobile communication, GSM & CDMA technology.
	2. To be able to understand the cellular radio system design.
	3. To get to know about the radio wave propagation.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction to Wireless Communication System:** Introduction to mobile communication, Past, present and Future wireless– Mobile Technology. Introduction to GSM and CDMA Technology. GSM system architecture overview, call management and system operation. CDMA based cellular system.	**14**
II	**Cellular Concept- System Design Fundamentals:** Cellular radio system design, frequency assignment, frequency reuse channels, Concept of cell splitting. Handover in cellular systems. Handoff algorithms.	**14**
III	**Wave Propagation:** Radio wave propagation, propagation models, reflection, scattering, fading, shadowing multipath effects Path loss over hilly and flat terrain, Power prediction over flat and hilly terrain.	**14**
IV	**Design & Simulation:** RF design, received signal phase and envelope characteristic. Simulation of wireless channel.	**14**
V	**Modulation Techniques:** Bandwidth and power spectral density, pulse shaping techniques, BPSK, QPSK, OQPSK, MSK, GMSK	**14**

Approved From Academic Council

Text Book/References Books/ Websites:-

1. William C. Y. Lee; Mobile Communication Engineering, Theory and Applications; McGraw Hill.
2. Theodore S. Rappaport; Wireless Communications Principles and Practice; PE India.
3. VK Grag, and JE Wilkes; Wireless and Personal Communication Systems; Prentice Hall.

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

PEOPLE'S UNIVERSITY, BHOPAL

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

Programme: Master of Technology **Specialization:** Digital Communication **Semester –II**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External (70)	Internal (30)	Total (100)	External (Nil)	Internal (Nil)	Total
MTDC1205	Antenna Engineering & Design	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 – Max Marks: Nil	Assignment/ Quiz/Attendance – Max. Marks: Nil

Pre-Requisite	To understand the fundamental radiation mechanisms of antennas and get an overview of the special characteristics of the most common antenna types.
Course Outcome	1. Apply the analysis and design of Antenna design.
	2. Provide an overview of Special topics for antenna design and measurement.
	3. Provide an awareness of Measurement of various antenna parameters.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction to Antennas**: Review the fundamental theory of antennas: Reciprocity theorem, Antenna equivalent circuit, Classification of antennas, Brief understanding of special types of Antennas. Gain a thorough understanding of the important concepts: Radiation Impedance, Radiation Pattern, Antenna Impedance, Bandwidth, Directivity, Gain, Antenna efficiency, Radiation Efficiency, Antenna Polarization, Antenna Apertures.	**14**
II	**Antenna Synthesis, Analysis and Optimization Techniques:** Introduction to various methods of antenna synthesis such as Schelkunoff Polynomial, Fourier transforms, Woodward Lawson. Introduction to antenna analysis methods: Integral equation method, Moment method, Finite Difference Time Domain methods; Applications of these methods to the practical antennas such as dipole, loop, helical, microstrip patch, and PIFA.	**14**
III	**Antenna Design:** Various impedance matching techniques such as Quarter wavelength transformer, T-match, Gamma Match, Omega match, Baluns and Transformers. Analytical comparative study of wire type and aperture type, narrow band and wide band, element and antenna array antennas.	**14**
IV	**Special Topics for Antenna Design and Measurement:** Techniques to miniaturize an antenna for wireless LAN and Blue tooth applications, Wideband and multi-band antennas, Mobile antennas and antenna diversity, Reconfigurable antennas, Practical consideration in designing antennas for wireless communications (such as the interaction between mobile antenna and human body).	**14**
V	**Applications:** Measurement of various antenna parameters necessarily needed for practical antennas. Understanding the working and design of anechoic chamber, practical difficulties, types and applications.	**14**

Approved From Academic Council

Text Book/References Books/ Websites:-

1. Balanis C A; Antenna Theory: design and applications; Wiley.
2. Hohnson R C and H Jasik; Antenna Engineering Handbooks; McGraw Hill.
3 Harrington R F; Time harmonic Electromagnetic Fields; McGraw Hill.

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

PEOPLE'S UNIVERSITY, BHOPAL

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

Programme: Master of Technology **Specialization:** Digital Communication **Semester –II**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External	Internal	Total	External	Internal	Total (100)
MTDC1206	Advance Communication & Networking Lab	-	-	2	(Nil)	(Nil)	Nil	(70)	(30)	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: 15	Assignment/Quiz/Attendance – Max. Marks: 15

Pre-Requisite	Nil
Course Outcome	1. To study and understand digital modulation techniques
	2. To apply theoretical knowledge to demonstrate radiation pattern of different antenna
	3. To analyze and apply the channel losses in wireless model

Unit	Contents (Theory)	Marks Weightage
-	Radiation pattern & Measurement techniques of different antennas, Impedance measurements of Horn/Yagi/dipole/Parabolic antennas, digital modulation techniques, Transmission power in the Wireless network, Different losses in the channel.	**100**

Text Book/References Books/ Websites: - Nil

Suggested List of Laboratory Experiments :- (Expandable):

1. Experimental study of radiation pattern of different antennas.
2. Measurement techniques of radiation characteristics of an antenna.
3. Impedance measurements of Horn/Yagi/dipole/Parabolic antennas.
4. To measure the losses in the channel.
5. To study of digital modulation techniques.
6. To study of transmission power in the Wireless network.

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PEOPLE'S UNIVERSITY, BHOPAL

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

Programme: Master of Technology **Specialization:** Digital Communication **Semester –II**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External	Internal	Total	External	Internal	Total (100)
MTDC1207	Optical Communication Lab	-	-	2	(Nil)	(Nil)	Nil	(70)	(30)	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: 15	Assignment / Quiz/ Attendance – Max. Marks: 15

Pre-Requisite	Nil
Course Outcome	1. To learn the basic elements of optical fiber transmission link
	2. To understand different kinds of losses, signal attenuation in optical fibres & other dispersion factor.
	3. Study of network operations, OTDM, OTDN etc. Link budget & network design and management.

Unit	Contents (Theory)	Marks Weightage
-	Optical fiber transmission link, Different kinds of losses, signal attenuation in optical fibers & other dispersion factor, Single Mode Fibers, Transmitters, Receivers & links.	**100**

Text Book/References Books/ Websites:-Nil

Suggested List of Laboratory Experiments :- (Expandable):

1. Basic Fiber Measurements (attenuation, numerical aperture, scattering).
2. Multimode Fibers (bandwidth, dispersion, time and frequency domain)
3. Single Mode Fibers (bandwidth, dispersion, pulse propagation)
4. Transmitters (Lasers, LEDs, bandwidth, spectra, modulation)
5. Receivers (PIN and APD detectors, SNR, noise, bandwidth)
6. Links (intersymbol interference, components, SNR, eye diagrams)

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PEOPLE'S UNIVERSITY, BHOPAL

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

Programme: Master of Technology **Specialization:** Digital Communication **Semester –II**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External	Internal	Total (50)	External	Internal	Total
MT1208	Audit Course - II (English For Research Paper Writing)	2	-	-	(35)	(15)	Min: 20 (D Grade)	(Nil)	(Nil)	Nil

Duration of Theory (Externals): 2 Hours

Theory Internal- Max Marks: 15	Best of Two Mid Semester Test – Max Marks: Nil	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. Student will understand that how to improve your writing skills and level of readability.
	2. Learn about what to write in each section of research article.
	3. Understand the skills needed when writing a Title.

Unit	Contents (Theory)	Marks Weightage
I	Planning and Preparation; Word Order; Breaking up long sentences; Structuring Paragraphs and Sentences; Being Concise and Removing; Redundancy; Avoiding Ambiguity and Vagueness.	**07**
II	Clarifying Who Did What; Highlighting Your Findings; Hedging and Criticizing; Paraphrasing and Plagiarism; Sections of a Paper; Abstracts; Introduction.	**07**
III	Review of the Literature; Methods; Results; Discussion; Conclusions; The Final Check	**07**
IV	Key skills are needed when writing a Title; key skills are needed when writing an Abstract; key skills are needed when writing an Introduction; skills needed when writing a Review of the Literature.	**07**
V	Skills are needed when writing the Methods; skills needed when writing the Results; skills are needed when writing the Discussion; skills are needed when writing the Conclusions; useful phrases; how to ensure paper is as good as it could possibly be the first- time submission.	**07**

Text Book/References Books/ Websites:-

1. R. Goldbort (2006) Writing for Science; Yale University Press (available on Google Books).
2. R. Day (2006) How to Write and Publish a Scientific Paper; Cambridge University Press.
3. N Highman (1998); Handbook of Writing for the Mathematical Sciences; SIAM. Highman's book.
4. Adrian Wallwork ; English for Writing Research Papers; Springer.

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

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