CMR UNIVERSITY
Private University Established in Karnataka State by Act No. 45 of 2013

DIRECTORATE OF RESEARCH AND INNOVATION

PROGRAM STRUCTURE AND CURRICULUM

Doctor of Philosophy *(PhD)*

January 2022 Onwards

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1.	**About the University:**
	CMR University is "A NEW AGE UNIVERSITY TO NURTURE CREATIVE THINKERS". **CMR University** is promoted by **CMR Jnanadhara Trust**, which has over 25 years of Experience in **Academic Excellence & Leadership in Education** and is established under **CMR University Act 2013** and notified by **Government of Karnataka** (No. ED 91 UNE 2013 dated 12 Nov 2013). CMR University is offering Multi-Disciplinary Research, Post-Graduate (PG) & Under-Graduate (UG) Programs - with flexibility of course options - of practical relevance to the country's needs of Education, Industry & Society. The doctoral programs of CMRU are in both part time and full-time mode and the programs operate as per UGC guidelines.
2.	**SPECIAL FEATURES of CMRU:**
	CMRU has entered following strategic partnerships, and build the associations to empower the students and scholars for research • Global Business Foundation Skills (GBFS) courseware and NASSCOM IT-ITeS Sector Skills Council)'s employability skill assessment certification. • Industry-integrated, up-to-date & contemporary curriculum with value addition course on Business Analytics certification from IBM. • CMR University is a signatory to UN Global Compact with 'Principles for Responsible Management Education' (PRME), a United Nations initiative. • Continuous and comprehensive evaluation system, with 70% weightage for the term-end examinations & 30% weightage for project-based experiential learning methodology. • Theme specific subjects through UGC SWAYAM MOOCs. • Excellent state-of-the-art infrastructure with technology-enabled classrooms. • Student-centric support services & orientation, foundation & bridge courses for effective learning. • Conveniently located hostel accommodation (separate for Boys & Girls). • Design Thinking, Research&Entrepreneurshipmodules integrated into the curriculum

3.	**Title and Extent of Application:**
	Title: These regulations shall be cited as Academic Regulations Pertaining to Doctoral Degree of CMR University for the Directorateof Research and Innovation (2022 onwards).
	Extent of Application: These regulations will apply to Doctoral Degree Program being run in CMR University.

4.	**Program Specification:**		
	Schools offering Program		**All Schools of study of CMR University and associated departments**
	Category		**Research**
	Name of the Program (Short Title)		**PhD**
	Nomenclature for Final Award		**Doctor of Philosophy**
	System of Education		Semester System
	Awarding Body		CMR University, Bangalore

5.	**Eligibility Criteria:**		
			The following rules & regulations are as per UGC guidelines and could change as per any prevailing & upcoming UGC instructions. The candidate shall have post-graduation/master's degree from any recognized University in the state or any other University in India or abroad, recognized by the Equivalence Committee of this University or by AIU, New Delhi, with a minimum of 55% of marks in aggregate or equivalent Cumulative Grade Point Average (CGPA). However, in the case of candidates belonging to SC and ST (and other reservation norms stipulated by the Government), the minimum marks required shall be 50%. The minimum marks for admission in Engineering & Technology and Management subjects shall be a minimum of 60% of marks in aggregate or equivalent Cumulative Grade Point Average (CGPA). However, in the case of candidates belonging to SC and ST (and other reservation norms stipulated by the Government), the minimum marks required shall be 55%. In case of the teachers employed in University / affiliated

	Lateral Entry:		colleges on or before 31-03-1992 and are continuing in service on a regular basis shall be given a relaxation of 5% of marks at the Master's Degree level. Candidates with Bachelor's degree in Engineering /Technology /Architecture /Medicine under10+2+4/5 system with not less than a First Class or equivalent CGPA along with minimum of five years of professional experience are eligible to apply for admission to PhD program only in Management discipline. In case of examinations, where such a classification does not exist, a minimum of 60% marks is required in the qualifying examinations. Other things remaining the same, CMR University recognizes CA from The Institute of Chartered Accountants of India and CMA from The Institute of Cost Accountants of India for registering for PhD in Commerce and Allied discipline. A candidate seeking admission to PhD program under lateral entry category must have the prescribed qualification as per Para 5and must have registered and completed the course work fully in any other recognized University. Candidates who have not completed the coursework fully in any other recognized University are not eligible under the category of lateral entry.

6a.	**Details of Courses and Credits:**		
	There shall be three categories of courses viz., 'common to all disciplines', 'domain specific' and 'theme specific' courses. The total credits for allthe courses are 14 credits. Common Courses are those which are common and approved forthe Doctoral Program for all the disciplines offered by the University.		
6b.	**Credit Distribution for the Program:**		
	Category	***Course***	***Credits***
	Common to all disciplines	Research Methodology	6
		Research & Publication Ethics	2
	Domain Specific Subject	As applicable to each Scholar	4
	Theme Specific Subject	As applicable to each scholar	2
	Total Credits for the Program		14
	Total Academic Hours	**90 hours in 1st semester and 2nd semester is a self-study one**	

7.	**Program Delivery Systems:**
	The program involves class-room teaching by subject experts and resource persons, interactive sessions, and hands-on assignments. In addition to the class hours, the research scholars are supported with a group of experts to facilitate discussions to ensure learning of research methods as well as application of domain knowledge.At the discretion of the instructor, the classes can also be online, in workshop mode, and could involve assignment & experiential learning. The discipline specificcourse needs to be completed at University and is common for all department research scholars. The themespecific course completion will be online through SWAYAM Portal's Massive Open Online Courses (MOOC). The discipline specific exam will be conducted by the university on a self-study basis based on the syllabus detailed in this program structure document.The theme specific subject exam will be through UGC SWAYAM only and the certificate of completion with minimum pass 55% need to be submitted to research@cmr.edu.in for onward transmission to exam department and issuance of CMRU certificate reflecting the theme specific subject marks & credit.

8.	**Learning Objectives and Outcomes:**
	Learning Objectives of the Program: ▪ To enhance research skills and problem solving abilities ▪ To develop scientific knowledge and critical thinking ▪ To enrich - in all concerned disciplines and sectors of education and use a wide range of appropriate methodology in research. ▪ To understand research and research methods ▪ To understand and develop broad comprehension of research area and the processes & requirements for conducting successful research. ▪ To apply the basic aspects of research process in order to plan and execute a research project / paper.
	Learning Outcomes of the Program: At the end of the course, the research scholars are expected to: ▪ Critically analyze the research data and published research work. ▪ Demonstrate the knowledge of research process by actively participating in a research project independently and with the research team in their specialized stream/domain. ▪ Develop ability to conduct research and write research reports independently ▪ Development of attitudes, skills, values through research. ▪ Develop domain knowledge with recent trends ▪ All forms of research in their respective domains, should reach the class room teaching through teaching notes.

9.	**Scheme of Evaluation and Weightage:**		
	The evaluation system of the program is comprehensive and continuous during the entire period of semester, both by internal faculty and also by the external resource persons who have requisite expertise in domain/course area. In a semester, the evaluation and grading will be on the following parameters:		
	(a) Continuous and Comprehensive Evaluation (CCE)		30 Marks
	(b) Semester End Examination (SEE)		70 Marks
	Total marks (a + b)		100 Marks
	(a) The continuous and comprehensive evaluation will carry a maximum of 30% weightage of total marks. The concerned faculty will choose any three of the following parameterswith weightage for each parameter. ***'Class participation' will remain compulsory.***		
	i.	Practical Orientation on Design Thinking, Creativity & Innovation	
	ii.	Participatory and Integrated Learning	
	iii.	Assignments (Individual &Team)	
	iv.	Field Work (Data Collection)	
	v.	Participation in Seminars/Academic Events/Symposia etc.	
	vi.	Mini Research Projects	
	vii.	Presentations	
	viii.	Class Participation	
	ix.	Development of Case Study	
	The faculty will submit the '**CCE Assessment Plan**' to the Director, School of Research and Innovation which shall be approved by the Vice Chancellor. The total marks of the parameters will be scaled down accordingly for 30 marks/30% of total marks.		
	(b) Semester End Examination (SEE)		**70% Weightage of the Total Marks**
	i. Term-End Examination for each course will be conducted at the end of each semester, covering the entire syllabus. ii. The Examination will be conducted for 100 marks and obtained marks will be scaled down to 70 marks.		
	1. Minimum Passing Marks in Each Course		
	A scholar must score a minimum of 55% in aggregate and obtain a minimum of 55% marks each in CCE and SEE to pass in a semester.		

	2. CCE Upgrade
	In case a scholar is not able to complete the CCE within the given time, one additional opportunity would be given to complete and submit the CCE for revision of CCE marks before the SEE of that semester. Concerned faculty must report to the Director of DORI& due approval from Registrar/Vice-Chancellor during the same semester to be obtained.
	3. Make-up Examination

	The Make-up Examination facility shall be available to those scholars who have appeared and failed in the SEE in a semester. There shall be no Make-up Examination for those scholars who have failed in the supplementary examination. **Exception:** If a scholar has satisfactory attendance in a course and has secured a minimum of 55% in CCE but could not appear in SEE for valid and convincing reasons, shall be eligible to appear for the Make-up Examination after due approval by the Registrar/Vice Chancellor.
	4. Supplementary Examination
	The Supplementary Examination will be conducted along with regular examinations for those scholars who have failed in the previous semester/s. A satisfactory level of attendance during the previous semester is required to write the supplementary examination.

10. Grading System:

CMR University has adopted for the declaration of results and grading in academic performance & learning capabilities by Grade Point Average (GPA) and Letter Grade System (LGS) as follows:

%	Grade	Grade Point	Qualitative Level
90 – 100	O	10	Outstanding
80 – < 90	A+	9	Excellent
75 – < 80	A	8	Very Good
70 – < 75	B+	7	Good
60 – < 70	B	6	Above Average
55 – < 60	C	5	Average
<55	F	0	Unsatisfactory (Reappear)

Semester Grade Point Average (SGPA) will be awarded at the end of each semester and Cumulative Grade Point Average (CGPA) will be awarded at the end of the program.

Semester Grade Point Average (SGPA):

Each course in a program is associated with number of credits. Based on the number of Credits for a course and obtained Grade Point (GP) for that course in a Semester, the GPA is calculated as given below:

For a Course, if C = Number of Credits, the Credit Point (CP) = C X GP

Total CP of a Semester = Sum of Credit Points of all the Courses in that Semester

$$= \sum CP$$

For a Semester, $\boldsymbol{SGPA} = \frac{\sum \mathbf{CP}}{\sum \mathbf{C}}$ for that Semester

For a Program, $\boldsymbol{CGPA} = \frac{\sum \mathbf{CP\ for\ all\ Semesters}}{\sum \mathbf{C\ for\ all\ Semesters}}$

CGPA of 5.5 and above is required for the award of degree.

11. Maximum duration for passing the coursework:

For all research scholars, it is mandatory to clear the coursework subjects within a maximum of three attempts.

12. Minimum requirements for passing the coursework:

A scholar shall be declared to have passed the coursework of PhD program if he/she secures at least a CGPA of 5.5 (Course Alpha-Sign Grade C) in the aggregate of both internal assessment and term end semester examination marks put together in each course such as theory papers / practical / project work.

12 A. Revaluation:

i. A scholar can register for the revaluation through proper application to the Registrar (Evaluation). The Registrar (Evaluation) will arrange for the revaluation and the results will be intimated to the scholar.
ii. Revaluation is not permitted for assignment.

12 B. Review:

Scholars not satisfied with Revaluation can apply for Review of his/ her examination answer paper in a theory course, within the prescribed date on payment of a prescribed fee through proper application to Registrar (Evaluation). Scholars applying for Revaluation only are eligible to apply for Review.

12 C. Eligibility for Research Supervisor Allocation:

All scholars must successfully complete the 1st and 2nd semester coursework and must show satisfactory progress in the 1st and 2nd Doctoral Committee Meeting to be eligible for Research Supervisor allocation to be carried out during 3rd semester.

12 D. Certification and Award of Degree:

1. The coursework completion certificate will be issued only upon successful completion of all coursework subjects as per the academic & regulatory norms of CMR University.
2. The degree will be awarded to a research scholar only after successful completion of the program as per the CMR University Research Regulations

	13. Amendments to Academic &Regulatory Norms:
	The Program Structure and Regulations are subject to changes and amendments, in accordance with academic and regulatory norms of the University.

14. Semester-Wise Design of The Program:

Program	Semester-Wise Program Structure					
	Semester-1	**Semester-2**	**Semester-3**	**Semester-4**	**Semester-5**	**Semester-6**
PhD (Regular Entry)	Coursework -1. Coursework-2	Coursework-3, Coursework-4	Scholar has additional two semesters to complete the course work		-	
	DC Meeting-1 (Interview stage)	DC Meeting-2	DC Meeting-3	DC Meeting-4	DC Meeting-5* Pre-Submission Colloquium	
	Survey of Literature	Review of Literature (scholar's self-effort)	Identification of Research Problem	Data Collection	Data Analysis, Report Writing and Submission of Thesis	
	-	-	Progress Report-1	Progress Report-2	Progress Report-3	Progress Report-4 (If required)
PhD (Lateral Entry)	DC Meeting-1	DC Meeting-2**	DC Meeting-3** Pre-Submission Colloquium		Depending on the satisfactory progress of research work, early submission of thesis may be permitted on case to case basis upon approval from RAC.	
	Survey and Review of Literature& Coursework equivalence	Identification of Research Problem and Data Collection	Data Analysis, Report Writing and Submission of Thesis			
	Progress Report-1	ProgressReport-2	Progress Report-3	Progress Report-4 (If required)		

*** Based on the progress of research work,** *the 5th Doctoral Committee (DC) will recommend for pre-thesis submission colloquium.*

*** The respective Doctoral Committee (DC) meeting will decide the time of submission of the thesis and recommend for submission on the basis of quality of research work and the amount of time spent on thesis in other recognized university in case of lateral entry candidates.*

Note:

a) Research supervisors will be allotted to the regular entry candidates only after the end of 2nd Semester

b) Research supervisors will be allotted to the lateral entry candidates only after the 1st Doctoral Committee meeting.

15. Program and Evaluation Structure:

Semester I

Course Code	Name of the Course	Credits	Total Hours	Course Design by	CCE Max. Marks	SEE Max. Marks	Total Marks	Min. Passing Marks
PHD101	Research Methodology	6	90	CMRU	30	70	100	55

Semester II								
Course Code	**Name of the Course**	**Credits**	**Total Hours**	**Course Design by**	**CCE Max. Marks**	**SEE Max. Marks**	**Total Marks**	**Min. Passing Marks**
(Part A)	Research & Publication Ethics	2	30	CMRU	30	70	100	55
(Part B) Domain Specific Subject	Domain Specific (as applicable)	4	60	CMRU	30	70		55
(Part C) Theme Specific Subject	Theme Specific (as applicable)	2	30	UGC SWAYAM	As per UGC SWAYAM rules	As per UGC SWAYAM rules		55

16. Curriculum Structure
Semester II
Part – B
Domain Specific - As Applicable to Individual Scholars

Course Code	Name of the Course	Credits	Total Hours	Course Design by	CCE Max Marks	SEE Max Marks	Total Marks	Min. Passing Marks
PHD209BM	Contemporary Management	4	60	CMRU	30	70	100	55
PHD210BM	Contemporary Aspects of Commerce	4	60	CMRU	30	70	100	55
PHD201BE	Trends in Indian Economy	4	60	CMRU	30	70	100	55
PHD207BS	Organic Chemistry	4	60	CMRU	30	70	100	55
PHD208BS	Emerging Trends in Bio-Technology	4	60	CMRU	30	70	100	55
PHD209BS	Emerging Trends in Microbiology	4	60	CMRU	30	70	100	55
PHD204BT	Data Science and Big Data Analytics	4	60	CMRU	30	70	100	55
PHD205BT	Wireless Sensor Networks	4	60	CMRU	30	70	100	55
PHD206BT	Digital Signal	4	60	CMRU	30	70	100	55

	Processing							
PHD207BT	Computer Science Research Fundamentals	4	60	CMRU	30	70	100	55
PHD208BT	Encryption Algorithms	4	60	CMRU	30	70	100	55
PHD209BT	Digital Image Processing	4	60	CMRU	30	70	100	55
PHD210BT	Bio-Medical Instrumentation	4	60	CMRU	30	70	100	55
PHD202BL	Approaches in Legal Research	4	60	CMRU	30	70	100	55
PHD204BH	Contemporary English Literature	4	60	CMRU	30	70	100	55
PHD205BH	Hindi Kahani Ka UdbhavAur Vikas	4	60	CMRU	30	70	100	55
PHD201BD	Trends and Contemporary Issues in Education	4	60	CMRU	30	70	100	55
PHD201BI	Recent Developments in Library and Information Science	4	60	CMRU	30	70	100	55
PHD201BC	Mass Communication Theory and Practice	4	60	CMRU	30	70	100	55
PHD201BW	Trends in Social Work	4	60	CMRU	30	70	100	55
PHD201BP	Issues and Applications in Psychology	4	60	CMRU	30	70	100	55
PHD201ME	Advanced Mechanical Engineering	4	60	CMRU	30	70	100	55
PHD201CV	Modern Construction Materials	4	60	CMRU	30	70	100	55
PHD201PH	Amorphous Solids and Chalcogenide Glasses	4	60	CMRU	30	70	100	55
PHD201KN	Kannada Literature	4	60	CMRU	30	70	100	55
PHD201AR1	Architecture: Environmental	4	60	CMRU	30	70	100	55

	Psychology and Crime Prevention Through Environmental Design (CPTED)							
PHD201AR2	Teaching Modes in Architectural Education	4	60	CMRU	30	70	100	55

PART-C

Semester II/III/IV								
Course Code	**Name of the Course**	**Credits**	**Total Hours**	**Course Design by**	**CCE Max Marks**	**TEE Max Marks**	**Total Marks**	**Min. Passing Marks**
PHD301	***Theme Specific (from UGC SWAYAM,*** (minimum 4 weeks course)***, https://swayam.gov.in/UGC***	2	30	CMRU	As per UGC SWAYAM rules	As per UGC SWAYAM rules	100	55

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Dr. Phani Kumar Pullela
Associate Director, Directorateof Research and Innovation

Dr. Praveen R.
Registrar

Vice Chancellor

16. Curriculum Structure:

PHD101: RESEARCH METHODOLOGY (Common to All Disciplines)

1.	COURSE FRAME WORK		
		PROGRAM	PhD
		COURSE CODE& TITLE	**PHD101** **RESEARCH METHODOLOGY**
		SEMESTER	**I SEMESTER**
		Credits for the Course	**6**
		Total Teaching Hours / Week	**6 Hours**
		PRACTICUM	**12 Hours**

2.	LEARNING OBJECTIVES	
	a)	To define research and to understand the various concepts in research process and research methods
	b)	To understand and develop research area and the processes required for conducting successful research.
	c)	To apply the basic aspects of research process in order to plan and execute a research project / paper.
	d)	To know and to operate with Excel spreadsheets/SPSS to conduct statistical analysis.

3.	LEARNING OUTCOMES	
	After the course, the research scholar will be able to:	
		Understand research terminology
		Describe quantitative, qualitative and mixed methods of approach to research
		Identify the components of research process from the literature review for the submission of research report.
		Critically analyze the published research.
		Develop awareness of the ethical principles, challenges involved in research processes.

4.	SYLLABUS OF THE COURSE		
	Course Code	**Name of the Course**	
	PHD101	**RESEARCH METHODOLOGY**	
		Total Teaching Hours:	**90Hours**
	Unit No.	**Curriculum Coverage & Topic / Sub Topics**	**Teaching Hours**
	1	**Introduction**	**06 Hours**
		Meaning, scientific knowledge-common sense knowledge-scientific research-objectives-types of research – descriptive vs. analytical, applied vs. fundamental, quantitative vs. qualitative, conceptual vs. empirical – research process – characteristics and criteria of good research – research methods vs methodology	
	2	**Research Problem**	**08 Hours**
		Meaning-selecting a research problem – techniques, concepts-constructs and variables-types of variables; hypothesis: meaning-criteria-nature-difference between proposition, hypothesis and a theory. types of hypothesis-difficulties-sources-functions. literature review – meaning, importance, sources, problem-, identifying gaps from literature review and setting objectives for research problem	
	3	**Research Design and Method**	**08 Hours**
		Meaning-need for research design – concepts-features-phases-qualitative and quantitative designs- types of research designs. descriptive-exploratory-explanatory-experimental-others designs-advantages and disadvantages; pilot study developing a research plan-case study: meaning-features-applications-advantages and disadvantages-social surveys: meaning-objectives-types-planning-growth-social surveys in India	
	4	**Sampling and Data Collection**	**08 Hours**
		Sampling: meaning-purpose-principles– steps in sampling design – characteristics of a good sample design – types of sampling–probability and non-probability-advantages and disadvantages-sampling in qualitative research-sample size-criteria- techniques of data collection –primary data – data collection instruments. measurement scales.	
	5	**Data Analysis**	**20 Hours**
		Review of descriptive statistics, probability, random variable and probability distributions. interval estimation – single mean and single proportion, sample size determination. testing of hypothesis – null and alternative hypothesis, type i and type ii errors, one tail and two tail tests, level of significance. test for single mean and two means. test for single proportion and two proportions. chi square test for independence of attributes and equality of proportions. test for correlation coefficient and test for regression coefficient. one way and two-way ANOVA. non-parametric tests – sign test, Wilcoxon sign rank test, Mann Whitney test, Run test for randomness and Kruskal Wallis test. Introduction to multivariate analysis.	
	6	**Report Writing& Scholarly Publishing**	**24 Hours**
		Purpose-Contents-Problems-Interpretation and report writing – Techniques of interpretation – Structure and components of scientific reports – Different steps in the preparation – Layout, structure and language of the report – Illustrations	

		and tables – Types of report – Technical reports and thesis-Bibliography (Harvard and APA styles), drafting a minireview paper to for submission to a journal	
	7	**IPRs and Ethical Issues**	**06 Hours**
		Meaning-Importance-Protection-Patents-Copy Rights-Trade Marks Ethics in Research: Meaning-Importance-Problems-citation of published material-No citation of published material (Plagiarism) – Citation and acknowledgement-accountability.	
	8	Computer Applications for Research	**06 Hours**
		Use of tools/ techniques for research: Methods to search required information effectively, reference management software like Zotero/ Mendeley, Software for paper/ report formatting like LaTeX/ MS Office, Use of plagiarism software	
	9	**Practicum:**	**12 Hours**
		1. Data analysis using statistical package (SPSS): 06 Hours 2. Structuring Questionnaire and data collection: 06 Hours	
		Note: Assignments mandatory as part of CCE	

5.		**Reference Books:**	
		1.	Kothari C.R. Research Methodology: Methods and Techniques, New Age International, New Delhi,2009
		2.	Ahuja, Rak Research Methods, Rawat Publications, Jaipur,2002
		3.	Bhandarkar, P.L and Wilkinson, T.S. Methodology and Techniques of Social Research, Himalaya Publishing House,2002
		4.	Thakur, Devendra Research Methodology in Social Sciences, Deep and Deep Publications Pvt Ltd, New Delhi,2008
		5.	John W. Best and James V. Kahn, Research in Education (10th Edition), Pearson, 2005
		6.	Henry E.Garrett , Statistics in Psychology and Education, Longmans, Green and Co,1926
		7.	Pannerselvam, R. Research Methodology, Prentice –Hall of India, New Delhi,2004
		8.	Fink A., Conducting research Literature Reviews: From the Internet to Paper, Sage Publications,2009
		9.	Mayers S.L., Data Analysis for Scientists, John Wiley & Sons,1976
		10.	Torchim W.M.K., Research Methods: The concise Knowledge Base, Atomic Dog Publishing,2005
		11.	Day R.A., How to Write and Publish a Scientific Paper, Cambridge University Press1992
		12.	SubbarauN.R.,Hand book on Intellectual Property Law and Practice, S Viswanathan Printers and Publishing Private Ltd,1998
		13	Bhattacharya, Deepak Kumar Research Methodology, Excel Books, New Delhi,2006

		14	Trachim William M.K., Research Methods, Biztantra, New Delhi,2009
		15	Rao, AdithamBhujanga, Research Methodology, Excel Books, New Delhi,2008
		16	IGNOU, Action Research-A Document, 1995

Semester II
Part – A
Common to all Disciplines
PHD201: RESEARCH AND PUBLICATION ETHICS

1.	**COURSE FRAME WORK**	
	PROGRAM	**Doctor of Philosophy (Ph.D.)**
	COURSE CODE ANDNAME	**PHD201 - Research and Publication Ethics**
	SEMESTER	**Semester - II**
	TOTAL TEACHING HOURS	**30 Hours**

2.	**LEARNING OBJECTIVES**	
	e)	Equip students with philosophy and science of publishing research work ethically.
	f)	Provide knowledge to identify predatory publishers and journals
	g)	Understand conflict of interest and hands on of software tools related to plagiarism.
	h)	To acquaint with citations and research metrics.

3.	**LEARNING OUTCOMES**	
	After the course, the research scholar will be able to:	
	f)	Carry out research ethically and publish papers without compromising on quality.
	g)	Identify predatory journals and avoid publishing in the same.
	h)	Learn the importance of open access publications and advantage of publishing in these platforms.
	i)	Equip themselves with knowledge on how to use software tools for checking plagiarism.
	j)	Explore database, appraise authors via citation and produce quality research work ethically.

4.	SYLLABUS OF THE COURSE		
	Course Code	**Name of the Course**	
	PHD201	**Research and Publication Ethics**	
		Total Teaching Hours:	**30 Hours**
	Module No.	**Curriculum Coverage and Topic / Sub Topics**	**Teaching Hours**
	1	**PHILOSOPHY AND ETHICS**	**03 Hours**
		Introduction to philosophy: definition, nature and scope, concept, branches.Ethics: definition, moral philosophy, nature of moral judgments and reactions.	
	2	**SCIENTIFIC CONDUCT**	**05 Hours**
		Ethics with respect to science and research. Intellectual honesty and research integrity. Scientific misconducts: Falsification, Fabrication, and Plagiarism (FFP). Redundant publications: duplicate and overlapping publications, salami slicing.Selective reporting and misrepresentation of data	
	3	**PUBLICATION ETHICS**	**07 Hours**
		Publication ethics: definition, introduction and importance. Best practices / standards setting initiatives and guidelines: COPE, WAME, etc. Conflicts of interest. Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types. Violation of publication ethics, authorship and contributor ship. Identification of publication misconduct, complaints and appeals. Predatory publishers and journals PRACTICE	
	4	**OPEN ACCESS PUBLISHING**	**04 hours**
		Open access publications and initiatives. SHERPA/ROMEO online resource to check publisher copyright & self-archiving policies. Software tool to identify predatory publications developed by SPPU. Journal finder / journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggester, etc.	
	5	**PUBLICATION MISCONDUCT**	**04 Hours**
		A. Group Discussions: **02 Hours** Subject specific ethical issues, FFP, authorship. Conflicts of interest. Complaints and appeals: examples and fraud from India and abroad. **B. Software tools:** **02 Hours** Use of plagiarism software like Turnitin, Urkund and other open source software tools	
	6	**DATABASES AND RESEARCH METRICS**	**07 Hours**
		A. Databases: Indexing databases. Citation databases: Web of Science, Scopus, etc. **B. Research Metrics:** Impact Factor of journal as per Journal Citation Report, SNIP, SJR, IPP, Cite Score. Metrics: h-index, g index, i10 index, altmetrics.	

		Note: Minimum of three (10 marks each) hand written assignments are mandatory as part of CCE.
	Mandatory assignment	Write a review paperon the literature survey done by the research scholar's topic of research, and draft ready to be submitted to a UGC CARE/ SCOPUS Journal.

5.		**REFERENCES**
	1.	Bird, A. (2006). Philosophy of Science. Routledge.
	2.	MacIntyre, Alasdair (1967) A short History of Ethics. London.
	3.	P Chaddah, (2018) Ethics in Competitive Research: Do not get scooped; do not get plagiarized, ISBN:978-9387480865
	4.	National Academy of Sciences, National Academy of Engineering and Institute of Medicine. (2009). On being a scientist: A Guide to Responsible Conduct in Research: Third Edition. National Academy Press.
	5.	Health Sciences, 1-10. Retrieved from https://www.niehs.nih.gov/research/resources/bioethics/whatis/oindex.cfm
	6.	Bella, J. (2012). Predatory publishers are corrupting open access. Nature, 489(7415), 179-179. https://doi.org/10.1038/489179a
	7.	Indian National Science Acadamy(INSA), Ethics in Science Education, Research and Govenrnance(2019), ISBN:978-81-939482-1-7. http://www.insaindia.res.in/pdf/Ethics_Book.pdf

Semester II
Part – B
Domain Specific (As Applicable to Individual Scholars)

1.	**COURSE FRAME WORK**		
		PROGRAM	Doctor of Philosophy (PhD)
		COURSE CODE & TITLE	**PHD209BM – CONTEMPORARY MANAGEMENT**
		SEMESTER	**II SEMESTER**
		Credits for the Course	**4 Credits**
		Total Teaching Hours / Week	**4 Hours**

2.	**LEARNING OBJECTIVES**	
	a)	To make management fundamentals clear.
	b)	To comprehend changing dynamics of professional management.
	c)	To realize application of efficient and effective management.
	d)	To facilitate contemporary concepts, techniques and practices.
	e)	To clear doubts on efficacy of contemporary management.

3.	LEARNING OUTCOMES	
	After the course, the research scholar will be able to:	
	a)	Application of contemporary management concepts and process.
	b)	How to develop, manage and motivate teams.
	c)	Understand organisation behaviour and changes.
	d)	Develop modern strategies and processes.

4.	SYLLABUS OF THE COURSE		
	Course CODE	*Name of the Course*	
	PHD209BM	CONTEMPORARY MANAGEMENT	
		Total Teaching Hours:	60 Hours
	Unit No.	Curriculum Coverage & Topic / Sub Topics	Teaching Hours
	1	Introduction	12 Hours
		Management: nature, purpose, significance and functions; theories of management: Fredrick Taylor (scientific management), Henry Fayol (administrative management), Hawthorne studies (behavioural sciences), Peter Drucker (MBO), contributions to management; POLC: (planning, organising, leading, controlling), staffing, motivation, leadership, performance appraisal: nature, process, significance	
	2	Contemporary Issues, Sustainable Business Development	12 Hours
		VUCA: (volatility, uncertainty, complexity, ambiguity), social responsibility of managers, TBL: (triple bottom line of sustainable business development: social, ecological, financial); globalization, corporate governance, diversity and inclusion; decision making: meaning, nature, contents, steps; business environment PEST: (political, economic, social and technical), case studies	
	3	Organisation Behaviour and Effectiveness	12 Hours
		Organisational behaviour: introduction, individual behaviour, perception, learning, personality, Johari window; organisational effectiveness: organisational performance, stake holder perspective, high performance work practices, measuring performance, organisational citizenship, organisation culture, organisation change, group dynamics: benefits and types of groups, group formation and development, team building, achieving organisational goals, handling conflicts, case studies	
	4	Modern Management Systems	12 Hours
		Latest Trends: financial management, human resource management, marketing management, information technology: fundamentals, concepts, process, strategies; Maslow's hierarchy of needs, Porters five forces, Boston Consulting Group matrix, strategic planning, effective business communication, case studies	
	5	MSMEs and Family Business Management	12 Hours
		New age MSMEs, New age entrepreneurs-start-ups, Innovation and innovation culture; family business – issues in family business management, ownership, succession and transfer of power, creating family business strategy, financing family business, governance, communication and conflict resolution, gender and family business and future of family business in India, case analysis	

5.	STUDY MATERIALS		
	a)	Text Books	
		1.	Stephen P. Robbins; Organizational Behaviour, 12th Edition, Prentice Hall
		2.	UdaiPareek; Organizational Behaviour, Oxford University Press

		3.	L.M. Prasad: Principle and Practice of Management
		4.	Peter Drucker: Management: Tasks, Responsibilities, Practices, Harper Collins
		5.	Gordon.E and Natarajan.K: Financial Markets and Services, Himalaya Publishing House, New Delhi.
		6.	Khan M.Y: Indian Financial Systems Tata McGraw Hill, New Delhi

	b)	**Reference Books**	
		1.	Garry Deissler, Human Resource Management, Pearson, 13th edition.
		2.	Rao V.S.P: Human Resource Management Text and Cases, Excel Books
		3.	David A. DeCenzo, Stephen P. Robbins: Personnel/Human Resource Management, Prentice Hall of India
		4.	Kotler & Koshy, Marketing Management – A South Asian Perspective, Pearson 2007
		5.	Rajan Saxena, Marketing Management, 3rd Edition, TMH
		6.	O'Brien: Management Information Systems, McGraw Hill International Edition, New Delhi
		7.	Sudalaimuthu and Hariharan: Information Technology for Managers, Himalaya Publications

1.	**COURSE FRAME WORK**	
	PROGRAM	Doctor of Philosophy (PhD)
	COURSE CODE & TITLE	**PHD210BM - CONTEMPORARY ASPECTS OF COMMERCE**
	SEMESTER	**II SEMESTER**
	Credits for the Course	**4 Credits**
	Total Teaching Hours / Week	**4 Hours**

2.	**LEARNING OBJECTIVES**	
	a)	To understand the business environment, policy environment and reforms.
	b)	To apply the theory and practice of accounting and enable analysis of financial statements.
	c)	To understand the Indian capital market, its operations, instruments and regulations.
	d)	To identify the importance of Indian Financial system and recent developments.
	e)	To understand the activities and functions in the field of business administration and focus on general such as management, marketing, production, finance and data processing and entrepreneurship in all phases of business activity.

3.	LEARNING OUTCOMES	
	After the course, the research scholar will be able to:	
	a)	Understand the policy reforms and regulations.
	b)	Analyze the financial statements and understand the Indian capital market, its operations, instruments and regulations.
	c)	Understand contemporary ecommerce concepts and terminology, and the processes and management decisions that are involved in launching, operating and managing business activity on the World Wide Web.
	d)	Understand the recent developments in banking and insurance sectors.
	e)	Know the application of the latest technology adopted in banking to market their products/services.

4.	SYLLABUS OF THE COURSE		
	Course CODE	***Name of the Course***	
	PHD210BM	**CONTEMPORARY ASPECTS OF COMMERCE**	
		Total Teaching Hours:	**60 Hours**
	Unit No.	**Curriculum Coverage & Topic / Sub Topics**	**Teaching Hours**
	1	**Economic Environment of Business**	**12Hours**
		Business environment: meaning and elements - economic environment - economic policies – planning; legal environment of business in India - competition policy - consumer protection - environment protection - policy environment: liberalization privatization and globalization; Second generation reforms - industrial policy and implementation - industrial growth and structural changes. Business economics: nature and uses - concept of profit and wealth maximization - demand analysis and elasticity of demand; cost and revenue - price determination in different market situations: perfect competition, monopolistic competition, monopoly, price discrimination and oligopoly, pricing strategies.	
	2	**Accounting and Finance**	**12Hours**
		Accounting standards in India - inflation accounting - human resource accounting - responsibility accounting - social accounting; money and capital markets - working of stock exchanges in India, NSE, OTCEI, NASDAQ - derivatives and options; regulatory authorities: SEBI - rating agencies; new instruments; GDRS, ADRS; venture capital funds - mergers and acquisitions - mutual funds - measurement of risk and returns securities and portfolios ; computer application in accounting and finance; financial management: capital structure, financial and operating leverage - cost of capital - capital budgeting - working capital management - dividend policy;	
	3	**Business Management**	**12Hours**
		Principles of management: planning – organizing - staffing – motivation-leadership – communication - controlling corporate governance and business ethics; functional areas: marketing management: concepts of marketing, marketing mix –environment - consumer behavior, - market segmentation - product decisions pricing decisions; human resources management: concepts - functions - performance appraisal - industrial relations in India; international business : structure of India's foreign trade - composition and direction, - regulation and promotion of foreign trade.	
	4	**Banking and Insurance**	**12Hours**
		Financial Services: banking: importance of banking to business - types of banks – functions -banking sector reforms in India - development banking - E-banking - banking products and services; Insurance: introduction – savings and investment	

		schemes – insurance documents – life insurance – general insurance – group insurance –pension plans – health insurance – legislative framework – other financial services.	
	5	**E-Commerce**	**12Hours**
		Introduction: internet concepts – types: B2C – B2B – C2C – M-Commerce - E-Commerce business models –revenue models – electronic payment systems – security systems – social media and E-Commerce.	

5.	**STUDY MATERIALS**		
	a)	**Text Books**	
		1.	Business Environment by Francis Cherunilam, Himalayan Books.
		2.	Marketing management by Philip Kotler, Pearson, 14th Edition, New Delhi.
		3.	Human Resource Management by Garry Deissler, Pearson, 13th edition.
		4.	E-Commerce: Business, Technology, society, Laudon, Kenneth, Traver, Carol, Guercio, Pearson publications, New Delhi.
		5.	International Business, Text and Cases, Francis Cherunilam, EEE.
		6.	Accounting & Finance by Horngreen et al., Pearson, 7th Edition, Sydney.

	b)	**Reference Books**	
		1.	Business Economics, H L Ahuja, S. Chand and Company Ltd.
		2.	Marketing Management, Philip Kotler &Amstrong, Pearson, New Delhi.
		3.	Financial Markets and Services, Gordon.E and Natarajan.K, Himalaya Publishing House, New Delhi.
		4.	Futures and Options, Vohra N.D and Bagri B.R, Tata McGraw Hill, New Delhi.
		5.	Electronic Commerce – Frame work technologies and Applications, Bharat Bhasker, Tata McGrawHill Publications, New Delhi.

1.	**COURSE FRAME WORK**	
	PROGRAM	Doctor of Philosophy (PhD)
	COURSE CODE & TITLE	**PHD201BE - TRENDS IN INDIAN ECONOMY**
	SEMESTER	**II SEMESTER**
	Credits for the Course	**4 Credits**
	Total Teaching Hours / Week	**4 Hours**

2.	**LEARNING OBJECTIVES**	
	a)	To know the trends in the macro aggregates of the Indian economy.
	b)	To know the agricultural, industrial and service sector growth and challenges in the Indian economy.
	c)	To know the financial condition and to understand the implications of it on the Indian economy.
	d)	To know the growth of external sector and its impact on the Indian economy.

3.	LEARNING OUTCOMES	
	After the course, the research scholar will be able to:	
	a)	Understand various issues like growth of national income, population, poverty, human resources and economic stability in the Indian economy.
	b)	Understand the contribution of agriculture, industry and service sector to the overall development of the Indian economy.
	c)	Understand the budgetary exercises in bringing fiscal discipline in the Indian economy.
	d)	Understand the overall growth of foreign trade and its contribution to the Indian economy in the changing international order.

4.	SYLLABUS OF THE COURSE		
	Course CODE	***Name of the Course***	
	PHD201BE	**TRENDS IN INDIAN ECONOMY**	
		Total Teaching Hours:	**60 Hours**
	Unit No.	**Curriculum Coverage & Topic / Sub Topics**	**Teaching Hours**
	1	**Indian Economy: Macroeconomic Overview**	**12 Hours**
		National Income: GDP – GNP – PCI (Real and Nominal) – trends; poverty: incidence of rural and urban – trends – poverty alleviation programs; Population: demographic transition – size and growth – causes and remedies – migration of rural population; human resource development: importance – indicators – health and nutrition; employment: trends – structure – causes for unemployment and remedies; inflation: trends – causes – effects – remedies – Indian money and capital market trends – growth of capital market in India.	
	2	**Agriculture, Industry and Service Sectors**	**12 Hours**
		Agriculture: role – nature – cropping pattern – productivity and production trends – agriculture policy – WTO and agriculture – agriculture finance and marketing; Industry: trends in production and productivity – major industries – small scale and cottage industries – recent industrial policy – privatization and disinvestment – industrial sickness; Service sector: growth and contribution – service led growth.	
	3	**Union Public Finance**	**12 Hours**
		Public finance: growth of revenue – expenditure and debt – recent tax reforms – composition of expenditure – causes and expenditure management; public debt: problems and issues; fiscal policy – fiscal imbalance – role of Fiscal Responsibility and Budgetary Management Act – growth of fiscal deficit – causes and remedies.	
	4	**Foreign Trade of India**	**12 Hours**
		Composition and direction – balance of payments: causes for deficit – remedies: India's exchange rate policy – management of foreign exchange reserves – issues of convertibility of rupee – need for foreign capital, FDI and FII – India's external debt management – multinational corporations – FERA and FEMA – globalization and its impact on the Indian economy, World Economic Institutions – WTO, IMF, World Bank	
	5	**Social and Economic Infrastructure**	**12 Hours**
		Health, energy & power, transport, communication, urban & rural infrastructure, private & public investment in infrastructure	

5.	STUDY MATERIALS		
	a)	Text Books	
		1.	Indian Economy, V. K.Puri and S. K. Misra, Himalaya Publishing House, New Delhi
		2.	Indian Economy, J.R. Gupta, Atlantic Publishers, New Delhi
		3.	Indian Economy, Ramesh Singh, McGraw Hill Publications, New Delhi
		4.	Impact of Globalization on Indian Economy, P. Rajalingam, Tata Publications, New Delhi
		5.	IDFC, India Infrastructure Reports

	b)	Reference Books	
		1.	Report on currency and finance, Reserve Bank of India.
		2.	Reserve Bank Bulletin, Reserve Bank of India.
		3.	Economic Survey, Government of India.
		4.	CMIE reports, Centre for monitoring the Indian Economy, Mumbai.
		5.	Plan documents, Government of India.

1.	COURSE FRAME WORK		
		PROGRAM	Doctor of Philosophy (PhD)
		COURSE CODE & TITLE	**PHD207BS - ORGANIC CHEMISTRY**
		SEMESTER	**II SEMESTER**
		Credits for the Course	**4 Credits**
		Total Teaching Hours / Week	**4 Hours**

2.	LEARNING OBJECTIVES	
	a)	To be familiar with the interpretation of structure of compounds from spectroscopic analysis.
	b)	To gain knowledge about different types of important organic transformation.
	c)	To gain knowledge about synthetic strategies used for the synthesis of Organic compounds.
	d)	To be familiar with different types of photochemical reactions.
	e)	To gain knowledge about asymmetric compounds and asymmetric synthesis.

3.	LEARNING OUTCOMES	
	After the course, the research scholar will be able to:	
	a)	Interpret the structure of compounds.
	b)	Design a synthetic route to organic compounds and naturally occurring molecules.
	c)	Find out the mechanism involved in the transformations.
	d)	Synthesize chiral compounds based on its stereochemistry.

4.	SYLLABUS OF THE COURSE		
	Course CODE	***Name of the Course***	
	PHD207BS	**ORGANIC CHEMISTRY**	
		Total Teaching Hours:	**60 Hours**
	Unit No.	**Curriculum Coverage & Topic / Sub Topics**	**Teaching Hours**
	1	**Elements of Organic Spectroscopy**	**12 Hours**
		IR Spectroscopy: introduction, principles, characteristic vibrational frequencies of functional groups, Fermi resonance, Effect of hydrogen bonding on vibrational	

		frequencies; electronic spectroscopy: introduction, principles; NMR spectroscopy: ^{1}H NMR, ^{13}C NMR; mass spectrometry: introduction, principles, use of isotopic peaks, salient feature of fragmentation of organic compounds, McLafferty rearrangements, retro Diels-Alder fragmentation and ortho-effects; simple problems on structure determination based on the above spectral methods	
	2	**Strategies in Organic Synthesis**	**12 Hours**
		Oxidations: Swern, Prevost and Woodward oxidations; reductions: Birch reduction, reduction with $LiAlH_4$, $NaBH_4$, BH_3, AlH_3, and tri-n-butyl tin hydride; organo-metallic reagents: use of organo lithium, silicon and boron reagents in organic synthesis; functional group transformation; modern organic synthetic reactions: Wittig reactions, Click reaction, Grubb's catalyst and RCM olefin metathesis, Heck reaction, Julia- Olefination, Mukayama aldol reaction, Mitsunobu reaction, Suzuki Coupling	
	3	**Synthetic Strategies and Asymmetric Synthesis**	**12 Hours**
		Design of organic synthesis: terminology, retrosynthesis, FGI, disconnection, synthon synthetic equivalent, protecting groups, chemoselectivity, regioselectivity and stereoselectivity; linear and convergent strategies, use of disconnection approach in the synthesis of organic molecules.	
	4	**Organic Photochemistry**	**12 Hours**
		Properties of (n, π*) and (π, π*) states; photochemistry of alkenes: Cis-trans isomerisation, di-π- methane rearrangement; photochemistry of carbonyl compounds: Norrish Type-I reactions. photoreduction and photooxidation; Norrish Type-II reactions. Addition of carbonyl to carbon-carbon multiple bonds (Paterno-Buchi) reaction. barton reaction. singlet oxygen – photo oxidation and reactions with C=C compounds; photochemical cleavage of water.	
	5	**Stereochemistry and Stereoselective Synthesis**	**12 Hours**
		Asymmetric synthesis: terminology, concepts of prochirality, enantioselectivity and diastereoselectivity; methods for determination of enantiomeric and diastereomeric purity using polarimeter, ^{1}H-NMR and HPLC methods.	

5.	**STUDY MATERIALS**	
	a)	**Text Books**
	1.	Spectroscopic identification of organic compounds by P S Kalsi
	2.	Organic Spectroscopy by William Kemp
	3.	Some modern methods of organic synthesis by W Carruthers
	4.	Organic chemistry by Claydon
	5.	Organic SYNTHESIS- The disconnection approach by S. Warren
	6.	Introduction to organic photochemistry by John D. Coyle

	b)	**Reference Books**
	1.	Spectroscopic identification of organic compounds by RM Silverstein, G C Bassler and T B Morrill
	2.	Organic synthesis by O House
	3.	Reagents for organic synthesis, by Fieser&Fieser, Vol 1-11(1984)
	4.	Problems on organic synthesis by Stuart Warren
	5.	Stereochemistry of carbon compounds by Ernest L Eliel
	6.	Advanced organic chemistry by J. March, 6th Ed

	7.	Stereochemistry of organic compound by Eliel
	8.	Stereochemistry of organic compound by D. Nasipuri

1.	**COURSE FRAME WORK**		
		PROGRAM	Doctor of Philosophy (PhD)
		COURSE CODE & TITLE	**PHD208BS - EMERGING TRENDS IN BIOTECHNOLOGY**
		SEMESTER	**II SEMESTER**
		Credits for the Course	**4 Credits**
		Total Teaching Hours / Week	**4 Hours**

2.	**LEARNING OBJECTIVES**	
	a)	Nucleic acids replication, repair and recombination, protein synthesis and processing.
	b)	Conformation and stability of nucleic acid structures.
	c)	Nucleic acids isolation and purification and their detection methods.
	d)	Nucleic acid amplification, cloning genes.
	e)	Fundamental differences in genes of Prokaryotes & Eukaryotes.

3.	**LEARNING OUTCOMES**	
	After the course, the research scholar will be able to:	
	a)	Able to understand the basic morphological differences between DNA and RNA, their three-fold mechanism (Replication, Transcription, and Translation). Protein modifications.
	b)	Able to understand the transportation mechanisms of the nucleic acids.
	c)	Important factors that play a role in lysing the cells and separating the molecules based on individual characters like charge of the molecule.
	d)	Able to understand genes of bacteria.
	e)	Able to understand Eukaryotic gene structures and cloning.

4.	**SYLLABUS OF THE COURSE**		
	Course CODE	***Name of the Course***	
	PHD208BS	**EMERGING TRENDS IN BIOTECHNOLOGY**	
		Total Teaching Hours:	**60 Hours**
	Unit No.	**Curriculum Coverage & Topic / Sub Topics**	**Teaching Hours**
	1	**Introduction**	**12 Hours**
		Introduction to cell division, Mendelian laws and physical basis of inheritance, dominance and its molecular basis, basics of gene interaction, cis-trans-test and complementation test, lethal genes, polygenic traits, linkage and gene maps, double helix: physio-chemical considerations	
	2	**Organization & Mutation**	**12 Hours**
		Organization of prokaryotic and eukaryotic genomes, supercoiling, repetitive DNA, DNA replication: mechanism of replication of prokaryotic &eukaryotic chromosome, mutation: types and molecular mechanisms of mutations, mutagens, DNA repair	

	3	**Transport & Recombination Mechanisms**	**12 Hours**
		Transposition: mechanisms of transposition, role of transposons in mutation, Gene transfer in prokaryotes: Transformation, conjugation, transduction, construction of genetic maps in bacteria, Recombination: Homologous and site - specific recombination	
	4	**Gene Expression in Bacteria**	**12 Hours**
		Gene expression in bacteria: transcription and its regulation; operons, attenuation, anti-termination and anti-sense controls, Prokaryotic translation machinery, mechanism and regulation of translation,	
	5	**Gene Expression in Eukaryotes**	**12 Hours**
		Gene expression in eukaryotes: transcription, general and specific transcription factors, regulatory elements and mechanism of regulation, processing of transcripts	

5.	**STUDY MATERIALS**		
	a)	**Text Books**	
		1.	Genetics and Molecular Biology by Robert Schleif - The Johns Hopkins University Press, 1993, ISBN-13: 978-0801846748
		2.	Textbook of Molecular Biology Paperback – 2009 by Sastry (Author) Publisher: McMillian India Ltd (2009), ISBN-13: 978-0333929339
		3.	Molecular Biology: Genes to Proteins: 4th Edition Paperback – 2012 by Burton E. Tropp (Author) Publisher: Laxmi Publications; 4th Edition edition (2012) ISBN-13: 978-9380853499
		4.	Cell and Molecular Biology by Nalini Chandar (Author), Susan Viselli (Author) Publisher: Iippincott Williams & Wilkins; First edition (2012) ISBN-13: 978-8184737059

	b)	**Reference Books**	
		1.	Biotechnology; Editor: Deniz Ekinci; ISBN 978-953-51-2040-7, April, 2015
		2.	Author(s): Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, Peter Walter Edition: 5th; ISBN: 9780815341055 Publication Date: November 16, 2007
		3.	The Molecular Biology of Plant Cells by H. Smith - University of California Press 1978, ISBN-13: 978-0520034655

1.	**COURSE FRAME WORK**	
	PROGRAM	**Doctor of Philosophy (Ph. D)**
	COURSE CODE & TITLE	**PHD209BS – EMERGING TRENDS IN MICROBIOLOGY**
	SEMESTER	**II SEMESTER**
	Credits for the Course	**4 Credits**
	Total Teaching Hours/Weeks	**4 Hours**

2.	**LEARNING OBJECTIVES**	
	a)	History and Scope of Microbiology
	b)	Microscopy and Specimen Preparation
	c)	Prokaryotic and Eukaryotic Cell Structure and Function
	d)	Culture Media, Culture Methods and Identification of Bacteria

	e)	Control of Microorganisms
	f)	Infection and Immunity
	g)	Mycobacteriaceae

3.	**LEARNING OUTCOMES**	
	After the course, the research scholar will be able to:	
	a)	Appreciate the discovery of microbes, their role in diseases, the scope and relevance of their study
	b)	Understand the techniques of microscopy and various types of specimen preparation, interaction and individual properties of dyes and mordants.
	c)	Understand the basic morphological differences between prokaryotes and Eukaryotes.
	d)	Assess and use various culture media, culture methods and identification tests for bacteria.
	e)	Understand the need and and apply methods for sterilization, disinfection and antimicrobial chemotherapy.
	f)	Understand the sources, transmission methods and routes of infection for various infectious diseases.
	g)	Understand the types of immunity, its mechanisms and measurement
	h)	Understand the morphological, cultural, biochemical characteristics of Mycobacteriaceae, with an emphasis on the pathogenic species.

4.	**SYLLABUS OF THE COURSE**		
	CourseCODE	***Name of the Course***	
	PHD209BS	**EMERGING TRENDS IN MICROBIOLOGY**	
		Total Teaching Hours:	**60 Hours**
	Unit No.	**Curriculum Coverage & Topic/Sub Topics**	**Teaching Hours**
	1	**History and Scope of Microbiology**	**12 Hours**
		Discovery of Microorganisms, Recognition of the Microbial Role in Disease, Scope and Relevance of Microbiology	
	2	**Microscopy and Specimen Preparation**	**12 Hours**
		Light Microscope, Dark field microscope, Phase contrast microscope, Fluorescence microscope, Preparation and Staining of Specimens – fixation, dyes and simple staining, differential staining, staining specific structures.	
	3	**Prokaryotic and Eukaryotic Cell Structure and Function**	**06 Hours**
		Prokaryotic and Eukaryotic cell structure and organization – overview	
	4	**Culture Media, Culture Methods and Identification of Bacteria**	**06 Hours**
		Types of media, aerobic and anaerobic culture methods, methods of isolating pure cultures. Morphology, staining reactions, cultural characteristics, resistance, metabolism, fermentation and other biochemical properties, antigenic structures of bacteria - overview.	
	5	**Control of Microorganisms**	**06 Hours**
		Control of microorganisms by physical and chemical agents – sterilization and disinfection, antimicrobial chemotherapy.	
	6	**Infection and Immunity**	**06 Hours**
		Sources of infection, methods of transmission of infection, factors predisposing to microbial pathogenicity, infecting dose, route of infection, types of infectious diseases. Immunity – types of immunity – innate and acquired, mechanisms of immunity, vaccines, measurement of immunity, local immunity, herd immunity.	
	7	**Mycobacteriaceae: Tuberculosis, Non-tuberculous**	**12 Hours**

		Mycobacteria, *Mycobacterium leprae*	
		Morphology, cultural characteristics, resistance, biochemical reactions, antigenic properties, host range, pathogenesis, epidemiology, laboratory diagnosis, sensitivity tests, allergic tests, immunoprophylaxis, vaccine, treatment.	

5.	**STUDY MATERIALS**	
	1	Microbiology by Prescott, Harley and Klein, WCB Publishers, ISBN 0-697-01372-3
	2	Microbiology by Pelczar, Chan and Kreig, McGraw Hill Book Company, ISBN 0-07-Y66494-3
	3	Topley and Wilson's Microbiology and Microbial Infections, 9th edition, ISBN-13: 978-0340663165
	4	Review of microbiology and immunology, Richard M Hyde, 1986, University of Oklahoma, Health Sciences Center, Dept. of Microbiology and Immunology, ASIN: B00070X8WK
	5	Basic & Clinical Immunology, Daniel P. Stites, 1994, Appleton & Lange; Internat.8r.e. edition Paperback – International Edition, ISBN-10: 0838505619
	6	Textbook of Microbiology, R. Ananthanarayan and CK Jayaram Paniker Universities Press; Eight edition, ISBN-10: 8173716749

1.	**COURSE FRAME WORK**	
	PROGRAM	Doctor of Philosophy (PhD)
	COURSE CODE & TITLE	**PHD204BT - DATA SCIENCE AND BIG DATA ANALYTICS**
	SEMESTER	**II SEMESTER**
	Credits for the Course	**4 Credits**
	Total Teaching Hours / Week	**4 Hours**

2.	**LEARNING OBJECTIVES**	
	a)	Develop in depth understanding of the foundation concepts.
	b)	Develop in-depth understanding of theory and various techniques used for analytics.
	c)	Develop skills of solving analytics problems using various technologies and tools.
	d)	Develop understanding of application of Big data analytics in various domains.
	e)	Understand various research directions in the area of Big data analytics.

3.	**LEARNING OUTCOMES**	
	After the course, the research scholar will be able to:	
	a)	Explain basic concepts in data science and Big Data analytics.
	b)	Apply principles of Data Science to the analysis of business problems.
	c)	Solve analytics problems using appropriate technologies and tools.
	d)	Explain various applications across multiple domains.
	e)	Identify gaps and issues with current approaches which will enable identification of potential research areas.

4.	**SYLLABUS OF THE COURSE**

	Course CODE	*Name of the Course*	
	PHD204BT	**DATA SCIENCE AND BIG DATA ANALYTICS**	
		Total Teaching Hours:	**60 Hours**
	Unit No.	**Curriculum Coverage & Topic / Sub Topics**	**Teaching Hours**
	1	Introduction to Big Data Analytics and Data Analytics Lifecycle	**12 Hours**
		Big data overview, state of the practice in analytics, the data scientist, big data analytics in industry verticals. data analytics lifecycle: discovery, data preparation, model planning, model building, communicating results, operationalizing	
	2	**Advanced Analytics – Theory and Methods**	**12 Hours**
		K Means clustering, association rules, linear regression, logistic regression, Naïve Bayesian classifier, decision trees, time series analysis, text analysis,	
	3	**Advanced Analytics – Technologies and Tools**	**12 Hours**
		Analytics for unstructured data - MapReduce and Hadoop, the Hadoop ecosystem, in-database analytics – SQL essentials, basics of NoSQL	
	4	**Applications of Data Science and Analytics**	**12 Hours**
		Industry examples of big data: digital marketing, web analytics, fraud and big data, risk and big data, big data and advances in health care	
	5	**Understanding the State of the Art and Future Directions**	**12 Hours**
		Seminar using a survey paper that contains research directions	

5.	**STUDY MATERIALS**		
	a)	**Text Books**	
		1.	Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data, EMC2
		2.	Analytics in a Big Data World: The Essential Guide to Data Science and Its Applications, Bart Baesens
		3.	Michael Minelli et al, "Big Data Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses"
		4.	Big Data for Dummies, Alan Nugent, Fern Halper, Judith Hurwitz and Marcia Kaufman

	b)	**Reference Books**	
		1.	Big data analytics: a survey, Chun-Wei Tsai, Chin-Feng Lai, Han-Chieh Chao and Athanasios V. Vasilakos, *Journal of Big Data* 2015, **2**:21, http://www.journalofbigdata.com/content/2/1/21
		2.	Machine Learning for Big Data: Hands - On for Developers and Technical Professionals, Jason Bell
		3.	Big Data and Analytics (With CD), Seema Acharya, Subhashini Chellappan
		4.	Trevor Hastie, Robert Tibshirani, Jerome. H. Friedman. The elements of statistical learning: data mining, inference and prediction. Springer, 2009 http://www-stat-class.stanford.edu/~tibs/ElemStatLearn/
		5.	NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Pramod J. Sadalage and Martin Fowler

1.	COURSE FRAME WORK		
		PROGRAM	Doctor of Philosophy (PhD)
		COURSE CODE & TITLE	**PHD205BT – WIRELESS SENSOR NETWORKS**
		SEMESTER	**II SEMESTER**
		Credits for the Course	**4 Credits**
		Total Teaching Hours / Week	**4 Hours**

2.	LEARNING OBJECTIVES	
	a)	To develop an understanding of modern network architectures from a design and performance perspective.
	b)	To be familiar the major concepts involved in wide-area networks (WANs), local area networks (LANs), Wireless LANs (WLANs) and Wireless Sensor Networks (WSNs).
	c)	To propose, implement, and evaluate new ideas for solving wireless sensor network design issues.
	d)	To gain knowledge of emerging technologies and their potential impact.

3.	LEARNING OUTCOMES	
	After the course, the research scholar will be able to:	
	a)	Get an overview of the various network level protocols.
	b)	Understand what research problems sensor networks pose in disciplines such as signal processing, wireless communications and even control systems.
	c)	To get a broad understanding of the technologies and applications for the emerging and exciting domain of wireless sensor networks.

4.	SYLLABUS OF THE COURSE		
	Course CODE	***Name of the Course***	
	PHD205BT	**WIRELESS SENSOR NETWORKS**	
		Total Teaching Hours:	**60 Hours**
	Unit No.	**Curriculum Coverage & Topic / Sub Topics**	**Teaching Hours**
	1	**Overview**	**12 Hours**
		Challenges for wireless sensor networks, enabling technologies for wireless sensor networks.	
	2	**Architectures**	**12 Hours**
		Single-node architecture - hardware components, energy consumption of sensor nodes, operating systems and execution environments, network architecture - sensor network scenarios, optimization goals and figures of merit, gateway concepts.	
	3	**Networking Sensors**	**12 Hours**
		Physical layer and transceiver design considerations, mac protocols for wireless sensor networks, low duty cycle protocols and wakeup concepts - s-mac, the mediation device protocol, wakeup radio concepts, address and name management, assignment of mac addresses, routing protocols- energy-efficient routing, geographic routing.	
	4	**Infrastructure Establishment**	**12 Hours**
		Topology control, clustering, time synchronization, localization and positioning, sensor tasking and control.	
	5	**Sensor Network Platforms and Tools**	**12 Hours**
		Sensor node hardware – Berkeley motes, programming challenges, node-level	

		software platforms, node-level simulators, state-centric programming.

5.	STUDY MATERIALS	
	a)	**Text Books**
1.		Holger Karl & Andreas Willig, "Protocols and Architectures for Wireless Sensor Networks", John Wiley, 2005.
2.		Feng Zhao & Leonidas J. Guibas, "Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007.

	b)	**Reference Books**
1.		Kazem Sohraby, Daniel Minoli, &TaiebZnati, "Wireless Sensor Networks Technology, Protocols and Applications", John Wiley, 2007.
2.		Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003.

1.	COURSE FRAME WORK	
	PROGRAM	Doctor of Philosophy (PhD)
	COURSE CODE & TITLE	**PHD206BT – DIGITAL SIGNAL PROCESSING**
	SEMESTER	**II SEMESTER**
	Credits for the Course	**4 Credits**
	Total Teaching Hours / Week	**4 Hours**

2.	LEARNING OBJECTIVES	
	a)	Intuitive understanding and practical implementation of the theoretical concepts of DSP.
	b)	Study and understanding of representation of signals and systems.
	c)	Design and analysis of Discrete Time signals and systems.
	d)	To generate foundation for understanding of DSP and its applications like audio, image, telecommunication and other real world applications.

3.	LEARNING OUTCOMES	
	After the course, the research scholar will be able to:	
	a)	Understand the mathematical concepts of signal representation and transformations with their analysis.
	b)	Develop the ability for generating proper solution to signal processing problems.
	c)	Understand Digital Signal Processing applications and implementation of signal processing to various applications.
	d)	Understand the mathematical concepts of signal representation and transformations with their analysis.
	e)	Develop the ability for generating proper solution to signal processing problems.

4.	SYLLABUS OF THE COURSE		
	Course CODE	*Name of the Course*	
	PHD206BT	DIGITAL SIGNAL PROCESSING	
		Total Teaching Hours:	**60 Hours**
	Unit No.	**Curriculum Coverage & Topic / Sub Topics**	**Teaching Hours**
	1	**Discrete Fourier Transforms (DFT)**	**12 Hours**
		Frequency domain sampling and reconstruction of discrete time signals; DFT as a linear transformation, its relationship with other transforms.	
	2	**Properties of DFT**	**12 Hours**
		Multiplication of two DFTS- the circular convolution, additional DFT properties	
	3	**Use of DFT in Linear Filtering**	**12 Hours**
		Overlap-save and overlap-add method; direct computation of DFT, need for efficient computation of the DFT (FFT Algorithms)	
	4	**Radix-2 FFT**	**12 Hours**
		Algorithm for the computation of DFT and IDFT–decimationintime and decimation-in-frequency algorithms. Goertzel algorithm, and chirp-z transform.	
	5	**IIR Filter Design**	**12 Hours**
		Characteristics of commonly used analog filters –Butterworth and Chebysheve filters, analog to analog frequency transformations.	

5.	STUDY MATERIALS	
	a)	**Text Books**
	1.	Digital Signal Processing – Principles Algorithms & Applications, Proakis&Monalakis, Pearson Education, 4th Edition, New Delhi, 2007
	2.	Digital Signal Processing – Avtar Singh and S. Srinivasan, Thomson Publications, 2004.

	b)	**Reference Books**
	1.	Discrete time signal processing, Oppenheim & Schaffer, PHI, 2003
	2.	Digital signal processing, S. K. Mitra, Tata Mc-Graw Hill, 3rd edition, 2010.
	3.	Digital signal processing, Lee Tan: Elsivier publications, 2007

1.	COURSE FRAME WORK	
	PROGRAM	Doctor of Philosophy (Ph. D)
	COURSE CODE & TITLE	**PHD207BT - COMPUTER SCIENCE RESEARCH FUNDAMENTALS**
	SEMESTER	II SEMESTER
	CREDITS for the Course	**4 Credits**
	Total Teaching Hours / week	**4 Hours**

2.	LEARNING OBJECTIVES	
	a)	To sharpen basic skills in CS so as to pursue research
	b)	Develop sharp knowledge of building blocks of CS
	c)	Apply fundamental principles and methods of Computer Science to a wide range of applications
	d)	Apply mathematical and scientific reasoning to a variety of computational problems
	e)	Design, correctly implement and document solutions to significant computational problems

3.	LEARNING OUTCOMES	
	After this course, the student will be able to:	
	a)	Formulate solutions to computing problems
	b)	Work effectively in teams to design and implement solutions to computational problems
	c)	Apply sound principles to the synthesis and analysis of computer systems
	d)	Design and implement effective solutions to computing problems
	e)	Design and implement software systems that meet specified design and performance requirements

4.	SYLLABUS OF THE COURSE		
	Course CODE	***Name of the Course***	
	PHD207BT	**COMPUTER SCIENCE RESEARCH FUNDAMENTALS**	
		Total Teaching Hours:	**60 hours**
	Unit No.	**Curriculum Coverage & Topic / Sub Topics**	**Teaching Hours**
	1	**DIGITAL LOGIC & PROGRAMMING LANGUAGES**	**12 hours**
		Digital Logic: Number system, Information representation, Computer arithmetic on fixed & floating point numbers, Boolean algebra, Combinational circuits, sequential circuits, Memory system, Processor organization, Input-output organization, pipe-line processing, static & dynamic interconnection networks. **Programming Languages:** Paradigms, Data types, operations, Expressions, Control structures, I/O statements, Parameter parsing techniques. Language constructs for object-oriented, functional, logic & concurrent programming, Chomsky hierarchy of formal languages, finite automata & pushdown automata.	
	2	**OPTIMIZATION & SIMULATION TOOLS**	**12 hours**
		Optimization & Simulation Tools: Linear Programming: LPP in the standard form, canonical forms, conversion in standard form, Simplex prevention of cyclic computations in Simplex & Tableau, Big-M method, Dual Simplex & revised simplex. **Simulation:** Analog vs. Digital simulation, Continuous & discrete system simulation, Simulation of Hypothetical Computer, Inventory system & Corporate system, simulation of PERT, Generation of uniform & Non- uniform random number, Monte Carlo method, Design of experiment, simulation languages.	

	3	**SOFTWARE ENGINEERING, COMPUTER GRAPHICS & COMPUTER NETWORKS**	**12 hours**
		Software Engineering: Development models, Metrics, Software Project Management, Analysis, Design: System design, detailed design, function-oriented, Object-oriented analysis & design, user interface design, Coding & Testing, Software quality & reliability, Object Modeling Technique (OMT) methodology. **Computer Graphics**: Components of an Interactive Graphics system, Display systems, Input/output & storage devices, 2D geometry, Graphic operations, 3D Graphics, Animation, Graphic standards, Application Concepts, Projections and Hidden surface elimination. **Computer Networks**: Fundamentals, Reference Models, Data Communication, Internetworking: Components and issues; Media access controls, virtual circuits & datagrams, Routing algorithm, Congestion control, Network Security, Firewalls, Internet architecture and protocols.	
	4	**DATA BASE AND DATA STRUCTURE**	**12 hours**
		Data Base: Basic concepts, Characteristics of Database approach, Three-schema Architecture and Data Independence, Data Models, E-R Model, Relational Data Model, SQL Programming Techniques, Relational Database Design, Functional Dependencies, Normalization, Query Processing and Optimization, Transaction Processing Concepts, Concurrency Control Techniques and Recovery Techniques, Enhanced Data Models for Advanced Applications, Distributed Database and Client-Server Architectures. Overview of Data Warehousing and OLAP, Data Mining Concepts, Emerging Database Technologies and Applications. **Data Structure:** Arrays, String, Linked Lists - Singly, doubly & Circular List; Stacks, Queues, Priority Queues: Representation & Manipulation; Trees: Binary & Threaded Trees, traversal, Binary Search Tree, Huffman & AVL Trees, B Trees; Graphs: Adjacency Matrix, Path Matrix, Linked Representation, traversal; Searching & Sorting techniques	
	5	**OPERATING SYSTEM AND SYSTEM PROGRAMMING**	**12 hours**
		Operating System: Functions, Multiprogramming, Multiprocessing & Multitasking, Memory Management, Virtual memory, Paging, Fragmentation. Concurrent Processing: Mutual exclusion, Critical regions, lock & unlock. Scheduling: CPU scheduling, I/O scheduling, Deadlock: avoidance & prevention; UNIX: Structure & commands of UNIX, Interfacing with UNIX, Editors & Compliers for UNIX, LEX & YACC, File system, System calls, Filters, Shell Programming. **System Programming:** Assembly language fundamentals, Assemblers - 2 pass & single pass, Macros & Macro processors. Loading, Linking, relocation, program relocatability, linkage editing, Text editors, Programming Environments, Debuggers & program generation. Compilation & interpretation, Bootstrap complier, Phase of compilation - lexical & syntax analysis, storage allocation, code optimization & generation.	

5.	STUDY MATERIALS		
	a)	Text Books	
		1.	Software Engineering, by Roger S. Pressman
		2.	Fundamentals of Digital Logic and Microcomputer Design, by M. Rafiquzzaman
		3.	Simulation based Optimization, by Abhijit
		4.	Computer Networks, by Andrew S. Tannenbaum
		5.	Computer Graphics-Principles and Practice, by James D. Foley
		6.	Operating System Concepts, by Abraham Silberschatz

	b)	Reference Books	
		1.	O.S-Internals and Design Principles, by William Stallings
		2.	Computer Networks-Principles, Protocols and Practices, by Dr Oliver Bonaventure
		3.	Digital Logic design, by B. Holdsworth and R.C. Woods
		4.	Discrete-Event System Simulation, 2nd Edition, Banks, J., Carson J.S.and Nelson
		5.	Software Engineering reference framework, by M.R.V. Chaudron, J.F. Groote, K.M. van Hee, C. Hemerik, L.J.A.M. Somers and T. Verhoeff.

1.	COURSE FRAME WORK		
		PROGRAM	Doctor of Philosophy (PhD)
		COURSE CODE & TITLE	**PHD208BT - ENCRYPTION ALGORITHMS**
		SEMESTER	**II SEMESTER**
		Credits for the Course	**4 Credits**
		Total Teaching Hours / Week	**4 Hours**

2.	LEARNING OBJECTIVES	
	a)	To understand the fundamentals of encryption techniques and cryptography.
	b)	To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.
	c)	To understand the various key distribution and management schemes.
	d)	To understand how to deploy encryption techniques to secure data in transit across data networks
	e)	To design security applications in the field of Information Technology

3.	LEARNING OUTCOMES	
	After the course, the research scholar will be able to:	
	a)	Implement basic security algorithms required by any computing system.
	b)	Formulate research problems in the computer security field.
	c)	Evaluate security mechanisms using rigorous approaches, including theoretical derivation, modeling, and simulations.
	d)	Analyze the vulnerabilities in a computing system and design a security solution.
	e)	Analyze the possible security attacks in complex real time systems and their effective counter measures.
	f)	Identify the security issues in the network and resolve it.

4.	SYLLABUS OF THE COURSE		
	Course CODE	***Name of the Course***	
	PHD208BT	**ENCRYPTION ALGORITHMS**	
		Total Teaching Hours:	**60 Hours**
	Unit No.	**Curriculum Coverage & Topic / Sub Topics**	**Teaching Hours**
	1	**Classical Encryption Techniques**	**12 Hours**
		Classical Encryption Principles and Algorithms; Cipher Block Modes of Operation; Location of encryption devices; Key distribution; Approaches to message authentication; Secure Hash functions and HMAC; Public Key Cryptography Principles and Algorithms; Digital Signatures; Key management.	
	2	**Public-Key Cryptography and RSA**	**12 Hours**
		Principles of public-key cryptosystems. Public-key cryptosystems. Applications for public-key cryptosystems, requirements for public-key cryptosystems. public-key cryptanalysis. The RSA algorithm, description of the algorithm, computational aspects, the security of RSA: Other Public-Key Cryptosystems: Diffiehellman key exchange, The algorithm, key exchange protocols, man in the middle attack, Elgamal Cryptographic systems, Elliptic curve arithmetic, abelian groups, elliptic curves over real numbers, elliptic curves over Zp, elliptic curves over GF(2m), Elliptic curve cryptography, Analog of Diffie-hellman key exchange, Elliptic curve encryption/ decryption, security of Elliptic curve cryptography, Pseudorandom number generation based on an asymmetric cipher, PRNG based on RSA.	
	3	**Security Technologies**	**12 Hours**
		Wireless security, Wireless network threats, Wireless network measures, mobile device security, security threats, mobile device security strategy, IEEE 802.11 Wireless LAN overview, the Wi-Fi alliance, IEEE 802 protocol architecture. HTTPS Connection Initiation, Connection Closure. Secure Shell (SSH): Transport Layer Protocol, User Authentication Protocol, and Connection Protocol.	
	4	**Key Management and Distribution**	**12 Hours**
		Symmetric key distribution using Symmetric encryption, a key distribution scenario, Symmetric key distribution using asymmetric encryption, simple secret key distribution, secret key distribution with confidentiality and authentication, distribution of public keys, public announcement of public keys, publicly available directory, public key authority, public keys certificates, X-509 certificates. Certificates, X-509 version 3, public key infrastructure. User Authentication: Remote user Authentication principles, Mutual Authentication, one-way Authentication, remote user Authentication using Symmetric encryption, Kerberos, Motivation, Kerberos version 4, Kerberos version 5, Remote user Authentication using Asymmetric encryption, federated identity	

		management, identity management, identity federation, personal identity verification.	
	5	**Electronic Mail Security**	**12 Hours**
		Pretty good privacy, notation, operational; description, S/MIME, RFC5322, Multipurpose internet mail extensions, S/MIME functionality, S/MIME messages, S/MIME certificate processing, enhanced security services, Domain keys identified mail, internet mail architecture, E-Mail threats, DKIM strategy, DKIM functional flow, IP Security: IP Security overview, applications of IPsec, benefits of IPsec, Routing applications, IPsec documents, IPsec services, transport and tunnel modes, IP Security policy, Security associations, Security associations database, Security policy database, IP traffic processing, Encapsulating Security payload, ESP format, encryption and authentication algorithms	

5.	**STUDY MATERIALS**	
	a)	**Text Books**
	1.	William Stallings: Cryptography and Network Security, Pearson 6th edition 2013.
	2.	Michael E. Whitman and Herbert J. Mattord: Principles of Information Security, 2nd Edition, Cengage Learning, 2005.
	3.	William Stallings: Network Security Essentials Applications and Standards, Person, 2000.
	4.	Deven N. Shah: Information Security – Principles and Practice, Wiley India, 2009.

	b)	**Reference Books**
	1.	V K Pachghare: Cryptography and Information Security, 2013.
	2.	Behrouz A. Forouzan: Cryptography and Network Security, Tata McGraw-Hill, 2007

1.	**COURSE FRAME WORK:**		
		PROGRAM	Doctor of Philosophy (Ph. D)
		COURSE CODE & TITLE	**PHD209BT** **DIGITAL IMAGE PROCESSING**
		SEMESTER	**II SEMESTER**
		Credits for the Course	**4 Credits**
		Total Teaching Hours / Week	**4 Hours**

2.	**LEARNING OBJECTIVES:**	
	a)	Learn digital image fundamentals.
	b)	Be exposed to simple image processing techniques.
	c)	Be familiar with image compression and segmentation techniques.
	d)	Learn to represent image in form of features.

3.	LEARNING OUTCOMES:	
	After this course, the student will be able to:	
	a)	Discuss digital image fundamentals.
	b)	Apply image enhancement and restoration techniques.
	c)	Use image compression and segmentation Techniques.
	d)	Represent features of images.

4.	SYLLABUS OF THE COURSE:		
	Course Code	*Name of the Course*	
	PHD209BT	DIGITAL IMAGE PROCESSING	
	Module No	Curriculum Coverage & Topic / Sub Topics	60 Hours
	1.	Digital Image Fundamentals	12 Hours
		Introduction – Origin – Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels – color models.	
	2.	Image Enhancement	12Hours
		Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering– Smoothing and Sharpening Spatial Filtering – Frequency Domain: Introduction to Fourier Transform – Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters.	
	3.	Image Restoration and Segmentation	12 Hours
		Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering Segmentation: Detection of Discontinuities–Edge Linking and Boundary detection – Region based segmentation- Morphological processing- erosion and dilation.	
	4.	Wavelets and Image Compression	12 Hours
		Wavelets – Subb and coding – Multiresolution expansions – Compression: Fundamentals – Image Compression models – Error Free Compression – Variable Length Coding – Bit-Plane Coding – Lossless Predictive Coding – Lossy Compression – Lossy Predictive Coding – Compression Standards.	
	5.	Image Representation and Recognition	12Hours
		Boundary representation – Chain Code – Polygonal approximation, signature, boundary segments – Boundary description – Shape number – Fourier Descriptor, moments- Regional Descriptors – Topological feature, Texture – Patterns and Pattern classes – Recognition based on matching.	

5.	STUDY MATERIALS:		
	a)	Text Book:	
		1.	Rafael C. Gonzales, Richard E. Woods, “Digital Image Processing”, Third Edition, Pearson Education, 2010.

	b)	**References**	
		1.	Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, "Digital Image Processing Using MATLAB", Third Edition Tata McGraw Hill Pvt. Ltd., 2011.
		2.	Anil Jain K. "Fundamentals of Digital Image Processing", PHI Learning Pvt. Ltd., 2011.
		3.	Willliam K Pratt, "Digital Image Processing", John Willey, 2002.
		4.	Malay K. Pakhira, "Digital Image Processing and Pattern Recognition", First Edition, PHI Learning Pvt. Ltd., 2011.
		5.	http://eeweb.poly.edu/~onur/lectures/lectures.html.
		6.	http://www.caen.uiowa.edu/~dip/LECTURE/lecture.html

1.	**COURSE FRAME WORK**	
	PROGRAM	Doctor of Philosophy (PhD)
	COURSE CODE & TITLE	**PHD210BT - BIO MEDICAL INSTRUMENTATION**
	SEMESTER	**II SEMESTER**
	Credits for the Course	**4 Credits**
	Total Teaching Hours / Week	**4 Hours**

2.	**LEARNING OBJECTIVES**	
	a)	To know the various functional blocks present is bio signal acquisition system so that the students capable to design the data acquisition system.
	b)	To understand the different bio potential characteristics and recording methods to enable to record various bio signals.
	c)	To develop an understanding of the nonelectrical parameters measurements to enable to record various non-electrical parameters.
	d)	To study the biochemical measurements to create confidence in students to do biochemical measurement.
	e)	

3.	**LEARNING OUTCOMES**	
	After the course, the research scholar will be able to:	
	a)	Know the various functional blocks present is bio signal acquisition system and to design the data acquisition system.
	b)	Obtain the domain knowledge of different bio potential characteristics and recording methods. Bio signals.
	c)	Develop measurement systems by selecting different types of sensors, signal conditioning circuits for acquiring and recording various physiological parameters.
	d)	To enhance ability for biochemical measurement.

4.	**SYLLABUS OF THE COURSE**		
	Course CODE	***Name of the Course***	
	PHD210BT	**BIO MEDICAL INSTRUMENTATION**	
		Total Teaching Hours:	**60 Hours**
	Unit No.	**Curriculum Coverage & Topic / Sub Topics**	**Teaching Hours**

	1	**Biomedical Transducers and Amplifiers**	**12Hours**
		Categories and Characteristics of Transducer, Signal conditioning units, Multichannel data acquisition system, various types recorders, necessity for low noise pre-amplifiers, Difference amplifier, Chopper amplifier, Different types of electrode and its equivalent circuits.	
	2	**Biopotential Recording**	**12Hours**
		ECG, EEG, EMG, PCG, EOG, ERG lead system and recording methods, typical waveform, frequency spectrum, abnormal waveform.	
	3	**Non-Electrical Parameter Measurements**	**12Hours**
		Respiration rate, Pulse rate, Temperature, Blood Pressure, O2, CO2 measurements, Respiratory volume measurement, BMR measurement, Plethysmography technique, Impedance technique Bipolar and Tetra polar circuits, Detection of various physiological parameters using impedance technique	
	4	**Blood Flow Meter and Blood Cell Counter**	**12Hours**
		EM and ultrasonic blood flow meters, indicator dilution method, Thermodilution method, Manual and Automatic Counting of RBC, WBC and Platelets.	
	5	**Bio-Chemical Measurements and Biosensors**	**12Hours**
		pH, pC02, p02, pHCO3 and electrophoresis, colorimeter, spectrophotometer, flame photometer, auto analyzer, Biosensors.	

5.	**STUDY MATERIALS**		
	a)	**Text Books**	
		1.	Geddes LA and Baker L.E Principals of Applied Biomedical Instrumentation, John Wiley and sons New York 1975
		2.	Webster J.G Medical Instrumentation application and design – John Wiley and sons New York 3rd edition 1999
		3.	Khandpur R.S Hand Book of Biomedical Instrumentation – Tata Mc Graw Hill publication, New Delhi 2nd edition 2003

	c)	**Reference Books**	
		1.	Joseph J Carr and John M Brown – Introduction to Biomedical Equipment Technology - Pearson Education 4th edition New Delhi 2001.
		2.	Richard S.Cobbold Transducers for Biomedical Measurements; Principle and applications- John Wiley and sons,1992.

1.	**COURSE FRAME WORK**		
		PROGRAM	Doctor of Philosophy (PhD)
		COURSE CODE & TITLE	**PHD202BL – APPROACHES IN LEGAL RESEARCH**
		SEMESTER	**II SEMESTER**
		CREDITS for the Course	**4 Credits**
		Total Teaching Hours / Week	**4 Hours**

2.	LEARNING OBJECTIVES	
	a)	To be familiar with major research areas in law.
	b)	To be familiar with current trends in legal research.
	c)	To assimilate and understand the basic tenets of law.

3.	LEARNING OUTCOMES	
	After the course, the research scholar will be able to:	
	a)	Be conversant with basic principles of law.
	b)	Effectively reason and present critical analysis on current legal issues.
	c)	Better comprehend the inherent interdisciplinary character of law.

4.	SYLLABUS OF THE COURSE		
	Course CODE	***Name of the Course***	
	PHD202BL	**PHD202BL – APPROACHES IN LEGAL RESEARCH**	
		Total Teaching Hours:	**60 Hours**
	Unit No.	**Curriculum Coverage & Topic / Sub Topics**	**Teaching Hours**
	1	**Legal Theory**	**12 Hours**
		Natural law theories - classical positivism - pure theory of law - analytical school of law - sociological school of law - American realism - Scandinavian realism - historical and anthropological jurisprudence - feminist jurisprudence - postmodernist jurisprudence.	
	2	**Constitutional Law & Judicial Process**	**12 Hours**
		Basic principles of constitutional law - historical background – distribution of sovereignty – rule of law – separation of powers – federal structure - judicial review – amendment and entrenchment – basic structure doctrine Judicial process in common law and civil law systems –nature and development. Doctrine of stare decisis – ratio and obiter – methods for determining ratio – prospective overruling. Judicial process in India – with special reference to articles 32,226 136,141 and 142.	
	3	**Criminal Law & Administration**	**12 Hours**
		Crime - causes of crime - concept of criminal jurisprudence – definition of penology - historical and contemporary approaches to penology. - theories of punishment - retribution - deterrence - prevention - reformation Privileged class deviance, meaning, nature - conceptions of white collar crimes - hi-tech crime - cybercrime - economic crime - politics and crime – central vigilance commission - right to information - public accounts commission - ombudsman commission of enquiry - prevention of corruption act	
	4	**Commercial Law & IPR**	**12 Hours**
		Corporate social responsibility – sexual harassment at the workplace – child labour the agreement on trade related aspects of intellectual property rights - general provisions and basic principles - objectives and principles, Copyright of academic works and plagiarism.	
	5	**Environmental Law & Policy**	**12 Hours**
		Environmental policy, law and development - pollution control and waste management laws - international environmental law - laws related to biodiversity	

5.	STUDY MATERIALS		
	a)	Text Books	
		1.	Mahajan, Vidya Dhar, and M. C. Setalvad. Jurisprudence and Legal theory. Eastern Book Company, 2001.
		2.	MP Jain, Indian constitutional law, Wadhwa & Company, 2003
		3.	Cardozo, The Nature of Judicial Process, Yale University Press London 1949
		4.	Jain and Jain, Principles of Administrative Law, Lexis Nexis, Butterworths,Nagpur (2007).
		5.	Siddique, Ahmad: Criminology, Problems & Perspectives, Eastern Book Co Lucknow, 1982
		6.	The Companies Act, 2013
		7.	The Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013
		8.	Child Labour (Prohibition and Regulation) Act 1986
		9.	Blakeney, Michael. Trade related aspects of intellectual property rights: a concise guide to the TRIPs Agreement. Sweet & Maxwell, 1996.
		10.	Narayanan, Parameswaran. Intellectual property law. Eastern Law House, 2002.
		11.	Divan, Shyam, and Armin Rosencranz. Environmental law and policy in India. Oxford University Press, 2001.

	b)	Reference Books	
		1.	Bodenheimer, Edgar. "Jurisprudence: The philosophy and method of the law." (1974).
		2.	Seervai, HormasjiManekji. Constitutional law of India: a critical commentary. Vol. 3. NM Tripathi, 1996.
		3.	Upendra Baxi, The Crisis of the Indian Legal System Vikas Publishing House, New Delhi 1982
		4.	Upendra Baxi, Liberty and Corruption: The Antulay Case and Beyond ,Surendranath, 1989
		5.	Salzman, James, and Barton H. Thompson. Environmental law and policy. New York: Foundation Press, 2003.
		6.	Correa, Carlos M. Intellectual property rights, the WTO and developing countries: the TRIPS agreement and policy options. Zed books, 2000.

1.	COURSE FRAME WORK		
		PROGRAM	Doctor of Philosophy (PhD)
		COURSE CODE & TITLE	PHD204BH - CONTEMPORARY ENGLISH LITERATURE
		SEMESTER	II SEMESTER
		CREDITS for the Course	4 Credits
		Total Teaching Hours / Week	4 Hours

2.	LEARNING OBJECTIVES	
	a)	To be familiar with major trends and writers in English literature through detailed study of specific literary works.
	b)	To be familiar with important schools of literary criticism with the help of representative texts.
	c)	To be familiar with different trends and bearings of literary criticism and help them grasp methods and techniques of interpreting literature.
	d)	To expose them to the major trends in contemporary Literary Theory.
	e)	To gain knowledge of the methods and materials of literary research; ability to conduct literary research according to established procedures and to use such research effectively and responsibly.

3.	LEARNING OUTCOMES	
	After the course, the research scholar will be able to:	
	a)	Be acquainted with major trends and writers in English literature through detailed study of specific literary works.
	b)	Critically analyze and evaluate literary works in the context of their intellectual, cultural, socio-political and literary background.
	c)	Be acquainted with major genres in British, American and Indian literature.
	d)	Write researched, well-developed papers concerning works of literature using various critical approaches.

4.	SYLLABUS OF THE COURSE		
	Course CODE	***Name of the Course***	
	PHD204BH	**CONTEMPORARY ENGLISH LITERATURE**	
		Total Teaching Hours:	**60 Hours**
	Unit No.	**Curriculum Coverage & Topic / Sub Topics**	**Teaching Hours**
	1	**Introduction**	**12 Hours**
		Genres of Literature; Meaning, scope and significance of Genres; Types of Genres – fiction, realistic fiction, fantasy, poetry, drama, satire, tragedy, comedy, tragicomedy, autobiographies	
	2	**Literary Theory and Criticism**	**12 Hours**
		Study of major twentieth-century theories and applications: historical, formalist, archetypal, psychoanalytic, new historicist, feminist, postcolonial, multicultural, structuralist and various post-structuralist perspectives; Aristotle's Poetics; Ferdinand de Saussure (Langue and Parole); Roland Barthes (Death of the Author)	
	3	**British Literature**	**12 Hours**
		Selected texts from British literature covering the major genres: Jean Rhys (Wide Sargasso Sea); John Keats (Ode on a Grecian Urn); William Shakespeare (Macbeth)	

	4	**American Literature**	**12 Hours**
		Selected texts from American literature covering the major genres: Nathaniel Hawthorne (The Scarlet Letter); Anne Sexton (After Auschwitz); Arthur Miller (The Crucible)	
	5	**Indian Literature**	**12 Hours**
		Selected texts from Indian literature covering the major genres: Amitava Ghosh (The Shadow Lines); Kamala Das (An Introduction); Girish Karnad (Tughlaq)	

5.	**STUDY MATERIALS**		
	a)	**Text Books**	
		1.	Leitch, Cain, Finke, Johnson, McGowan, and Williams, eds. The Norton Anthology of Theory and Criticism. 2nd ed. New York: W.W. Norton & Co., 2010. ISBN 978-0-393-93292-8
		2.	Eagleton, Terry. Literary Theory. 3rd ed. Minneapolis: University of Minnesota Press, 2008. ISBN-13: 978-0816654475
		3.	Modern British Literature edited by Kermode and Hollander, Oxford Anthology, 1973
		4.	Gibaldi, Joseph. MLA Handbook for Writers of Research Papers. 4th ed. New York: Modern Language Association, 1995.
		5.	Chopin, Kate. The Awakening: Complete, Authoritative Text with Biographical and Historical Contexts, Critical History, and Essays from Five Contemporary Theoretical Critical Perspectives. Ed. Nancy A. Walker. Boston: St. Martin's Press, 1993.

	b)	**Reference Books**	
		1.	Ferdinand de Saussure - Langue and Parole
		2.	Roland Barthes - Death of the Author
		3.	Jean Rhys - Wide Sargasso Sea
		4.	John Keats - Ode on a Grecian Urn
		5.	William Shakespeare - Macbeth
		6.	Nathaniel Hawthorne - The Scarlet Letter
		7.	Anne Sexton - After Auschwitz
		8.	Arthur Miller - The Crucible
		9.	Amitava Ghosh - The Shadow Lines
		10.	Kamala Das - An Introduction
		11.	Girish Karnad - Tughlaq

1.	COURSE FRAME WORK		
		PROGRAM	Doctor of Philosophy (Ph. D) HINDI
		COURSE CODE & TITLE	PHD 205BH हिन्दी कहानी का उद्भव और विकास
		SEMESTER	II SEMESTER
		CREDITS for the Course	4 Credits
		Total Teaching Hours / Week	4 Hours

2.	LEARNING OBJECTIVES	
	a)	हिन्दी साहित्य इतिहास का गूढ ज्ञान और इतिहास का काल विभाजन से संबंधी तत्थोंऔर प्रवृतियों की जानकारी ।
	b)	हिन्दी कहानी के उद्भव, विकास एवं विविध प्रवृत्तियों का बोध और समसामायिक कहानियों की जानकारी रखना ।
	c)	हिन्दी कहानी के विभिन्न आयाम और उनकी पृष्ठभूमि के बारे में संज्ञान ।
	d)	शोधार्थी को हिन्दी कहानियों पर पडे विभिन्न वादों का प्रभाव और उनकी प्रवृतियों के बारे में जानकारी रकना ।
	e)	हिन्दी कथा साहित्य की विशिष्टताएँ और उनके प्रभाव के बारे में जानकारी (राष्ट्रीय स्तर पर) ।

3.	LEARNING OUTCOMES	
	After the course, the research scholar will be able to:	
	a)	शोधार्थी को हिन्दी साहित्य इतिहास एवं साहित्य का काल विभाजन एवं विभिन्न आयामों/ प्रवृतियों के अध्ययन से मूल्यांकन और तत्थों पर अनुसंधान करना।
	b)	हिन्दी कहानी की विकास संबंधी जानकारी के साथ साथ समसामायिक कहानियों का मूल्यांकन से प्राप्त अंशो को शोध विषयसे जोडना ।
	c)	हिन्दी कहानी के विविध आयामों के अध्ययन से प्राप्त ज्ञान का मूल्यांकन करना ।
	d)	हिन्दी कहानी के भिन्न –भिन्न वादों/प्रवृतियों का अध्ययन से प्राप्त तत्थों को शोधार्थी शोध विषय के साथ तुलनात्मक मूल्यांकन कर सके ।
	e)	विभिन्न काल से जुडे हिन्दी कथा साहित्य की अध्ययन से प्राप्त विशेष बिंधुओं को शोधार्थी मूल्यांकन करके शोध विषयसे जोड सके ।

	SYLLABUS OF THE COURSE		
	Course CODE	*Name of the Course*	
	PHD 205BH	**हिन्दी कहानी का उद्भव और विकास**	
		Total Teaching Hours :	**36 Hours**
	Unit No.	**Curriculum Coverage & Topic / Sub Topics**	**Teaching Hours**
	1	**भूमिका**	**4 Hours**
		हिन्दी साहित्य की भूमिका हिन्दी साहित्य इतिहास का काल–विभाजन, आंदोलन एवं प्रवृत्ति	
	2	**हिन्दी कहानी का उद्भव**	**4 Hours**
		हिन्दी कहानी पृष्ठभूमी और इतिहास हिन्दी कहानी का उद्भव और विकास, नामकरण	
	3	**हिन्दी कहानी का विकास क्रम**	**8 Hours**
		हिन्दी कहानी का विकास क्रम:कहानी का अर्थ, परिभाषा हिन्दी कहानी :विविधआयाम नई कहानी–परिभाषा एवं प्रवृत्ति स्वातंत्रोत्तर हिन्दी कहानी, जनवादी कहानी,समकालीन कहानी	
	4	**आधुनिक बोध के कहानीकार**	**4 Hours**
		आधुनिक बोध की पहली कहानीकार: प्रेमचंद, जयशंकर प्रसाद	
	5	**प्रेमचंदोत्तर हिन्दी कहानीकार**	**5 Hours**
		प्रेमचंदोत्तर हिन्दी कहानीकार–जैनेंद्र कुमार,अज्ञेय,यशपाल,उपेन्द्रनाथ अश्क, विष्णु प्रभाकर, अमृतलाल नागर, अमृतराय, रांघेय राघव, भैरव प्रसाद गुप्त और चंद्रकिरण सौनरेक्सा	
	6	**नई कहानी के प्रमुख कहानीकार**	**5 Hours**
		नई कहानी के प्रमुख कहनीकार: मोहन राकेश, राजेंद्र यादव, कमलेश्वर, निर्मल वर्मा, फणीश्वरनाथ रेणु, हरिशंकर परसाई, मन्नू भंडारी,उषा प्रियंवदा, कृष्णा सोबती	
	7	**हिन्दी जनवादी कहानीकार:**	**6 Hours**
		भीष्म सहानी, अमरकांत,मर्कण्डेय, ज्ञानरंजन हिन्दी कहानी का समकालीन परिदृश्य	

4.	STUDY MATERIALS		
	a)	Text Books	
		1.	हिन्दी साहित्य का इतिहास– आचार्य रामचंद्र शुक्ल, अशोक प्रकाशन, नई दिल्ली– संस्करण–२००५
		2.	हिन्दी कहानी का विकास –मधुरेश, लोकभारती प्रकाशन,इलाहाबाद–पंचम संस्करण–२००८
		3.	हिन्दी कहानी का इतिहस –गोपाल राय,राजकमल प्रकाशन, नई दिल्ली–पहला संस्करण–२०११
		4.	हिन्दी कहानी परम्परा और प्रगति – डॉ.हरदयाल,वाणी प्रकाशन, नई दिल्ली–पहला संस्करण–२००५
		5.	कहानी के नये प्रतिमान –कुमार कृष्ण, वाणी प्रकाशन, नई दिल्ली–पहला संस्करण–२००५
		6.	हिन्दी कहानी की विकास प्रक्रिया –आनंद प्रकाश, लोकभारती प्रकाशन,इलाहाबाद– प्रथम संस्करण–१९९७

	b)	Reference Books	
		1.	हिन्दी कहानी : एक अंतरंग पहचान– रामदरश मिश्र
		2.	कहानी प्रवृत्ति और विश्लेषण– सुरेंद्र उपाध्याय
		3.	नई कहानी: पुनर्विचार– मधुरेश
		4.	नई कहानी की भूमिका– कमलेश्वर
		5.	कहानी नई कहानी– नामवरसिंह
		6.	प्रेमचंद : चिंतन और कला–सं. इंद्रनाथ मदान
		7.	प्रेमचंद और उनका युग –रमविलास शर्मा
		8.	प्रेमचंद का कथा संसार–नरेंद्र मोहन
		9.	समकालीन कहानी का पहचान– नरेंद्र मोहन

1.	COURSE FRAME WORK	
	PROGRAM	Doctor of Philosophy (PhD)
	COURSE CODE & TITLE	**PHD201BD - TRENDS AND CONTEMPORARY ISSUES IN EDUCATION**
	SEMESTER	**II SEMESTER**
	Credits for the Course	**4 Credits**
	Total Teaching Hours / Week	**4 Hours**

2.	LEARNING OBJECTIVES	
	a)	Understand the importance of interdisciplinary approach and its use in finding out solutions to educational problems.
	b)	Be familiar with various uses of technology in the exposition and extension of education.
	c)	Interpret the concept of equalization of educational opportunities in its proper spirit.
	d)	Acquainted with various means of extending educational opportunities to the weaker sections of the society.
	e)	Understand the changing demands of the modern society from the teaching profession.
	f)	Review the researchers in modern trend in education.

3.	LEARNING OUTCOMES	
	After the course, the research scholar will be able to:	
	a)	Examine the social implications of the recent trends in Education
	b)	Identify different issues pertaining to diversity as well as their impact on student learning
	c)	State the nature and scope of the factors affecting the quality of schooling
	d)	Explain how different kinds of schooling affect the quality of schooling
	e)	Analyze the changing role of the teacher in contemporary society

4.	SYLLABUS OF THE COURSE		
	Course Code	***Name of the Course***	
	PHD201BD	**TRENDS AND CONTEMPORARY ISSUES IN EDUCATION**	
		Total Teaching Hours:	**60 Hours**
	Unit No.	**Curriculum Coverage & Topic / Sub Topics**	**Teaching Hours**
	1	**Interdisciplinary Approach for Problems in Education**	**12 Hours**
		Interdisciplinary - concept, need and scope; interdisciplinary approaches; research based curriculum development, globalization and national objectives of education.	
	2	**Approaches and Process of Learning**	**12 Hours**
		Approaches - Lifelong learning, distance learning, co-operative learning, blended learning, flexi space learning, reflective learning; processes - inquiry based learning, brain based learning, media literary and learning	
	3	**New Trends in Education**	**12 Hours**
		Inclusive education, ICT in education, Life Skill education, multicultural education, alternative assessment, social constructivism.	
	4	**Trends in Educational Management**	**12 Hours**
		Decision making – nature, division of work, centralization action and decentralization of decision making, their merits and limitations. organizational	

		compliance, organizational development, PERT, modern trends in educational management	
	5	**Issues in Education**	**12 Hours**
		Educational policies, wellbeing education, comparative education, development education, citizenship education, economics of education	

5.	**STUDY MATERIALS**		
	a)	**Text Books**	
		1.	Aggarwal J.C., Landmarks in the History of Modern Indian Education, Vikas Publishing House, New Delhi, 1996
		2.	Aggarwal J.C., Basic Ideas in Education¸ Shipra Publication, Delhi, 3rd Ed,2006
		3.	Aggarwal J.C., Population Education, Shipra Publication, Delhi, 2009
		4.	Ann Kovalchik¸ Kara Dawson, Education and Technology, ABC-CLIO, Inc. Pub. California¸ 2004
		5.	Baily Richard¸ Barrow Robin¸ Carr David & McCarthy Christine, The Sage Handbook of Philosophy of Education, Sage Pub. First Ed.,2010
		6.	Behar Sharad Chandra, Globalizing Education: Perceptions and Processes, Indian Institute of Education, Pune, 2005.
		7.	Chand Jagdish, Value Education, Anshah Publishing House, Delhi, 2007
		8.	Chandra S.S. & Sharma Rajendra, Sociology of Education, Atlantic Pub,2004

	b)	**Reference Books**	
		1.	Cheryl Ann, Armstrong Derrick &SpandagouLlektra, Inclusive Education: International Policy &Prtactice, Sage Pub.2010.
		2.	Cole Mike, Education, Equality and Human Right, Routledge Publication,2012
		3.	Dickson Janet, Hughes Barry & Irfan Mohammad, Patterns of Potential Human Progress¸ Oxford University Press, 2010
		4.	Fernandes Maria Milagris, The Foundations of Education: The Philosophical Approach, Himalaya Pub. House, New Delhi, 2004
		5.	Mohanty Jagannath, Modern Trends in Indian Society, Deep & Deep Pub. New Delhi, 2nd ed, 2005
		6.	NelascoShobana¸ Agarwal Meenu¸ Njiribeako Austin, Issues of Information Communication Technology in Education, Kanishka Publication, New Delhi, 2009
		7.	Nikolopoulou Anastasia, Abraham Taisha &Mirbagheri Farid, Educational for Sustainable Development, Sage Pub.New Delhi, 2010

		8.	Peacock Kathy Wilson, Natural Resources and Sustainable Development, Viva Books, 2010.
		9.	Patil V.T., Value Education and Human Rights Education, GNOSIS Publications, New Delhi, 2008
		10.	Pandey K.P., Perspectives Social Foundations of Education, Shipra Publication, 2010.
		11.	Pandya Rameshwari&Mathu Anuradha, Imbibing Value Education, Kalpaz Publication, Delhi, 2005
		12.	Roy Gardner, Jo Cairns, Denis Lawton, Education for Values, Kogan Pages U.S.2000
		13.	Stephen J. Farenga& Daniel Ness, Encyclopedia of Education and Human Development, Pentagon Press, 2006

1.	**COURSE FRAME WORK**		
		PROGRAM	Doctor of Philosophy (PhD)
		COURSE CODE & TITLE	**PHD201BI - RECENT DEVELOPMENTS IN LIBRARY AND INFORMATION SCIENCE**
		SEMESTER	**II SEMESTER**
		CREDITS for the Course	**4 Credits**
		Total Teaching Hours / Week	**4 Hours**

2.	**LEARNING OBJECTIVES**	
	a)	To get the required inputs to become effective Information managers.
	b)	To be acquainted with emerging library management skills and techniques.
	c)	To gain understanding about the emerging role of ICT.
	d)	To get an extensive exposure to the application of ICT in Library Science

3.	**LEARNING OUTCOMES**	
	After the course, the research scholar will be able to:	
	a)	Develop leadership and managerial skills to hand libraries more effectively.
	b)	Develop skills to perform library operations and to evaluate library and information centre's performance.
	c)	Use modern library management techniques to achieve the organizational effectiveness and efficiency

4.	SYLLABUS OF THE COURSE		
	Course CODE	*Name of the Course*	
	PHD201BI	**RECENT DEVELOPMENTS IN LIBRARY AND INFORMATION SCIENCE**	
		Total Teaching Hours:	**60 Hours**
	Unit No.	**Curriculum Coverage & Topic / Sub Topics**	**Teaching Hours**
	1	**Introduction and ICT**	**12 Hours**
		Development of libraries with special reference to India, library as an agency of mass communication; origin and growth of ICT - Information Technology and its components - Communication Technology and its components- Role of ICT in the development of LIS centers.	
	2	**Types of Networks and Security Measures**	**12 Hours**
		Types of network & network topologies- network components: UTP, optical fibers, Ethernet, network interface card, hub, routers, modems and requirements of Wi-Fi; planning of computer network in library and information centers- network security measures.	
	3	**Relational Database Management Systems (RDBMS)**	**12 Hours**
		Introduction and concept of RDBMS- DBMS vs. RDBMS- RDBMS software; Proprietary and Open source- Interfaces for RDBMS using SQL- Development of database using MySQL.	
	4	**Internet**	**12 Hours**
		Internet based services - Types of Internet Connectivity - Web browsers - Web Servers and its functions - Search Engines - Website design using HTML/XHTML; blogs and RSS Feeds - Internet Security - use of internet in LIS.	
	5	**Digital Library**	**12 Hours**
		Introduction and basic concepts- hardware and software for DL - content creation for DL - Intellectual Property Right (IPR) Issues - digitization and preservation - development of DL using Greenstone/Dspace- important DL projects in the world and India.	

5.	STUDY MATERIALS		
	a)	**Text Books**	
		1.	Jeanne, F. M. A Librarian's Guide to the Internet: A Guide to searching and evaluating information, Oxford: Chandos publishing, 2006
		2.	Lucy, A. Tedd. An Introduction to computer based library system. Ed.3 Chinchester, Wiley, 2005
		3.	Zorkoczy, Peter: Information Technology: An introduction, London, Otiman, 2005
		4.	Patel, Jashu. Libraries and Librarianship in India. London, Greenwood Press, 2001

	b)	Reference Books	
		1.	Lancaster, F.W. Electronic publishing and their implications for libraries and beyond, London, Clive Bingley, 1990
		2.	Vishwanathan. T. Communication Technology. New Delhi, T.M.H. 1995
		3.	Gorman, G.E. Digital factor in Library and Information Services. London: Facet publishing, 2002.
		4.	Haynes, David. Metadata for Librarianship in India. London: Greenwood Press, 2004

1.	COURSE FRAME WORK		
		PROGRAM	Doctor of Philosophy (PhD)
		COURSE CODE & TITLE	**PHD201BC-MASS COMMUNICATION THEORY AND PRACTICE**
		SEMESTER	**II SEMESTER**
		CREDITS for the Course	**4 Credits**
		Total Teaching Hours / Week	**4 Hours**

2.	LEARNING OBJECTIVES	
	a)	To be familiar with the philosophy and fundamental principles of mass communication.
	b)	To be aware of cultural differences in communicative and media practices.
	c)	To recognise ethical responsibility to other individuals, the community, the discipline, the profession, and society as a whole based on various perspectives and associated standards of ethical communication in face-to-face and mediated environments.

3.	LEARNING OUTCOMES	
	After the course, the research scholar will be able to:	
	a)	Communicate effectively using a variety of communication and information technologies and media.
	b)	Use communication theory to analyse and evaluate individual, group, and mass media messages for how they work and for their consequences.
	c)	Understand and apply the concepts of social and legal regulation as they relate to the use of existing and emerging communicative materials.

4.	SYLLABUS OF THE COURSE		
	Course CODE	***Name of the Course***	
	PHD201BC	**MASS COMMUNICATION THEORY AND PRACTICE**	
		Total Teaching Hours:	**60 Hours**
	Unit No.	**Curriculum Coverage & Topic / Sub Topics**	**Teaching Hours**
	1	**Introduction**	**12 Hours**
		Communication Process and Types: communication perspective and objectives, communication and its process - meaning and functions, process, feedback and barriers to communication; levels, types and channels of communication - dyadic, multi-adic, group and organizational, verbal, visual, non-verbal (paralinguistic, kinesics, proxemics, chronemics), extension of audio and visual communication;	

		communication -meaning, nature, channels, and functions.	
	2	**Approaches to Mass Communication**	**12 Hours**
		Various Approaches to Mass Communication: theoretical approach - semiotics school, process school, mass society theory, critical political economy theory, pluralism, functionalism, effect studies, structuralism and post structuralism, feminism, nature of media, content, style and representation; approach to culture: communication and culture, mass culture, Frankfurt school and Birmingham school, popular culture and McLuhan's cultural change; pertinent issues - media commercialization, globalization of culture, gender issues, media and children, and marginalized groups.	
	3	**Mass Communication Theories and Models**	**12 Hours**
		Mass Communication Theories and Models: normative theories of the press and beyond; mass communication theories- individual difference theory, cognitive dissonance theory, dance and Larsen theory, Kelly's attribution theory, McLuhan's theory, media content theory, semantic theories of broadcasting, reflective-projective theory, mirror theory, empirical theory, conspiracy theory and social influence or identification theory; basic and behavioral models of communication - Schramm's models, gate keeping model, and convergence model.	
	4	**Mass Communication Channels and Contemporary Issues**	**12 Hours**
		Mass Communication Channels and Contemporary Issues: press and political system; democracy and press- fourth pillar; changing trends in print journalism; electronic media - radio and development issues, use of radio for propaganda, TV and social behavior, TV and psychological behavior, TV for development - theoretical framework and case studies; new media and its impact on society and individual; cinema as mass media, cultural aspect of cinema, cinema and society.	
	5	**Emerging Issues in Journalism**	**12 Hours**
		Public Relations as a tool for strengthening democracy, Content distribution through mobile phones, Hyper-local media, curated media and leaky journalism as future trends	

5.	**STUDY MATERIALS**		
	a)	**Text Books**	
		1.	McQuail Dennis, Mass Communication Theory, Sage Publication, New Delhi
		2.	Baran, Stanley J and Davis, Dennis K, Mass Communication Theory, Thomson Wadsworth, Delhi
		3.	Narula Uma, Mass Communication Theory and Practice, Har Anand Publication

	b)	**Reference Books**	
		1.	De Fluer, Melvin, Sandra, Ball Rokiach, Theories of Mass Communication, Longman, New York
		2.	Kumar Kewal J, Mass Communication in India, Jaico Books, New Delhi

1.	**COURSE FRAME WORK**		
		PROGRAM	Doctor of Philosophy (PhD)
		COURSE CODE & TITLE	**PHD201BW – TRENDS IN SOCIAL WORK**
		SEMESTER	**II SEMESTER**
		Credits for the Course	**4 Credits**
		Total Teaching Hours / Week	**4 Hours**

2.	**LEARNING OBJECTIVES**	
	a)	Understand the concept, definition, objectives and functions and methods of social work.
	b)	Develop knowledge of history and development of social work in India and abroad.
	c)	3. Understand the current trends of social work practice in India.
	d)	Develop understanding about the fields of social work.
	e)	Develop understanding about the influence of various social movements in contributing to the perspectives of social work practice in India.
	f)	Understand domains in social work education in India.

3.	**LEARNING OUTCOMES**	
	After the course, the research scholar will be able to:	
	a)	Gaining in-depth knowledge in different domains in social work.
	b)	Learning the overall perspective of different fields in social work and practice in India.
	c)	Understanding the difference between social work in India and abroad.

4.	**SYLLABUS OF THE COURSE**		
	Course CODE	***Name of the Course***	
	PHD201BW	**TRENDS IN SOCIAL WORK**	
		Total Teaching Hours:	**60 Hours**
	Unit No.	**Curriculum Coverage & Topic / Sub Topics**	**Teaching Hours**
	1	**Concept of Social Work**	**12 Hours**
		Concept, Definition, Objectives and Functions of Social Work, and Brief introduction to Methods of Social Work.	
	2	**History and Development of Social Work in India and Abroad**	**12 Hours**
		Charity, Philanthropy; social situations, (Poverty, problems of immigrant, orphan hood, squalor, war victims etc.) and Social reform movements. Remedial social work, Development -oriented social work, Social activism, Human Rights Perspective.	
	3	**Trends in Social Work Practice in India**	**12 Hours**
		Welfare approach & Social welfare, Social Service, Remedial and therapeutic approach, Social change, Social Action, Social development approach and Conflict oriented approach, Human Rights, Social exclusion (marginalization, exploitation, oppression), Empowerment. Code of Professional Ethics, Family and Child Welfare, Medical and Psychiatric Social Work, Criminology and Correctional Work, HRM, URCD, SWA.	
	4	**Perspectives of Social Work Practice in India:**	**12 Hours**
		Ideological of social reform movements, advent of Missionary (Contemporary Missionaries), Gandhian, Mahatma Jyotiba Phule, ChhatraptiShahu, Dr. Babasaheb	

		Ambedkar thoughts, Marxist perspectives, Feminist perspective, Subaltern perspectives (Dalit and Adivasi) and Post—modernism influence. ii. Social movements and development perspectives - Dalit movements, Tribal movements, Peasants movements, Working class movements, Naxalite movements, Women's movements, Environment and Ecological movements, Movements of project affected persons.	
	5	**Social Policies and Development in India**	**12 Hours**
		Evolution of social policy in India in a historical perspective Different sectoral policies and their implementation: Policies concerning education, health, social welfare, women, children, welfare of backward classes, social security, housing, youth, population and family welfare, environment and ecology, urban and rural development, tribal development and poverty alleviation. The historical and social context of development in India Demographic transitions – Rural development: agrarian and land reforms; Green Revolution - Industrialization and urban development - Labour relations -Gender issues — Environmental issues (land, water, forest) - Education - Health	

5.	**STUDY MATERIALS**
	a) Text Books
1.	Batra, Nitin (2004) Dynamics of Social Work in India, Jaipur: Raj Publishing House.
2.	Bhattacharya, Integrated Approach to Social Work in India, Jaipur: Raj Publishing House.

	b) Reference Books
1.	Bradford, W. Sheafor, Charles, R. Horejsi, Gloria A. - Fourth Edition (1997) Techniques and Guidelines for Social Work, London: Allyn and Bacon, A Viacom Company.
2.	Dasgupta, Sugata (1964) Towards a Philosophy of Social Work in India, New Delhi: Popular Book Services.
3.	Desai, Murali (2002) Ideologies and Social Work: Historical and Contemporary Analysis, Jaipur: Rawat Publication.
4.	Diwakar, V. D. (1991) Social Reform Movement in India, Mumbai: Popular Prakashan.
5.	Dubois, Brenda, Krogsrud, Karla, Micky – Third Edition (1999) Social Work - An Empowering Profession, London: Allyn and Bacon.
6.	Feibleman, J.K. (1986) Understanding Philosophy - A Popular History of Ideas, New York: Souvenir Press.
7.	Fink, Arthur E., Wilson, Everett E. - Third Edition (1959) The Fields of Social Work, New York: Henry Holt and Company.
8.	Friedlander, Walter A. (1977) Concepts and Methods of Social Work, New Delhi: Prentice Hall of India Pvt. Ltd.
9.	Nair, T. Krishnan (1981) Social Work Education and Social Work Practice in India, Madras Association of School of Social Work in India
10.	Rameshwari, Devi and Ravi Prakash (2000) Social Work Practice, Jaipur: Mangal Deep Publications.
11.	Roy, Bailey and Phil, Lee (1982) Theory and Practice in Social Work, London: Oxford Pub. Ltd.
12.	Sheldon, B., & Macdonald, G., (2010) A Textbook of Social Work, London: Routledge.
13.	Rao, V. (1994). "Social Policy: The Means and Ends Question "Indian Journal of Public Administration, Vol.50, No.1, Jan. -March

1.	COURSE FRAME WORK		
		PROGRAM	Doctor of Philosophy (PhD)
		COURSE CODE & TITLE	**PHD201BP-ISSUES AND APPLICATIONS IN PSYCHOLOGY**
		SEMESTER	**II SEMESTER**
		CREDITS for the Course	**4 Credits**
		Total Teaching Hours / Week	**4 Hours**

2.	LEARNING OBJECTIVES	
	a)	To help scholars to understand the relationship between theoretical and applied aspects of Psychology
	b)	To acquaint scholars with various applications of Psychology
	c)	To familiarize scholars with problems and solutions in various applied fields
	d)	To apprise scholars of the role of Psychologists in various applied fields

3.	LEARNING OUTCOMES	
	After the course, the research scholar will be able to:	
	a)	Explain and evaluate the theories, research, and practices within the field of psychology.
	b)	Demonstrate how the theories and research in psychology can be applied to help solve real-world problems.
	c)	Discuss the complex issues facing psychology today and how these issues affect individuals, community and society.

4.	SYLLABUS OF THE COURSE		
	Course CODE	***Name of the Course***	
	PHD201BP	**ISSUES AND APPLICATIONS IN PSYCHOLOGY**	
		Total Teaching Hours:	**60 Hours**
	Unit No.	**Curriculum Coverage & Topic / Sub Topics**	**Teaching Hours**
	1	**Psychological Measurement of Individual Differences**	**12 Hours**
		The nature of individual differences; Characteristics and construction of standardized psychological tests; Types of psychological tests; Use, misuse and limitation of psychological tests; issues in the use of psychological tests. Concept of health-ill health; Positive health, well-being; Causal factors in mental disorders (Anxiety disorders, mood disorders, schizophrenia and delusional disorders; personality disorders, substance abuse disorders); Factors influencing positive health, well-being, life style and quality of life; Happiness disposition.	
	2	**Therapeutic Approaches**	**12 Hours**
		Psychodynamic therapies; Behavior therapies; Client centered therapy; Cognitive therapies; Indigenous therapies (Yoga, Meditation); Bio-feedback therapy; Prevention and rehabilitation of the mentally ill; Fostering mental health. Psychology and Organizational Behavior: Personnel selection and training; Use of psychological tests in the industry; Training and human resource development; Theories of work motivation – Herzberg, Maslow, Adam Equity theory, Porter and Lawler, Vroom; Leadership and participatory management; Advertising and marketing; Stress and its management; Ergonomics; consumer psychology; Managerial effectiveness; Transformational leadership; Sensitivity training; Power and politics in organizations.	

	3	**Community Psychology**	**12 Hours**
		Definition and concept of community psychology: Use of small groups in social action; Arousing community consciousness and action for handling social problems; Group decision making and leadership for social change; Effective strategies for social change. Rehabilitation Psychology: Primary, secondary and tertiary prevention programs - role of psychologists; Organizing of services for rehabilitation of physically, mentally and socially challenged persons including old persons, Rehabilitation of persons suffering from substance abuse, juvenile delinquency, criminal behavior; Rehabilitation of victims of violence, Rehabilitation of HIV/AIDS victims, the role of social agencies. Disadvantaged groups:The concepts of disadvantaged, deprivation; Social, physical, cultural and economic consequences of disadvantaged and deprived groups; Educating and motivating the disadvantaged towards development; Relative and prolonged deprivation. Gender discrimination, Management of diversity; Glass ceiling effect, Self-fulfilling prophesy, Women and Indian society.	
	4	**Application of Psychology to Educational Field**	**12 Hours**
		Psychological principles underlying effective teaching-learning process; Learning styles; Gifted, retarded, learning disabled and their training; Training for improving memory and better academic achievement; Personality development and value education, Educational, vocational guidance and career counseling; Use of psychological tests in educational institutions; Effective strategies in guidance programs.	
	5	**Application of Psychology to Other Fields**	**12 Hours**
		The present scenario of information technology and the mass media boom and the role of psychologists; Selection and training of psychology professionals to work in the field of IT and mass media; Distance learning through IT and mass media; Entrepreneurship through e-commerce; Multilevel marketing; Impact of TV and fostering value through IT and mass media; Psychological consequences of recent developments in Information Technology. Environmental psychology: effects of noise, pollution and crowding; Population psychology: psychological consequences of population explosion and high population density; Motivating for small family norm; Impact of rapid scientific and technological growth on degradation of environment. Military Psychology: Devising psychological tests for defence personnel for use in selection, Training, counseling; training psychologists to work with defence personnel in promoting positive health; Human engineering in defence. Sports Psychology: Psychological interventions in improving performance of athletes and sports. Persons participating in Individual and Team Games. Media influences on pro and antisocial behavior. Psychology of terrorism	

5.	STUDY MATERIALS		
	a)	Text Books	
		1.	Baron, R. A. and Byrne, D. (2002). Social Psychology. New Delhi: Prentice Hall.
		2.	Marks, D. F., Murray, M., Evans, B. and Willing, C. (2000). Health Psychology: Theory, Research and Application, New Delhi: Concept
		3.	Luthans, F (2005). Organizational Behaviour (10th Ed.). New York: TataMcGraw Hill.

	b)	Reference Books	
		1.	Bell, P. A., Greene, T. C., Fisher, J. D. and Baum, A. (2001). Environmental Psychology (Vth Edition). USA: Wadsworth Group / Thomson learning, 10 Davis Drive Belmont CA.
		2.	Woodworth R.S. and Scholsberg, (1981). Experimental Psychology, New Delhi, Tata McGraw Hill Co. Ltd.
		3.	Swaminathan V.D. and Kaliappan, K.V. (1997), Psychology for effective living – Behaviour modification, Guidance, Counselling and Yoga, Chennai. The madras Psychology society publication.
		4.	Bayne and Horton, (2003). Applied psychology, Sage Publications
		5.	Weiten and Lloyd (2004). Psychology applied to Modern Life and Adjustment in 21st Century, Thomas Wadsworth Publications
		6.	Sharma, R, (2009). Applied Psychology, Atlantic Publications.
		7.	Bachav, A. M, (2012). Applied Psychology, ChandralokPrakashan
		8.	C.R. Snyder & Shane J. Lopez, (2007) Positive Psychology, Sage Publications
		9.	David F. Marks,Michael Murray,Brian Evans, Carla Willing Cailine Woodall and Catherine E Sykes, (2006). Health Psychology, Sage Publications.
		10.	Richard H. Cox, (2002) Sport Psychology, McGraw – Hill Higher Education

○	○ *COURSE FRAME WORK*	
○	**PROGRAM**	**Doctor of Philosophy (Ph.D.)**
	COURSE CODE AND NAME	**PHD201ME-Advanced Mechanical Engineering**
	SEMESTER	**Semester - II**
	CREDITS FOR THE COURSE	**4 Credits**
	TOTAL TEACHING HOURS	**48 Hours**
	TEACHING HOURS /WEEK	**4 Hours**

○	**LEARNING OBJECTIVES**	
○	**a)**	To impart the knowledge of changes in mechanical properties of materials when load is applied.
	b)	To know about the applications of advanced manufacturing processes.
	c)	To impart the knowledge of changes in mechanical properties of materials when load is applied.
	d)	To understand the concept of heat transfer.
	e)	To understand the measuring limitations of different instruments

○	**LEARNING OUTCOMES**	
○	**After the course, the research scholar will be able to:**	
	a)	Classify different types of materials by defining their mechanical properties. [L2]
	b)	Understand different types of composite and ceramic material processing methods. [L2]
	c)	Understand the working principle of various Non- Traditional Machining equipments. [L2]
	d)	Explain the concepts related to conduction, convection and radiation. [L2]
	e)	Design a measuring instrumentation system, based on the constraints. [L3]

4.	SYLLABUS OF THE COURSE		
	Course Code	**Name of the Course**	
	PHD201ME	**Advanced Mechanical Engineering**	
		Total Teaching Hours:	**60 Hours**
	Module No.	**Curriculum Coverage and Topic / Sub Topics**	**Teaching Hours**
	1	**Mechanical Behavior, Fracture and Fatigue**	**12 Hours**
		Mechanical Behavior: Stress-strain behavior of ductile and brittle materials including metals, polymers and ceramics, engineering stress-strain and true stress-strain diagrams, elastic modulus, linear and non-linear elastic behavior, viscoelasticity, mechanical properties in the elastic and plastic range; yield strength, ductility, ultimate tensile strength, toughness, resilience. Hardness measurement methods, brine, Rockwell and Vickers hardness tests. Plastic deformation of single crystal by slip and twinning. Stress and strain relaxation. Fracture: Type I, Type II and Type III. Ductile and Brittle fracture features. Concept of fracture toughness. Fatigue: Types of fatigue loading with examples, Mechanism of fatigue, fatigue properties, fatigue testing and S-N diagram.	
	2	**Ceramics & Composite Processing**	**12 Hours**
		Processing of ceramics: Applications, characteristics, classification. Processing of particulate ceramics, Powder preparations, consolidation, Drying, sintering, Hot compaction, Area of application, finishing of ceramics, Processing of Composites: Composite Layers, Particulate and fiber reinforced composites, Elastomers, Reinforced plastics, MMC, CMC, Polymer matrix composites.	
	3	**Advanced Welding &Non Traditional Machining**	**12 Hours**
		Advanced welding techniques: TIG and MIG welding, Electro Slag, Welding Electron Beam Welding, Plasma arc Welding, Laser Beam Welding, Explosion Welding, Diffusion Welding, Ultrasonic Welding, Friction welding, friction stir welding, linear friction welding, thermitwelding and under water welding, Non-Traditional Machining: Introduction, need, AJM, USM –Mechanics of cutting, models, WJM –principle, equipment, EDM – principles, equipment, Laser Beam Machining – Principle of working, equipment, Applications.	
	4	**Heat Transfer**	**12 Hours**
		General Differential equation of Heat Conduction, Steady State Heat Conduction,Basic laws: Planck's law, Wein's law, Stefan-Boltzman law, Kirchoff's law and Lambert's cosine law, Unsteady Heat Conduction, Free and Forced Convection – Hydrodynamic and Thermal Boundary Layer. Free and Forced Convection during external flow over Plates and Cylinders and Internal flow through tubes, laws of radiation: Planck's law, Wein's law, Stefan-Boltzman law, Kirchoff's law and Lambert's cosine law	

	5	**Temperature Measurement**	**12 Hours**
		Measurement of temperature principles, Different principles of Temperature Measurement, use of bimetallic thermometers, Resistance thermometers, RTD sensors, pyrometer, measurement of heat flux, calibration of temperature measuring instruments. Design of temperature measuring instruments.	

	REFERENCES	
	1.	Strength of Materials, James M Gere, Barry J Goodno, 9th Edition, Cengage Learning, 2017
	2.	Advanced Machining Processes by V. K. Jain, Allied Publications.
	3.	Manufacturing Engineering and Technology by Kalpakijian, Addison Wesley, 1995.
	4.	Fundamentals of heat and mass transfer, Frank P. Incropera and David P. Dewitt, John Wiley and Son's.
	5.	Measurement System, Application & Design – E.O. Doeblin.

○	○ *COURSE FRAME WORK*		
○		**PROGRAM**	**Doctor of Philosophy (Ph.D.)**
		COURSE CODE AND NAME	**PHD201CV-MODERN CONSTRUCTION MATERIALS**
		SEMESTER	**Semester - II**
		CREDITS FOR THE COURSE	**4 Credits**
		TOTAL TEACHING HOURS	**48 Hours**
		TEACHING HOURS /WEEK	**4 Hours**

○	**LEARNING OBJECTIVES**	
○	**f)**	To study and understand the properties of advanced construction materials used in construction such as special concretes, metals, composites, water proofing compounds, non weathering materials, and smart materials.

○	**LEARNING OUTCOMES**	
○	**After the course, the research scholar will be able to:**	
	f)	On completion of this course the students will have the knowledge of modern construction materials to be used in the field.

4.	**SYLLABUS OF THE COURSE**		
	Course Code	**Name of the Course**	
	PHD201CV	**Advanced Civil Engineering**	
		Total Teaching Hours:	**60 Hours**
	Module No.	**Curriculum Coverage and Topic / Sub Topics**	**Teaching Hours**
	1	**SPECIAL CONCRETES**	**12 Hours**
		Concretes, Behaviour of concretes – Properties and Advantages of High Strength and High Performance Concrete – Properties and Applications of Fibre Reinforced Concrete, Self compacting concrete, High Volume Fly Ash Concrete, Ternary blend	

		concrete,Alternate Materials to concrete on high performance & high Strength concrete. Role in modern construction industry.	
	2	**METALS**	**12 Hours**
		Types of Steels – Manufacturing process of steel – Advantages of new alloy steels – Properties and advantages of aluminum and its products – Types of Coatings & Coatings to reinforcement – Applications of Coatings – Importance of metals in construction field.	
	3	**COMPOSITES**	**12 Hours**
		Introduction to Plastics – Types, Properties & Manufacturing process – Impact of plastics over society - Advantages of Reinforced polymers – Types of FRP – FRP on different structural elements – Applications of FRP.	
	4	**OTHER MATERIALS**	**12 Hours**
		Types and properties of Water Proofing Compounds – Types of Non-weathering Materials and its uses – Types of Flooring and Facade Materials and its application.	
	5	**SMART AND INTELLIGENT MATERIALS**	**12 Hours**
		Types & Differences between Smart and Intelligent Materials – Special features –Case studies showing the applications of smart & Intelligent Materials.	

○	**REFERENCES**	
	6.	ACI Report 440.2R-02, “Guide for the design and construction of externally bonded RP systems for strengthening concrete structures”, American Concrete Institute, 2002.
	7.	Aitkens , "High Performance Concrete", McGraw Hill, 1999
	8.	Ashby, M.F. and Jones.D.R.H.H. “Engineering Materials 1: An introduction to Properties, applications and designs”, Elsevier Publications, 2005.
	9.	Deucher, K.N, Korfiatis, G.P and Ezeldin, A.S, "Materials for civil and Highway Engineers", Prentice Hall Inc., 1998.
	10.	Santhakumar.A.R., "Concrete Technology", Oxford University press, New
	11.	Shan Somayaji, "Civil Engineering Materials", Prentice Hall Inc., 2001

○	○ *COURSE FRAME WORK*		
○		**PROGRAM**	**Doctor of Philosophy (Ph.D.)**
		COURSE CODE AND NAME	**PHD201CV-Advanced Physics, Materials**
		SEMESTER	**Semester - II**
		CREDITS FOR THE COURSE	**4 Credits**
		TOTAL TEACHING HOURS	**48 Hours**
		TEACHING HOURS /WEEK	**4 Hours**

○	**LEARNING OBJECTIVES**	
○	**g)**	To study and understand the properties of advanced amorphous solids and chalcogenide glasses.

○	**LEARNING OUTCOMES**	
○	**After the course, the research scholar will be able to:**	
	g)	On completion of this course the students will have the knowledge of amorphous solids, their occurrence, new generation glasses, allied analytical and technical methods.

4.	**SYLLABUS OF THE COURSE**		
	Course CODE	***Name of the Course***	
	PHD201PH	**Amorphous Solids and Chalcogenide Glasses**	
		Total Teaching Hours:	**60 Hours**
	Unit No.	**Curriculum Coverage & Topic / Sub Topics**	**Teaching Hours**
	1	**Module-I: Properties of Amorphous Solids and Glasses**	**12 Hours**
		Freezing into the Solid State: Glass Formation versus Crystallization, Structure, Applications of Amorphous Solids, Glass transition, Kauzmann's paradox, Theories of glass transition, Factors that determines the glass transition temperature, Glass forming systems and ease of glass transition.	
	2	**Module-II: Preparation of Amorphous Solids**	**12 Hours**
		Thermal evaporation, Sputtering, glow discharge decomposition, Chemical Vapor Deposition,Melt quenching, Gel desiccation, Chemical reaction, Reaction amorphisation, Irradiation, Shock wave transformation.	
	3	**Module-III: Amorphous Semiconductors and Their**	**12 Hours**

		Properties	
		Classification of Amorphous Semiconductors (a-SC). Atomic Structure of Amorphous Semiconductors, Microscopic Structure, Short Range Order (SRO), Medium Range Order (MRO), Energy Band Structure of Amorphous Semiconductors.	
	4	**Module-IV: Chalcogenide Glasses and Organic Polymers**	**12 Hours**
		Introduction, Compositional Freedom in Chalcogenide Glasses and in Oxides, The 8 - n Rule and the "Ideal Glass", Topological Defects and Valence Alternation, Applications of Chalcogenide Glasses-Electric Switches, Xerographic and thermoplastic media, photo-resist and holographic media, Optical filters, Optical Sensors, Thin film waveguides, Non-linear elements, Photovoltaics.	
	5	**Module-V: Chalcogenide Glasses for PCMs**	**12Hours**
		Introduction, Preparation techniques, Thin Films, Characterization Techniques, History of Chalcogenide Phase Change Memory Technology, Electrical Switching in Chalcogenides,Threshold Switching, Memory Switching, SET-RESET in PCMs, PCM devices, Current status, PCM memory Vs Flash Memory, - Phase Change Material Parameters and the Influenced Characteristics, Scalability, Challenges, Advantages, Current Technology Phase Change Memory, Future Phase Change Memory Trends.	

5.	**STUDY MATERIALS**	
	a)	**Text Books**
	6.	R. Zallen, "Physics of Amorphous Solids" (John Wiley and Sons, New York, 1983).
	7.	S. R. Elliot, "Physics of Amorphous Materials" (Longman Inc, New York, 1983).
	8.	Simone Raoux and Matthias Wuttig, "Phase Change Materials - Science and Applications"(Springer, New York, 2008).

	b)	**Reference Books**
	6.	D. Adler, B. B. Schwartz and M. C. Steele, "Physical Properties of Amorphous Materials" (New York and London Plenum Press, 1985).
	7.	Z. U. Borisova, "Glassy Semiconductors" (Plenum Press, New York and London, 1981).
	8.	K. J. Rao, "Structural Chemistry of Glasses" (Elsevier, Holland, 2002).
	9.	E. R. Meinders, A. V. Mijiritskii, L.V. Pieterson and M. Wuttig, "Optical Data Storage Phase-Change Media and Recording", ed. F. Toolenaar (Springer, Netherlands, 2006).
	10.	A. V. Kolobov and K. Tanaka, in "Handbook of Advanced Electronic and Photonic Materials and Devices" edited by Hari Singh Nalwa (Academic, New York, 2000).

○	○ *COURSE FRAME WORK*		
		PROGRAM	**Doctor of Philosophy (Ph.D.)**
		COURSE CODE AND NAME	**PHD201KN- Kannada Literature**
		SEMESTER	**Semester - II**
		CREDITS FOR THE COURSE	**4 Credits**
		TOTAL TEACHING HOURS	**60 Hours**
		TEACHING HOURS /WEEK	**3 Hours**

○	**LEARNING OBJECTIVES**	
	h)	ಪ್ರಾಚೀನ ಕಾಲದ ಕನ್ನಡ ಸಾಹಿತ್ಯ ಸ್ವರೂಪವನ್ನು ಅರಿಯುವುದು.
	i)	ಮಧ್ಯಕಾಲೀನ ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಸ್ವರೂಪವನ್ನು ತಿಳಿದುಕೊಳ್ಳುವುದು.
	j)	ಜಾಗತಿಕ ಸಂದರ್ಭದಲ್ಲಿ ಸಾಹಿತ್ಯದಲ್ಲಿ ಉಂಟಾದ ಬದಲಾವಣೆಯ ಬಗೆಗೆ ತಿಳಿದುಕೊಳ್ಳುವುದು.

○	**LEARNING OUTCOMES**	
○	**After the course, the research scholar will be able to:**	
	h)	ಪ್ರಾಚೀನ ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಉಗಮ ಮತ್ತು ಬೆಳವಣಿಗೆಯ ಬಗೆಗೆ ಅರಿವು ಉಂಟಾಗುತ್ತದೆ.
	i)	ಮಧ್ಯಕಾಲೀನ ಕನ್ನಡ ಸಾಹಿತ್ಯದ ವಿವಿಧ ಸಾಹಿತ್ಯ ಪ್ರಕಾರಗಳ ಬಗೆಗೆ ತಿಳಿದುಕೊಳ್ಳುತ್ತಾರೆ.
	j)	ಆಧುನಿಕ ಸಂದರ್ಭದಲ್ಲಿ ಕಥನ ಸಾಹಿತ್ಯದ ವಸ್ತು, ವೈವಿಧ್ಯತೆಯ ಬಗೆಗೆ ತಿಳಿದುಕೊಳ್ಳುತ್ತಾರೆ.

4.	**SYLLABUS OF THE COURSE**		
	Course Code	**ಕನ್ನಡ (PHD201KN)**	
	PHD201KN	**Kannada Literature**	
		Total Teaching Hours:	**60 Hours**
	Module No.	**Curriculum Coverage and Topic / Sub Topics**	**Teaching Hours**

	1	ಪ್ರಾಚೀನ ಕನ್ನಡ ಸಾಹಿತ್ಯ	12 Hours
		➢ ಪ್ರಾಚೀನಪೂರ್ವಶಾಸನಸಾಹಿತ್ಯ : ಹಲ್ಮಿಡಿಶಾಸನ , ಅಶೋಕನಶಾಸನಗಳು, ಬಾದಾಮಿಶಾಸನ , ತಮಟಕಲ್ಲುಶಾಸನ , ಜಿನವಲ್ಲಭನಶಾಸನ ➢ ಪ್ರಾಚೀನಕನ್ನಡಸಾಹಿತ್ಯರೂಪಗಳು : ಚಂಪೂ, ಚಂಪೂವಿನಉಗಮಮತ್ತುವಿಕಾಸ	
	2	ಮಧ್ಯಕಾಲೀನ ಕನ್ನಡ ಸಾಹಿತ್ಯ	12 Hours
		➢ ಸಾಹಿತ್ಯರೂಪಗಳು : ವಚನ ರಗಳೆ , ಷಟ್ಪದಿ , ಸಾಂಗತ್ಯ , ತ್ರಿಪದಿ , ಕೀರ್ತನೆ ➢ ಕವಿಗಳುಮತ್ತುವಚನಕಾರರು : ಆಂಡಯ್ಯ , ನೇಮಿಚಂದ್ರ , ಕೇಶಿರಾಜ , ಜೇಡರದಾಸಿಮಯ್ಯ , ಅಲ್ಲಮಪ್ರಭು , ಬಸವಣ್ಣ , ಅಕ್ಕಮಹಾದೇವಿ , ಅಂಬಿಗರಚೌಡಯ್ಯಇತ್ಯಾದಿ	
	3	ಆಧುನಿಕ ಕನ್ನಡ ಸಾಹಿತ್ಯ: ಗದ್ಯ	12 Hours
		➢ ಆಧುನಿಕಕನ್ನಡಸಾಹಿತ್ಯಪ್ರಕಾರಗಳು : ಕತೆ , ಕಾದಂಬರಿ , ನಾಟಕ, ಜೀವನಚರಿತ್ರೆ , ಪ್ರಬಂಧ , ಸಂಪಾದನೆ , ವಿಚಾರಸಾಹಿತ್ಯ ➢ ಪ್ರಮುಖಲೇಖಕರು : ಗುಲ್ವಾಡಿವೆಂಕಟರಾಯರು , ಎಂ.ಎಸ್ . ಪುಟ್ಟಣ್ಣ , ಕುವೆಂಪು , ಕಾರಂತ , ಮಾಸ್ತಿ , ಶ್ರೀರಂಗ , ಕೈಲಾಸಂ , ಎಸ್ .ಎಲ್ಬೈರಪ್ಪ , ಯಶವಂತಚಿತ್ತಾಲ , ತೇಜಸ್ವಿ , ಪಿ .ಲಂಕೇಶ್ , ಅನುಪಮನಿರಂಜನ, ಸಾ .ರಅಬೂಬಕರ್, ರಹಮತ್ತರೀಕೆರೆ ,ಸಬಿಹಾಭೂಮಿಗೌಡ	
	4	ಕಥನ ಸಾಹಿತ್ಯದ ಸ್ವರೂಪ	12 Hours
		➢ ಕಥನಸಾಹಿತ್ಯದಉಗಮ , ವಿಕಾಸ	
	5	ಜಾಗತೀಕರಣದ ನಂತರ ಆಧುನಿಕ ಕನ್ನಡ ಕಥಾ **ಸಾಹಿತ್ಯ**	12 Hours
		➢ ಆಧುನಿಕಕನ್ನಡಕಥಾಸಾಹಿತ್ಯದಸ್ವರೂಪ , ➢ ಜಾಗತೀಕರಣದನಂತರಕಥಾಸಾಹಿತ್ಯದಲ್ಲಾದಬದಲಾವಣೆ ➢ ಆಧುನಿಕಕನ್ನಡಕಥಾಸಾಹಿತ್ಯದವಸ್ತುವೈವಿಧ್ಯತೆ	

REFERENCES

12.	ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ– ರಂ.ಶ್ರೀ. ಮುಗಳಿ
13.	ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ– ತ.ಸು. ಶಾಮರಾಯ
14.	ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆಯ ಸಂಪುಟಗಳು, (ಪರಿಷ್ಕೃತ) ಪ್ರಸಾರಾಂಗ, ಬೆಂ.ವಿ.ವಿ
15.	ವಿಮರ್ಶೆಯ ಪರಿಭಾಷೆ– ಓ. ಎಲ್. ನಾಗಭೂಷಣಸ್ವಾಮಿ
16.	ಕನ್ನಡ ಕಥನ ಸಾಹಿತ್ಯ: ಸಣ್ಣಕತೆ– ಜಿ.ಎಸ್ ಆಮೂರ

	17.	ಕನ್ನಡ ಸಾಹಿತ್ಯ ಕೋಶ–ಡಾ. ರಾಜಪ್ಪ ದಳವಾಯಿ
	18.	ಸಾಮಾನ್ಯನಿಗೆ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ ಸಂಪುಟಗಳು– ಬಿಂ.ವಿ.ವಿ
	19.	ಸಾಹಿತ್ಯ ಕಥನ– ಡಿ.ಆರ್ ನಾಗರಾಜ್

○	○ ***COURSE FRAME WORK***		
○		**PROGRAM**	**Doctor of Philosophy (Ph.D.)**
		COURSE CODE AND NAME	**PHD201AR1-Environmental Psychology and Crime Prevention Through Environmental Design (CPTED)**
		SEMESTER	**Semester - II**
		CREDITS FOR THE COURSE	**4 Credits**
		TOTAL TEACHING HOURS	**60 Hours**
		TEACHING HOURS /WEEK	**4 Hours**

○	**LEARNING OBJECTIVES**	
○		To facilitate the understanding of theories and concepts in the discipline of Environmental psychology. To obtain a bird's eye view of the agenda for crime prevention through Environmental design (CPTED).

○	**LEARNING OUTCOMES**	
○	**After the course, the research scholar will be able to:**	
		On successful completion of the course, students will be able to: 1) Have an insight into the various dimensions of the interaction between man and the built environment. 2) Appreciate role of design of public spaces in crime reduction.

4.	**SYLLABUS OF THE COURSE**		
	Course CODE	***Name of the Course***	
	PHD201PH	**Environmental Psychology and Crime Prevention Through Environmental Design (CPTED)**	
		Total Teaching Hours:	**60 Hours**
	Unit No.	**Curriculum Coverage & Topic / Sub Topics**	**Teaching Hours**

	1	**Module-I: Basics of** Environmental psychology	**15 Hours**
		Definition of Environmental psychology-brief history-scope-theories-behaviorism-Geographical Determinism-Ecological biology-gestalt psychology-perception and cognition maps	
	2	**Module-II: Concepts & behavior in** Environmental psychology	**15 Hours**
		Concepts-behavior settings by Roger Barker – Attention restoration theory by Kaplan and Kaplan – Proxemics and personal space by Robert Sommer and ET Hall – Culture in the built environment by Amos Rapoport	
	3	**Module-III:** Crime prevention through environmental design (CPTED)	**15 Hours**
		Crime prevention through environmental design (CPTED):CPTED as an agenda for action – origins – concept of defensible spaces by Oscar Newman – Ray Jeffery's CPTED – Natural surveillance, access control, territoriality, CPTED measures – CPTED in prison environment.	
	4	**Module-IV: Case studies**	**15 Hours**
		Elizabeth wood's work with the Chicago housing authority – Ideas of Jane Jacobs and Schlomo angel – The Broken windows theory by James Wilson and George Kelling – Ideas of Patricia and Paul Brantinghan – Situational crime prevention approach by Ronald Clarke and Patricia Mayhew – Ideas of Timcrowe – Woodbridge's CPTED concept in prison environment.	

5.	**STUDY MATERIALS**		
	a)	**Text Books**	
			Proshansky, Harold et al, Environmental psychology, Man and his physical setting, Holt, Rinchart and Winston, 1970
			Bell, Paul et al, Environmental psychology, Harcourt college publishers, 2001.

	b)	**Reference Books**	
			Fenelly, Laurence and Perry, Marianna, CPTED, Taylor and Francis Ltd, 2018.
			Crowe, Timothy, CPTED, Butterworth Heineman Ltd, 2013

○	○ *COURSE FRAME WORK*		
○		**PROGRAM**	**Doctor of Philosophy (Ph.D.)**
		COURSE CODE AND NAME	**PHD201AR2-Teaching Modes in Architectural Education**
		SEMESTER	**Semester - II**
		CREDITS FOR THE COURSE	**4 Credits**
		TOTAL TEACHING HOURS	**60 Hours**
		TEACHING HOURS /WEEK	**4 Hours**

○	**LEARNING OBJECTIVES**	
○		To facilitate the making of a comprehensive list of modes(combination) for teaching various subjects in Architectural Education and to categorize the subjects based on the use of teaching modes.To critically examine the online, hybrid and blended modes for their pros and cons in the teaching of subjects.

○	**LEARNING OUTCOMES**	
○	**After the course, the research scholar will be able to:**	
	On successful completion of the course, students will be able to: Have an insight into the teaching modes required for efficient delivery of subject content to students of B.Arch. program Have a grip on the integration of suitable on-line modes into teaching for the augmentation of learning in Architecture.	

4.	**SYLLABUS OF THE COURSE**		
	Course CODE	***Name of the Course***	
	PHD201PH	**Teaching Modes in Architectural Education**	
		Total Teaching Hours:	**60 Hours**
	Unit No.	**Curriculum Coverage & Topic / Sub Topics**	**Teaching Hours**
	1	**Module-I: Basics of** architecture teaching	**15 Hours**
		Classification of subjects taught in the B.Arch. program based on the teaching methods involved – for example, teaching modes in the Design oriented subjects, Construction oriented subjects, Services, Structures, History and Theory, Workshops, etc. Listing of methods for each stream – classroom instructions, one to one discussion between student and faculty with sketches of thoughts, doodles, space planning, drawings, models, etc. Instructions on the site – critiquing the drawings put up by the student etc. Similar listing covering all the subjects in the	

		B.Arch. program.	
	2	**Module-II: Online tools for teaching**	**15 Hours**
		Online mode of teaching used during the pandemic for all the streams of subjects – digital tools used like Zoom, Google class room, Cisco Webex, etc. Gadgets required for the college/faculty and for the students, like smart phones, laptops, tablets, etc. Use of interactive tools, 3D tools, etc. Critical assessment of the pros and cons of the online mode.	
	3	**Module-III:** Possibility of hybrid mode of teaching	**15 Hours**
		Hybrid Mode – Integration of online and face to face teaching – substitution of traditional classroom mode by internet-based activities – Use of technology – Suitability of hybrid mode for different streams of subjects – assessment.	
	4	**Module-IV: evolving web enhanced tools**	**15 Hours**
		Web enhanced or Blended Mode – Classroom and Studio sessions in a traditional way – Technology used to facilitate activities, deliver content and assess students – Suitability of blended mode for different streams of subjects – Assessment.	

5.	**STUDY MATERIALS**		
	a)	**Text Books**	
			Judith V. Boettcher, Rita – Marie Conrad, The Online Teaching Survival Guide, Jossy – Bass (A Wiley Brand), 2021.

	b)	**Reference Books**	
			Catlin R Tucker, Balance with Blended Learning, Corwin Press, 2020.

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Approved by:

Director
Directorateof Research and Innovation

Dr. Praveen R.
Registrar **Vice Chancellor**