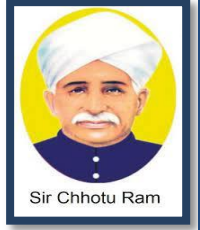




Established in 1951

CHHOTU RAM ARYA COLLEGE



SONIPAT



Criteria-VI

Governance, Leadership, and Management

6.5: Internal Quality Assurance System

6.5.1: Internal Quality Assurance Cell (IQAC) has contributed significantly for institutionalizing the quality assurance strategies and processes. It reviews teaching learning process, structures & methodologies of operations and learning outcomes at periodic intervals and records the incremental improvement in various activities

Index

S. No.	Particulars	Link
1	IQAC Meeting Notice	
2	IQAC Committee	
3	IQAC Meeting Minutes	
4	IQAC Meeting Compliance Report	
5	Self-Funded Courses	
6	Annual Committees	
7	Value Added Courses	
8	Placements	
9	Institutional Achievements	
10.	Workshops/Webinar	
11.	Research Publications	
12.	Interaction with Industries	

1. IQAC Meeting Notice:

2018-2019	https://www.cracollegesonepat.org/download/IQACMeetings/2018-2019.pdf
2019-2020	https://www.cracollegesonepat.org/download/IQACMeetings/2019-2020.pdf
2020-2021	https://www.cracollegesonepat.org/download/IQACMeetings/2020-2021.pdf
2021-2022	https://www.cracollegesonepat.org/download/IQACMeetings/2021-2022.pdf
2022-2023	https://www.cracollegesonepat.org/download/IQACMeetings/2022-2023.pdf

2. IQAC Committee:

2018-2019	https://www.cracollegesonepat.org/download/IQACCommittee/2018-2019.pdf
2019-2020	https://www.cracollegesonepat.org/download/IQACCommittee/2019-2020.pdf
2020-2021	https://www.cracollegesonepat.org/download/IQACCommittee/2020-2021.pdf
2021-2022	https://www.cracollegesonepat.org/download/IQACCommittee/2021-2022.pdf
2022-2023	https://www.cracollegesonepat.org/download/IQACCommittee/2022-2023.pdf

3. IQAC Meeting Minutes

2018-2019	https://www.cracollegesonepat.org/download/IQACMeetings/2018-2019.pdf
2019-2020	https://www.cracollegesonepat.org/download/IQACMeetings/2019-2020.pdf
2020-2021	https://www.cracollegesonepat.org/download/IQACMeetings/2020-2021.pdf
2021-2022	https://www.cracollegesonepat.org/download/IQACMeetings/2021-2022.pdf
2022-2023	https://www.cracollegesonepat.org/download/IQACMeetings/2022-2023.pdf

4. IQAC Meeting Compliance Report

2018-2019	https://www.cracollegesonepat.org/download/IQACMeetings/2018-2019.pdf
2019-2020	https://www.cracollegesonepat.org/download/IQACMeetings/2019-2020.pdf
2020-2021	https://www.cracollegesonepat.org/download/IQACMeetings/2020-2021.pdf
2021-2022	https://www.cracollegesonepat.org/download/IQACMeetings/2021-2022.pdf
2022-2023	https://www.cracollegesonepat.org/download/IQACMeetings/2022-2023.pdf

5. List of Self-funded Courses:

S.No.	Name of the Programme
1	B.A. (Hons.) Political Science
2	M.A. Hindi
3	M.A. Political Science
4	M.A. Geography
5	M.Sc. Math
6	M.Sc. Chemistry
7.	M.Sc. Physics

6. Annual Committees:

**Purchase
Committee
2021-2022**



CHHOTU RAM ARYA COLLEGE

(Affiliated to M.D. University, Rohtak)

SONEPAT-131001 (HARYANA)

Phone : 0130-2242925, Fax : 0130-2242925 E-mail : crasonapat@gmail.com Web : www.cracollegesonepat.org

Ref. No. CRA/.....

Date.....

CHHOTU RAM ARYA COLLEGE, SONIPAT

It is for information to all the staff members (Teaching and Non-teaching) that following committees are constituted for the smooth functioning of the college in a fair and transparent manner. These committees shall be effective w.e.f. 01.7.2022. Formal Approval is taken from the President, TRES, Sonipat over Whatsapp.

1. Construction and Maintenance Committee (including Budget and Estimates) including Purchase of Construction Material
 - i. Dr. Harindra Singh (Convener)
 - ii. Dr. Jitender Singh (Member)
 - iii. Dr. Rajeev Kumar (Member)
 - iv. Sh. Satish Rathee (Member)
2. Purchase Committee (including Solar and excluding Construction Material)
 - i. Dr. Naresh Rathee (Convener)
 - ii. Dr. Urmil Hooda (Member)
 - iii. Mr. Satish Rathee (Member)
3. Sports Equipments Purchase Committee
 - i. Dr. Rajiv Kumar (Convener)
 - ii. Dr. Vijay Kiran (Member)
 - iii. Dr. Vikas Gahlawat (Member)
4. Purchase Committee
 - i. Dr. J.S. Phor (Convener)
 - ii. Dr. Naresh Rathee (Member)
 - iii. Dr. Urmila Hooda (Member)



Dr. J.S. Phor

5. Printing & Stationery and Purchase of Consumable Goods Committee

- i. Dr. Harindra Singh (Convener)
- ii. Dr. Anu Rathee (Convener)
- iii. Dr. Vijay Kiran (Member)

6. Computer/Electric/Electronic/other Equipments of all types Repairing and Maintenance Committee

- i. Dr. Naresh Rathee (Convener)
- ii. Dr. Rajiv Kumar (Member)
- iii. Mr. Ajmer Singh (Member)

7. Lab. Equipment Committee

- i. Dr. Harindra Singh (Convener)
- ii. Dr. Ritu Dahiya (Convener)
- iii. Dr. Vijay Kiran (Member)
- iv. Mr. Ajmer Singh (Member)


Principal



**Purchase
Committee
2022-2023**



CHHOTU RAM ARYA COLLEGE

(Affiliated to M.D. University, Rohtak)

SONEPAT-131001 (HARYANA)

Phone : 0130-2242925, Fax : 0130-2242925 E-mail : crasonepat@gmail.com Web : www.cracollegesonepat.org

Ref. No. CRA/.....

Date.....

CHHOTU RAM ARYA COLLEGE, SONIPAT

It is for information to all the staff members (Teaching and Non-teaching) that following committees are constituted for the smooth functioning of the college in a fair and transparent manner. These committees shall be effective w.e.f. 01.11.2023. Formal Approval is taken from the President, TRES, Sonipat over Whatsapp.

1. Construction and Maintenance Committee (including Budget and Estimates) including Purchase of Construction Material
 - i. Dr. J.S. Phor (Convener)
 - ii. Dr. Rajeev Kumar (Member)
 - iii. Sh. Satish Rathee (Member)
 - iv. Sh. Jagdeep (Member)
2. Purchase Committee (including Solar and excluding Construction Material)
 - i. Dr. Naresh Rathee (Convener)
 - ii. Dr. Urmil Hooda (Member)
 - iii. Mr. Satish Rathee (Member)
3. Sports Equipments Purchase Committee
 - i. Dr. Rajiv Kumar (Convener)
 - ii. Dr. Vijay Kiran (Member)
 - iii. Dr. Vikas Gahlawat (Member)
4. Purchase Committee
 - i. Dr. J.S. Phor (Convener)
 - ii. Dr. Naresh Rathee (Member)
 - iii. Dr. Urmila Hooda (Member)



[Handwritten signature]

5. Printing & Stationery and Purchase of Consumable Goods Committee

- i. Dr. Anu Rathee (Convener)
- ii. Dr. Vijay Kiran (Member)
- iii. Dr. Urmila Hooda (Member)

6. Computer/Electric/Electronic/other Equipments of all types Repairing and Maintenance Committee

- i. Dr. Naresh Rathee (Convener)
- ii. Dr. Rajiv Kumar (Member)
- iii. Mr. Ajmer Singh (Member)

7. Lab. Equipment Committee

- i. Dr. Ritu Dahiya (Convener)
- ii. Dr. Vijay Kiran (Member)
- iii. Mr. Ajmer Singh (Member)


Principal



Excluding Purchase Committee
CHHOTU RAM ARYA COLLEGE, SONEPAT
Annual Duty List 2023-24

Order No CRA/2023/

Dated:

The Following committees have been constituted to assist the Principal in the day to day functioning and administration of the College. These duties come into force with immediate effect. **Ex-Convener/ Teachers in-charge, if any, are requested to hand over their charge to the new incumbent/s within a week** and report to the undersigned and also get the counter signatures of the undersigned.

The Conveners/ Teachers in-charges of the committees should note down the names of the members and associated with them. They are also advised to invite fresh quotations for the items of work to be undertaken by them throughout the year immediately (if applicable).

Special Note:

1. Under any circumstance, Regular classes should not suffer during the performance of the following duties.
2. No. on the spot quotation will be managed unless it is pertinent in view of the situation, with prior permission of the Principal. In case of emergency situation, on the spot quotations shall be called under the supervision of the Principal.
3. All quotations formalities should be completed as early as possible.
4. Follow the Gazette Notification in letter and spirit. (See the attachment)
5. Financial Power of Principal is upto Rs. 5000/- per item per day.

Illustration: Suppose there is repair work in the College and the committee has hired the labour on daily wages for 10 days @ Rs. 5000/- per day, in that case the Principal has to seek the permission of the Governing Body, because the total cost of repair exceeds the permissible limit irrespective of days.

6. All recurring expenses like Electricity bill, Water and Sewage Bill, Internet Bill, Website maintenance Bill, Telephone Bill, Professional fees etc. above Rs. 5000/- need not sent to the Governing Body for approval.
7. For advance money, prior permission of the Principal in necessary with an undertaking to submit the adjustment of advance within 30 days of its disbursement.



1. College Council/ Advisory Body/ College Development Board & Reception Committee

Chairman Dr. Narender Singh, Principal
Members

1. Dr. J.S. Phor
2. Dr. Naresh Rathee
3. Dr. Rajroop Chahal (Bursar)

Special Invitee Dr. Satish Malik, University representative
on Governing Body

2. Chief Proctor:

Dr. J.S. Phor

3. Senior Tutor:

Dr. J.S. Phor, Convener & Science Classes (UG & PG)

Dr. Naresh Rathee, Arts (UG & PG Classes)

Dr. Rajroop Chahal, Commerce (UG & PG Classes)

4. Building fund Committee/ All types of Construction work, PWD, B&R/ Electricity & Civil repair work

1. Dr. J.S. Phor
2. Dr. Rajiv Kumar
3. Mr. Satish Rathee

5. College Bursar

Dr. Rajroop Chahal

6. N.S.S. Programme Officer/ Outreach/ Women Cell

1. Dr. Usha Dahiya Unit-I
(Assisted by Mr. Jaidev, Assistant Lecturer)

2. Dr. Abhimanyu Unit-II
(Assisted by Dr. Mukesh Kumar, LA)

7. Staff Secretary

1. Dr. Rajiv Kumar

8. Social Affair Committee

1. Dr. Usha Dahiya, Convener
2. Dr. Abhimanyu

9. All types of Dilapidation/ Renovation/ Minor repair work out of building fund/ College Development Fund etc.

1. Dr. J.S. Phor
2. Dr. Rajiv Kumar
3. Mr. Satish Rathee



10. Smart Classes

1. Dr. J.S. Phor, Convener
2. Dr. Rajiv Kumar
3. Mr. Ajmer Singh, Lect. Computer Science
4. Mr. Ravinder Singh Dahiya, LA (Language Lab)

11. Committee for NAAC

1. Dr. Naresh Rathee, Coordinator
2. Dr. Rajroop Chahal
3. Mr. Pradeep
4. Dr. Aarish

12. U.G.C. Affairs/ Statistics Data Cell/ PARYAS/ New Policy of Education (NPE 2020) Committee/ Higher Education Council/ AISHE/ RUSA/ SWAYAM

1. Dr. Naresh Rathee, Coordinator
2. Dr. J.S. Phor
3. Dr. Rajroop Chahal

13. Collection of Degrees and Gown Committee for Convocation

1. Dr. Naresh Rathee, Convener
2. Mr. Manoj Kumar, Clerk
3. Mr. Rajesh (Singhwa), Clerk
4. Mr. Naveen Rathee, Clerk

14. Women Studies & Development Cell & Girls Common Room

1. Dr. Usha Dahiya, Convener
2. Dr. Vijay Kiran
3. Ms. Kirti

15. Research Committee

1. Dr. Anu Rathee, Convener
2. Dr. Vijay Kiran
3. Dr. Seema Dhochak, Lecturer in Commerce
4. Dr. Nidhi, Lecturer in Physics

16. Internal Assessment Committee/ RR/ CR and other university related matters and Name Struck etc.

Registrar	Dr. J.S. Phor
Deputy Registrar I	Dr. Naresh Rathee
Deputy Registrar II	Dr. Rajroop Chahal
Data Entry Clerk	Smt. Santosh

17. College and University Result Tabulation and Verification Committee/ Student Data

1. Dr. Rajiv Kumar – UG
2. Dr. Ritu Dahiya – PG
3. Mr. Manoj Kumar – Clerk (UG)
4. Mr. Rajesh (Singhwa) – Clerk (PG)



- 18. Checking of Income Tax Statement & Form-16 for TDS/ Filling of TDS Return/ NPS/ PF**
1. Dr. Rajroop Chahal
 2. Mr. Rajesh, Clerk
- 19. College Time Table/ Work Load Committee**
1. Dr. J.S. Phor
 2. Dr. Anu Rathee
 3. Dr. Rajroop Chahal
- 20. Photography Committee**
1. Dr. Urmila Hooda, Convener
 2. Mr. Vikram Tushir
- 21. Committee for Human Rights Issues and Protection of Women from sexual harassment at work place**
1. Dr. Anu Rathee, Advisor
 2. Dr. Usha Dahiya
 3. Dr. Vijay Kiran
- 22. Conduct of stage (Excluding subject societies, N.S.S., N.C.C.) and organization of seminar/ Conference/ workshop/ exhibition with the help of other staff members**
1. Dr. Anu Rathee, Convener
 2. Dr. Urmila Hooda
 3. Dr. Seema Dhochak
- 23. Cycle stand and Parking of vehicles Committee**
1. Dr. J.S. Phor, Convener
 2. Mr. Sanjay Tyagi, Clerk
 3. Mr. Pardeep Kumar, Clerk
 4. Mr. Khem Singh, Chowkidar
- 24. Preparation and Printing of Annual Report/ Brief Information Brochure/ College Magazine**
1. Dr. Naresh Rathee, Convener
 2. Dr. Rajroop Chahal
 3. Dr. Urmila Hooda
 4. Mr. Ajmer Singh
- 25. Printing of Certificates/ Invitation Cards/ Register/ Slip/ Various Proformas and other Miscellaneous printing items**
1. Mr. Ajmer Singh
 2. Mr. Pradeep
 3. Dr. Aarish



26. College Magazine Committee

Editor in Chief	Dr. Urmila Hooda
Editor Science Section	Dr. Ritu Dahiya
Editor Social Science	Dr. Usha Dahiya
Editor English Section	Dr. Urmila Hooda
Editor Hindi Section	Dr. Neelam
Editor Commerce Section	Dr. Sushila

27. SC/ BC/ ST and other Scholarship/ Stipend Screening Committee/ Minority Community Welfare Cell & Adhaar Card/ Attestation of SC/ BC Forms

1. Mr. Ajmer Singh, Convener
2. Mr. Rajesh (Singhwa)

28. Career Guidance and placement Cell/ Student Progression/ Students' achievements/ Apprenticeship and Training

1. Dr. Urmila Hooda
2. Mr. Vikram Tushir

29. Press/ Publicity and Public Relations Committee/ Social Media/ Whatsapp

1. Mr. Vikram Tushir
2. Mr. Ajmer Singh
3. Dr. Tamanna, Lecturer in Computer Science

30. Driving License/ Passport/ Adhaar Card

1. Dr. Rajiv Kumar, Nodal Officer
2. Dr. Tamanna
3. Dr. Abhimanyu

31. Cultural & Co-Curricular Activities

1. Dr. Urmila Hooda, Coordinator

Conveners

- | | |
|--------------------------|------------------|
| 1. Musical & Dance Items | Dr. Usha Dahiya |
| 2. Theatre Items | Dr. Urmila Hooda |
| 3. Literacy Items | Dr. Neelam |
| 4. Fine Arts | Dr. Vijay Kiran |

32. Subject Societies

Hindi Sahitya Parishad

Dr. Kavita, Lecturer in Hindi
Dr. Neelam, Lecturer in Sanskrit
Ms. Sonu

English Literacy Society

Dr. Rajiv Kumar
Dr. Urmila Hooda
Dr. Pinki, Lecturer in English
Dr. Savita, Lecturer in English
Ms. Supriya, Lecturer in English



Sanskrit Literacy Society

Dr. Neelam, Lecturer in Sanskrit
Dr. Kavita, Lecturer in Hindi

Geography Society

Ms. Reena, Lecturer in Hindi
Ms. Ritu, Lecturer in Geography
Dr. Nisha, Lecturer in Geography
Ms. Neelam, Lecturer in Geography
Mr. Pradeep, Lecturer in Geography
Mr. Jagdeep, Lecturer in Geography

Science Society & Exhibition

Dr. Ritu Dahiya
Dr. Vijay Kiran
Dr. Parmila, Lecturer in Maths
Dr. Nidhi, Lecturer in Maths
Dr. Amarjeet

Social Sciences Society

Dr. Seema, Lecturer in Zoology
Dr. Usha Dahiya
Ms. Kirti, Lecturer in Pol. Sci.
Ms. Kavita, Lecturer in Pol. Sci.
Ms. Mukesh, Lecturer in Pol. Sci.
Ms. Sangeeta, Lecturer in Pol. Sci.
Mr. Satish Rathee, Lecturer in History

Maths Society

Ms. Pinki, Lecturer in History
Ms. Kavita, Lecturer in Geography
Ms. Preeti, Lecturer in Geography
Ms. Neelam, Lecturer in Geography
Dr. Parmila, Lecturer in Maths
Ms. Rinku, Lecturer in Maths
Dr. Aarish, Lecturer in Maths
Mr. Deepak, Lecturer in Maths

33.

A. College Dispensary & First Aid

1. Dr. Ritu Dahiya
2. Dr. Vijay Kiran
3. Dr. Pinki
4. Dr. Seema Kuhad
5. Mr. Amarjeet
6. Mr. Devanand



B. Environmental Studies

1. Dr. Vijay Kiran
2. Ms. Preeti
3. Mr. Pradeep
4. Dr. Seema Kuhad
5. Ms. Sonia Narwal

34. Auction of Unserviceable/ Destroyable/ Consumable/ Actionable article Committee

1. Dr. J.S. Phor, Convener
2. Dr. Rajiv Kumar
3. Mr. Satish Rathee, Estate Officer
4. Mr. Sanjay Tyagi, Clerk

35. Incharge – Plantation

1. Dr. Anu Rathee
2. Dr. Vijay Kiran
3. Dr. Seema Dhochak
4. Mr. Ram Ganesh, Mali
5. Mr. Satish, Mali

36. Earn While You Learn Scheme

1. Dr. Urmila Hooda
2. Ms. Santosh, Clerk

37. Generator Set, Invertors, Electrical Items, Fans, Bulbs, Tubes/ Complaints/ Supply/ Repair related to HSEB/ PWD/ and verification of Electrical Bills and Maintenance of Registers

1. Dr. J.S. Phor, Estate Officer
2. Dr. Rajroop Chahal, Bursar
3. Mr. Rajesh Singh, Clerk
4. Mr. Parvesh, Peon
5. Mr. Ravinder Singh, LA

38. CCTV Committee

1. Dr. J.S. Phor, Estate Officer
2. Dr. Rajroop Chahal, Bursar
3. Mr. Rajesh Kumar, Clerk
4. Mr. Ravinder Singh, LA

39. Incharge – College Property (Furniture etc.)

1. Dr. J.S. Phor, Estate Officer
2. Mr. Mukesh, LA
3. Mr. Jaidev, LA
4. Mr. Parvesh, Peon



40. Fee Concession/ SAF/ Red Cross Fund

1. Dr. J.S. Phor
2. Dr. Rajiv Kumar
3. Dr. Vijay Kiran

41. Multipurpose Hall/ Auditorium Management

1. Dr. Rajiv Kumar
2. Dr. Abhimanyu
3. Mr. Ravinder Singh, LA

42. Legal Cell (College Building/ Agriculture Land/ Auction of Agriculture land on lease & other legal matters)

1. Dr. Rajroop Chahal

43. Legal/ Electoral Cell

1. Dr. Ritu Dahiya
2. Mr. Jagdeep
3. Mr. Amarjeet
4. Ms. Jyoti, Lecturer in Physics

44. Sports Board (For all purposes)

Chairman - Dr. Narender Singh, Principal

1. Dr. Naresh Rathee
2. Mr. Vikas Gahlawat
3. Mr. Pardeep Kumar, Lecturer in Physical Ed.

45. Introduction of Job Oriented Professional Courses/ Add-on Courses/ New Courses/ Subject and other University Affair

1. Dr. Naresh Rathee, Convener
2. Dr. Anu Rathee
3. Dr. Rajroop Chahal
4. Mr. Ravinder Khatri, Clerk
5. Mr. Ravinder Singh, LA

46. Historical/ Educational Tour/ Trekking Expedition etc.

1. Dr. Vijay Kiran
2. Mr. Pradeep
3. Dr. Aarish

47. Discipline and Anti-Ragging Committee

1. Dr. Anu Rathee, Convener
2. Dr. Vijay Kiran
3. Ms. Supriya

ANTI-RAGGING SQUAD

1. Dr. J.S. Phor
2. Dr. Naresh Rathee
3. Dr. Rajroop Chahal



7. Value-Added Courses

1.3.1 Value-added courses imparting transferable and life skills offered during the year

Value added courses	Date of Introduction	Number of students enrolled
Environment Education	2012	946
Moral Education	2016	92
Disaster Management	2016	78
Fundamental of Computer	2016	1037
Environmental Chemistry	2016	39
Environmental Issues	2016	198
General Spectroscopy	2016	39
Indian Society	2016	87
Drama Studies	2016	30
Natural and Man made Disaster	2016	22

M.D.U., ROHTAK
W.E.F. 2018-19

A) Open Elective Courses

Students of all PG programmes under CBCS (w.e.f.2018-19) are required to study one open elective course in each of the 2nd and 3rd Semesters for 2-Years Programmes and in each of the 4th and 5th semesters for 3-Years Programmes. They may choose any one of the following courses (excluding the courses offered by the departments of their own subjects, if not stated otherwise).

Open Elective Courses of 2nd Semester:-

Sr. No.	Nomenclature of the course	Course Code	Offered by the Department
1.	Introduction to Bioinformatics	16BINO1	Bioinformatics
2.	Principles and Applications of Agriculture Biotechnology-I	16CBTO1	Biotechnology
3.	Principles and Applications of Biotechnology-I	16CBTO3	Biotechnology
4.	Basic Biochemistry	16BCHO1	Bio-Chemistry
5.	Plant Resource Utilization	16BOTO1	Botany
6.	Cyber Forensic & Security	16CSAO1	Computer Science & Applications
7.	National Security of India	16DSSO1	Defence & Strategic Studies
8.	Basics of Economics	16ECCO1	Economics
9.	Fundamental Aspects of Education	16EDUO1	Education
10.	Indian Literature in Translation - I	18ENGO1	English
11.	Environmental Issues	16ENVO1	Environmental Science
12.	Food Adulteration	16FTEO1	Food Technology
13.	Genetics & Society	16GENO1	Genetics
14.	Basics of Geoinformatics	16GEOO1	Geography
15.	Geography of India Systematic and Regional	16GEOO2	Geography
16.	Nationalism in India	16HISO1	History
17.	Front Office & Guest Services Management	18MHMCTO1	IHTM
18.	Fundamentals of Management	16IMSO1	IMSAR
19.	Media & Society	16JRMO1	Journalism
20.	Family Law	16LAWO1	Law
21.	General Principles of Criminal Law	18LAWO2	Law
22.	Academic Integrity & Plagiarism	16LISO1	Library & Information Science
23.	Mathematical Techniques and Applications	16MATO1	Mathematics
24.	Parametric & Non-Parametric Tests	16MATO2	Mathematics
25.	Principles of Medical Biotechnology I	16MBTO1	Medical Biotechnology
26.	Microbes and Environment	18MCBO1	Microbiology

27.	Sources of Energy-I	16PHYO1	Physics
28.	Administrative Literacy	16PUBO1	Public Administration
29.	Disaster Management - I	16POLO1	Political Science
30.	Ancient Indian Culture & Philosophy	18SKTO1	Sanskrit
31.	Understanding Sociology	16SOCO1	Sociology
32.	Quantitative Techniques	16STAO1	Statistics
33.	Sampling & Estimation Techniques	16STAO2	Statistics
34.	Computer Science Principles	16CSEO1	UIET (Comp. Sc. & Eng.)
35.	Software Engineering Practices	16CSEO2	UIET (Comp. Sc. & Eng.)
36.	Business skills for Biotechnologists	16MBTO1	UIET (Biotech)
37.	Operations Research	16MMEO1	UIET (Mech. Eng.)
38.	Multimedia Communication	16ECEO1	UIET(Electronics & Comm
39.	Applied Zoology	16ZOOO1	Zoology

CENTRE FOR BIOINFORMATICS

M. D. UNIVERSITY, ROHTAK

CBCS-SCHEME OF EXAMINATION (M.Sc. -Bioinformatics)-2016-17 onwards

Course Title: Introduction to Bioinformatics

Credit: 3 0 0

Course Code: 16BINO1

MM. Th 80+ IA 20

Time: 3 Hours

Note: In all 7 questions are to be set, Question No. 1 is compulsory and to be set covering entire Syllabus. 6 questions will be set with two questions from each unit. Students are required to attempt one compulsory question and 4 other questions, *i.e.*, selecting atleast one from each unit.

UNIT I

Overview of Bioinformatics and Information technology: History, scope and application, Internet and World Wide Web; Generation of computers; Concept of networking; Internet protocols – OSI model; TCP/IP models.

UNIT II

Bioinformatics resources: Biological databases, Basic classification – Sequence & Structure; Generalized & Specialized; Primary & Secondary, with example databases .

Omics science: Introduction to genomics, proteomics, metabolomics, interactomics.

UNIT III

Bioinformatics tools: Information retrieval system (Entrez, SRS); Sequence alignment tools (BLAST, FASTA, CLUSTAL-W/X, MUSCLE, TCOFFEE), Variants of BLAST (BLASTn, BLASTp, PSI-BLAST, PHI-BLAST, etc).

M.Sc Agriculture Biotechnology

Semester-II

Course Title: Principles and Applications of Agriculture Biotechnology-I

MM. Th 80+IA 20

Time: 2 h

Course Code No. 16CBTO1

NOTE: There shall be seven questions in total. Question No.1 will be compulsory (short answer type) covering the entire syllabus and remaining six questions will be set two from each unit. Students are required to attempt four questions in all by selecting at least one from each unit.

Theory

UNIT I

Tools and techniques used in agriculture biotechnology, restriction digestion (restriction endonucleases, types and mechanism), ligases, alkaline phosphatases, polynucleotide kinase, SI nuclease, DNase, RNase, scoreable and selectable markers. PCR, C-DNA and genomic libraries.

UNIT II

Plant tissue culture and its application in crop improvement. Recombinant DNA technology and cloning vectors, Different methods of gene transfer in plants (*Agrobacterium* mediated transfers, microinjection, eletroporation, somatic cell hybridization).

UNIT III

Genetic and Molecular basis of Heterosis and Apomixis and their significance, Mutations and polyploidy in crop improvement, Molecular markers, Marker assisted breeding, QTL mapping, Origin, evolution and cultivation practices of the major crop plants. Improvement of crop plants: increase in iron, protein and amino acids, golden rice colours – anthocyanins, betalaines, crocin and crocetins. Flavours–capsaicin, vanillin, stevioside thaumatin. Developing vaccine and plantibodies, terminator technology and male sterility

Suggested readings:

1. Hou CT, Shaw JF (2009) – Biocatalysis and agricultural biotechnology, CRC Press, USA
2. Agricultural biotechnology, 1st edition, (2008) Rawat H, Oxford Book Co, India.
3. Agrobiotechnology and plant tissue culture, Bhojwani SS, Soh WY, Oxford & IBH Publ, India
4. Agricultural biotechnology, (2005), Kumar HD, Daya Publ House, India
5. Plant molecular breeding, (2009), Newbury HJ, John Wiley and Sons., USA.
6. Embryology of Angiosperms, (2009), S.S. Bhojwani and S.P. Bhatnagar, Vikas Publ House, India.
7. Ashwani Kumar, Shekhawat NS (2009) – Plant tissue culture and molecular markers: their role in improving crop productivity (IK International)
8. Biotechnology, 4th edition, (2010), H K Das, Wiley India Pvt. Limited, India
8. Biotechnology, 4th edition, (2010), H K Das, Wiley India Pvt. Limited, India

M.Sc Biotechnology

Semester-II

Course Title: Principles and Applications of Biotechnology-I

MM. Th 80+IA20

Time: 2 h

Course Code No. 16CBTO3

NOTE: There shall be seven questions in total. Question No.1 will be compulsory (short answer type) covering the entire syllabus and remaining six questions will be set two from each unit. Students are required to attempt four questions in all by selecting at least one from each unit.

UNIT I

Molecular cloning tools; Restriction modification systems: Types I, II and III. Mode of action and nomenclature, DNA modifying enzymes and their applications: DNA polymerases, DNA phosphatases, and DNA ligases; Cloning Vectors: Definition and Properties, Plasmid vectors: pBR and pUC series; Bacteriophage lambda and M13 based vectors, Cosmids, BACs, YACs, linkers and adaptors.

UNIT II

Protein expression vectors: *E. coli* lac and T7 promoter based vectors, yeast YIp, YEp and YCp vectors, Baculovirus based vectors, mammalian SV40 based expression vectors, Methods in Molecular Cloning, Transformation of DNA: Chemical method & Electroporation; Gene delivery: Microinjection, electroporation, biolistic method (gene gun), liposome and viral mediated delivery, Agrobacterium mediated delivery, in vitro culture of plant and animal cells

UNIT III

DNA Amplification and DNA sequencing; PCR, RT-PCR, Sanger's method of DNA Sequencing: traditional and automated sequencing, Introduction to next generation sequencing, Chromosome walking & jumping, shotgun sequencing. Preparation, uses and screening of Genomic and cDNA libraries; Colony hybridization and colony PCR applications of Recombinant DNA Technology; Products of recombinant DNA technology: Products of human therapeutic interest-insulin, antisense molecules, Applications of recombinant DNA in crop improvement, Gene therapy, Recombinant vaccines, Protein engineering, Site directed mutagenesis and Biosensor technology

Suggested readings:

1. Brown, TA (2010) Gene Cloning and DNA Analysis: An Introduction, Sixth Edition. A John Wiley & Sons, Ltd., Publication, Germany.
2. Clark DP, Pazdernik NJ (2009) Biotechnology: Applying the Genetic Revolution. Elsevier Academic Press, USA.
3. Primrose SB, Twyman RM (2006) Principles of Gene Manipulation and Genomics, 7th Edition. Blackwell Publishing, Oxford, U.K.
4. Wiley JM, Sherwood LM, Woolveron CJ (2008) Prescott, Harley and Klein's Microbiology. McGraw Hill Higher Education.
5. Primrose SB and Twyman RM (2008) Genomics: Applications in human biology. Blackwell Publishing, Oxford, U.K.

Open Elective papers offered by Department of Biochemistry

16BCHO1: Basic Biochemistry

Note: Question 1 will be compulsory and will cover the entire syllabus in the form of short questions. Question 2 to 7 will include three questions from each unit and candidate will have to attempt two questions from each unit. Overall, three questions to be attempted. All questions to carry equal marks(16).

MM. Th 80+IA 20

UNIT I:

Cell: definition, general structure and size of some important cells, general functions of cell organelles, basic difference in prokaryotic and eukaryotic cells

Carbohydrates: Definition, classifications and sources of carbohydrates, occurrence and biological functions of monosaccharides, disaccharides, and polysaccharides

Lipids: Introduction, classification and functions of lipids. Saturated and unsaturated fatty acids. Essential fatty acids. Triacylglycerides and their properties,

Amino acids: Nutritional classification of amino acids and physical properties of amino acids.

Proteins: Definition, types, sources, properties and biological significance of proteins, Primary, secondary, tertiary and quaternary structure of proteins.

UNIT 2:

Nucleic acids: Nucleotides & nucleosides, types of DNA and RNA, evidence that DNA is the genetic material, feature of DNA double helix, Size of DNA in prokaryotic and eukaryotic cells.

Vitamins: Sources, examples and classification, important functions of fat soluble and water soluble vitamins

Enzymes: History, general characteristics, nomenclature and IUB classification of enzymes, holoenzyme, apoenzyme, coenzymes, prosthetic groups, cofactors, activators, inhibitors, active site, metalloenzymes and isozymes, Units of enzyme activity, examples of some clinically important enzymes

Factors affecting enzyme activity: pH, temperature, time of incubation, enzyme concentration and substrate concentration. Properties of allosteric enzymes and their significance.

Suggested Readings for 16BCHO1: Basic Biochemistry:

1. Lehninger Principles of Biochemistry 4th Ed **By** David L. Nelson and Michael M. Cox, WH Freeman and Company.
2. Principles of Biochemistry **By** Geoffrey Zubay. Publisher: McGraw Hill College.
3. Biochemistry: The Molecular Basis of Life **By** Trudy McKee and James R McKee. Publisher: McGraw-Hill Higher education.
4. Biochemistry: Biomolecules, Mechanisms of Enzyme Action and Metabolism Vol 1 **By** D Voet. John Wiley and Sons.
5. Biochemistry **By** U. S. Satyanarayana
6. Outlines of Biochemistry **By** Eric C Conn, PK Stumpf, G Bruening and Ray H. Doi. John Wiley & Sons.

DEPARTMENT OF BOTANY

Open Elective Paper: Plant Resource Utilization Semester-II: Paper Code: 16BOTO1

MM. Th 80+IA 20
Time: 3 hrs.

Note: The examiner is required to set even questions in all. Question No. 1 will be compulsory and short answer type covering the entire syllabus. The remaining six questions will be set with two questions from each unit. The candidate will be required to attempt Question 1 and four more selecting at-least one from each unit.

UNIT-I

Origin of Agriculture, World Centres of Primary diversity of domesticated plants: Plant Introductions and Secondary Centres.

Botany, Cultivation, Harvesting and uses of Wheat and Rice.

Botany, Cultivation and uses of following fruits and vegetables: Mango, Apple, Banana, Potato, Alliums, Cabbage, Spinach and Tomato

UNIT-II

General Account of the Spices: Ginger, Turmeric, Cinnamon, Clove,

Beverage Plants: Source and general account of Tea and Coffee.

Legumes: Origin, Botany, Cultivation and uses of Pigeon pea, Chick pea, Cluster bean

Medicinal Plants: Plants as sources of drugs, parts used and uses.

Fibres: Types of fibres - Soft fibres, Hard fibres, Surface fibres, Brush fibres and Braiding fibres.

UNIT-III

Gums: Important commercial gums and their uses.

Tannins and Dyes: Sources and their uses.

Vegetable Oils and Fats: Distinction between fatty and essential oils. Drying (Soyabean and linseed), nondrying (Groundnut and Mustard oil) and Semi drying (cottonseed and Sunflower oil) oils and their uses.

Wood and its Uses: Soft woods and hard woods, wood as fuel, construction material Genetic Resources and their conservation.

SUGGESTED READINGS

1. Anonymous. *National Gene Bank*: Indian Heritage on Plant Genetic resources (Booklet). National Bureau of Plant Genetic Resource, New Delhi. 1997.
2. Copley, L.S. and W.M. Steels. *An Introduction to the Botany of Tropical Crop*

- Plants.3rd Ed.* The English Language Book Society and Longman, London. 1979.
3. Bole, P.V. and Y. Vaghani. *Filed Guide to Common Indian Trees*. Oxford University Press, Mumbai. 1991.
 4. Chandel, K.P.S., G. Shukla and N. Sharma. *Biodiversity in Medicinal and Aromatic Plants in India: Conservation and Utilization*. National Bureau of Plant Genetic Resources, New Delhi. 1996.
 5. Conway, G. and V.W.Rattan. *The Doubly Green Revolution. Food for all in the 21st Century*. Cornell Univ. Press. 1999.
 6. Dastur, J.F. *Medicinal Plants of India and Pakistan*.3rd Ed. Meyerbooks. 1985.
 7. Hill, A.F. *Economic Botany*. McGraw Hill Book Co. Inc., New York. 1986.
 8. Kirtikar, K.R. & D.D. Basu. *Indian Medicinal Plants*. Vols. I & II. 2nd Ed. Lalit Mohan Basu, Allahabad. 1953.
 9. Kochhar, S.L. *Economic Botany of the Tropics*.2nd Ed. MacMillan India Ltd., Delhi.
 10. Leonard, W.H. & J.H. Martin. *Cereal Crops*. MacMillan Co., New York, USA. 824 pp. 1963.

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
OPEN ELECTIVE COURSE

CYBER FORENSIC AND SECURITY

Paper Code: 16CSAO1

MM. Th 80+IA 20

Time: 3Hrs.

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

UNIT-1

Introduction to Information Systems: Types of information Systems, Introduction to information security, Need for Information security, Threats to Information Systems, Information Security Investigations.

Security threats - Sources of security threats- Motives - Target Assets and vulnerabilities – Consequences of threats- E-mail threats - Web-threats - Intruders and Hackers, Insider threats, Security Threats to E-Commerce, Cyber-crimes.

UNIT-2

Cyber Forensics: Cyber Security, Cyber Security roles, Cyber Security Principles, Difference between information Security and Cyber Security, Types of Computer Forensics Technology, Types of Military Computer Forensic Technology, Types of Law Enforcement: Computer Forensic Technology, Types of Business Computer Forensic Technology, Specialized Forensics Techniques, Hidden Data and How to Find It, Spyware and Adware, Encryption Methods and Vulnerabilities, Protecting Data from Being Compromised Internet Tracing Methods, Security and Wireless Technologies, Avoiding Pitfalls with Firewalls Biometric Security Systems

UNIT-3

Ethical Hacking: Essential Terminology, Hacking windows – Network hacking – Web hacking – Password hacking, Malware, Scanning, Cracking. Digital Evidence in Criminal Investigations: The Analog and Digital World, Training and Education in digital evidence, Evidence Collection and Data Seizure: Why Collect Evidence, Collection Options Obstacles, Types of Evidence, The Rules of Evidence, Volatile Evidence, General Procedure, Collection and Archiving, Methods of Collection, Artifacts, Collection Steps, Controlling Contamination: The Chain of Custody, Reconstructing the Attack, The digital crime scene, Investigating Cybercrime, Duties Support Functions and Competencies.

UNIT-4

Cyber Crimes and Cyber Security Standards: Crime incident Handling Basics: Cyber activism, Tracking hackers, clues to cyber-crime, privacy act, search warrants, common terms, organizational roles, procedure for responding to incidents, reporting procedures, legal considerations, Information Technology Act 2000: Scope, jurisdiction, offense and

contraventions, powers of police, adjudication, Intellectual property issues in cyberspace, ISO, Copyright Act, Patent Law, Cyber Laws in India.

Reference Books:

1. V.K. Pachghare, "Cryptography and Information Security", PHI Learning Private Limited, India.
2. William Stallings and Lawrie Brown, "Computer Security: Principles and Practice", Prentice Hall.
3. Swiderski, Frank and Syndex, "Threat Modeling", Microsoft Press.
4. John W. Rittinghouse, William M. Hancock, "Cyber Security Operations Handbook", ElsevierPub.
5. Deborah G Johnson, "Computer Ethics", 4th Edition, Pearson Education Publication.
6. Earnest A. Kallman, J.P Grillo, "Ethical Decision making and IT: An Introduction with Cases", McGraw Hill Publication.
7. Dr. Surya Prakash Tripathi, RitendraGoyal, Praveen Kumar Shukla, "Introduction to Information Security and Cyber Law", WilleyDreamtech Press.
8. Kenneth J. Knapp, "Cyber Security and Global Information Assurance: Threat Analysis and Response Solutions", IGI Global.
9. Cahnder, Harish, "Cyber Laws and Its Protection", PHI Learning Private Limited, Delhi, India
10. Michael E. Whitman, Herbert J. Mattord, "Principles of Information Security", Cengage Learning Pub.
11. Charles P. Pfleeger, Shari LawerancePfleeger, "Analysing Computer Security", Pearson Education India.
12. Joseph M Kizza, "Computer Network Security", Springer Verlag.

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**OPEN ELECTIVE OFFERED BY THE DEPARTMENT
Of
Defence and Strategic Studies**

SEMESTER-II

**PAPER CODE-16DSSO1
NATIONAL SECURITY OF INDIA**

Maximum Marks: 100

Credits: 3:0:0

Theory Marks: 80

Time Allowed: 3 Hours

Internal Assessment Marks: 20

INSTRUCTION FOR THE PAPER SETTERS

The Paper-Setters/Examiners will have to set Eight Question, selecting two from each out of Unit-I,II, III and IV. And one question consisting of Ten short answer type questions, without it any internal choice covering the entire syllabus be set in Unit V of the question Paper.

The Question Paper will consist of five units: I, II, III, IV and V. Unit-V will be compulsory. The first Four Units will contain two questions each from the respective syllabus and each question will carry 15 marks. Unit V of the question and will contain Ten short answer type question, with any internal choice and will cover the entire syllabus uniformly. Each short answer type question will carry Two marks. The Question Paper should be set strictly according to the syllabus. Separate marks for each question. Should be indicated in the question papers.

UNIT-I

1. **National Security Concepts:-**
 - a) **Definition of National Security, National Defence and National Interest.**
 - b) **Elements of National Security.**

UNIT-II

2. **National Security Structure:-**
 - a) **National Security Council and Cabinet Committee on Security affairs.**
 - b) **Armed Forces, Para-Military Forces.**

UNIT-III

3. Threats to Indian Security:-

- a) **Internal – Threats**
- b) **External – Threats**

UNIT-IV

4. India and Its Neighbours:-

- a) **India's Geo-Strategic Location**
- b) **India's Relations with its neighbours**

Books Recommended

1. Howard, Michael, "Theory and Practice of War"
2. Howard, Michael, "The Causes of War"
3. Bernard Black, L, "War and Its Causes"
4. Wright, Quincy, "A Study of War"
5. Mao-Tse-Tung, "Guerilla Warfare"
6. Legueur Walter, "Guerilla Warfare"
7. Robert E. Osgood, "Limited War – The Challenges to American Strategy".
8. Rees David, "Korea, the limited War"
9. Kitson Frank, "Low Intensity Operations, Subversion Insurgency, Peace keeping"
10. Osanka F.M., "Modern Guerilla Warfare"
11. Nasution, Abdul H., "Fundamentals of Guerilla Warfare"
12. Brodie, Bernard, "Strategy in the Missile Age"
13. Sampooraan Singh, "India and the Nuclear Bomb"
14. Tirpathi, K.S., "Evolution of Nuclear Strategy"

15. **Gupta, Rakesh, "Militarisation of outer-space"**
16. **Encyclopedia Britannica**
17. **Halperin Morton H., "Defence Strategies for the seventies"**
18. **Mir Publications, "Weaponary in Space, The Dilemma of Society"**

MA (Economics)
Semester-II
16ECOO1 - Basics of Economics (Open Elective Paper)

Max. Marks: 100
Time: 3 Hrs.

Written Exam:80
Internal Assessment: 20

Unit -1

What is an Economy? Control problems of an Economy: What, how and for whom to produce, concept of production possibility function and opportunity cost.

Unit-II

Consumer's equilibrium – meaning of utility, marginal utility, conditions of consumer's equilibrium.

Unit-III

Demand, market demand, determinants of demand, demand schedule, price elasticity of demand, factors effecting price elasticity of demand.

Unit-IV

Cost and Revenue: Total cost, Total fixed cost, Total variable cost.
Average cost: Average fixed cost, average variable cost Revenue- Total revenue and marginal revenue,-meaning their relationship

Note:

- (A) Nine questions would be set in all.
- (B) Question No. 1 based on the entire syllabus, would be compulsory. It would contain eight short answer questions of two marks each.
- (C) There would be two questions (16 marks each) from each of four units.
- (D) Candidates would be required to attend five questions (one compulsory and selecting one from each unit).

Reading List:

- D.N. Divedi: Principles of Economics, 2nd Edition, Vikas Publication House.
- R Dutta and K P M Sundaram: Indian Economy, S Chand
- A.N.Agarwal: Indian Economy, Problems of Development and Planning, New Age.
- Mishra and Puri: Indian Economy, Himalaya.

OPEN ELECTIVE - I (FUNDAMENTAL ASPECTS OF EDUCATION)

16EDU01

Time: 3 Hours

Max. Marks: 100

Credits: 03

(Theory: 80, Internal: 20)

NOTE FOR PAPER SETTER

- I Paper setter will set 9 questions in all, out of which student will be required to attempt 5 questions
- II Q. No. 1 will be compulsory and will carry 16 marks. It will comprise of 4 short answer type questions of 4 marks each to be selected from the entire syllabus.
- III Two long answer type questions will be set from each of four units, out of which the students will be required to attempt one question from each unit. Long answer questions will carry 16 marks each.
- IV All questions carry equal marks

COURSE OBJECTIVES:

After completing the course, the students will be able to:

- understand nature and functions of education and philosophy and their relationship
- explain the meaning, types and scope of educational technology
- acquaint the learner with the process of development and assessment and its implication in teaching learning process
- develop an understanding of different stages of growth and development.
- understand the concept of educational sociology and sociology of education.
- acquaint students with the basics of social organization and its concept.
- develop an understanding of different factors influencing social organization-folkways, mores, institutions; values.

COURSE CONTENTS

UNIT – I

Education and Philosophy

- Concept of Education and Philosophy.
- Nature of Education and Philosophy.
- Relationship of Education and Philosophy.
- Need of Philosophical Foundations of Education.
- Branches of Philosophy; Metaphysics, Epistemology and Axiology, their implications for Education; Philosophical redirection of educational research in recent times.

UNIT-II

Educational Technology. Meaning, Nature, Approaches, Types, Scope And Significance Of Educational Technology

Programmed Instruction: Concept, Principles and Styles of Programmed Instruction
Development of Programmed Instructional Material.

ICT In Education; Computer Assisted Instruction, Computer Managed Learning And Process of development of Computer based instructional material, Web Integrated Learning.

E-Learning and Virtual classrooms.

UNIT-III

Developmental Aspects of the Learner

Educational Psychology: Concept and scope
Concept of Teaching and learning
Role of Educational Psychology in the Teaching –learning process
Concept of Growth and development and principles' of development and its implications to teaching and learning process.
Genetic epistemology of Jean Piaget.
Motivation: Need, types and how can a teacher motivate students for learning.
Factors affecting Learning.

UNIT – IV

Concept of Educational Sociology and Sociology of Education

Social organization and its concepts.
Factor influencing social organization-folkways, mores, institutions; values.
Dynamic characteristics of social organization and its educational implications.
Education as an investment.
Brain drain: Concept, factors responsible for Brain drain, how to check brain drain from our country.

Suggested Readings:

- Andrews, T.W. (1961).Methods in Psychology, New York: John Wiley and Sons, Inc.
Baller, Warren R., Don, C.(1962). The Psychology of Human Growth and Development, New York: Holt, Rinehart and Winston.
Banerjee A.C. & Sharma S.R. (1999) : Sociological and Philosophical issues in Education, Jaipur : Book Enclave.
Bhushan, A & Ahuja, M. (1992), Educational Technology, Meerut : Vikas Publication.
Bloom, B.S. (1972), Taxonomy of Educational Objectives. A Hand Book- I (Cognitive Domain), New York: Devid Mokeay Campo.
Chauhan S.S.(1978), A Textbook of Programmed Instruction, New Delhi : Sterling Publishers.
Das, R.C.(1993), Educational Technology: A Basic Text, New Delhi: Sterling Publishers.
Dave, R.H (1969). Taxonomy of educational objectives and achievement testing; development of educational testing vol. 1. London: University of London Press.
Mangal. S.K. (2009). Essentials of Educational Technology. New Delhi: Prentice Hall of India pvt. Ltd.
Sharma, Hemant Lata (2014). Innovative inputs in ICT. Jalandhar: Amit Prakashan.
Sharma, Hemant Lata & Sharma, Savita (2010). Learning to Learn With Love : Theory and Practices of Co-operative Learning, New Delhi : Gagandeep Publication.
Pnadey, K.P.(1983). Perspective in Social Foundation of Education, Amitash Prakashan, Ghaziabad.
Kamat, A.R.,(1985).Education and Social Change in India, Samaiya Publishing Co., Bombay.
Maunheim, K.et al.,(1962). An Introduction to Sociology of Education. Routledge and Kegam Paul,London.
Mossish , Loor., (1972). Sociology of Education: An introduction, George Allen and Unwin, Londo
Walia J.A., (2011): Philosophical, Sociological and Economic Bases of Education, Jalandhar: Ahim Paul Publishers

DEPARTMENT OF ENGLISH AND FOREIGN LANGUAGES

Semester II

Code: 18ENGO1

OPEN ELECTIVE COURSE -I

Nomenclature of the Course: Indian Literature in Translation - I

Total Marks: 100

External Marks: 80

Internal Marks: 20

Time : 3 hrs

Lectures 3 Tutorials 0

Total Credits: 3

Learning Objectives:

- To familiarise the students with contemporary Indian narratives written in regional languages

Learning Outcomes:

- Ability to comprehend and appreciate Indian literature with professional competence
- Humanizing the academic programmes of other disciplines particularly programmes offered by science departments

Unit I

Amrita Pritam: *Pinjar* (from *Pinjar: The Skeleton and Other Stories* trans. and adapted Khushwant Singh)

Unit II

[Indira Goswami](#): *The Blue-Necked God* (trans. Gayatri Bhattacharya)

Unit III

[Shrilal Shukla](#): *Raag Darbari* (trans. [Gillian Wright](#))

Instructions to the Paper-Setter and the students:

All questions are compulsory and carry equal marks.

Question 1 will comprise six short-answer type questions. There will be two questions from each Unit.

Students will be required to attempt any four (in about 200 words each) selecting at least one from each Unit.

Questions 2, 3 and 4 (with internal choice) will be long answer-type questions based on Units I, II, and III respectively.

The paper-setter will mention Units.

Suggested Reading:

Baker, Mona and Gabriela Saldanha, eds. *Routledge Encyclopedia of Translation Studies*.

Baker, Mona, ed. *Critical Readings in Translation Studies*.

---. *In Other Words: A Course Book on Translation*.

Gentzler, Edwin. *Contemporary Translation Theories*.

George, Rosemary Marangoly. *Indian English and the Fiction of National Literature*.

Gupta, Akhil. *Red Tape: Bureaucracy, Structural Violence, and Poverty in India*.

Mukherjee, Sujit. ed. *Translation as Recovery*.

---. *Translation as Discovery and Other Essays: On Indian Literature in English Translation*.

Rao, V. Pala Prasada, K. Nirupa Rani, Digumarti Bhaskara Rao. *India-Pakistan: Partition Perspectives in Indo-English Novels*.

Roy, Anjali Gera and Nandi Bhatia. *Partitioned Lives: Narratives of Home, Displacement, And Resettlement*.

Saint, Tarun K. *Witnessing Partition: Memory, History, Fiction*.

Subramanian, Shreerekha. *Women Writing Violence: The Novel and Radical Feminist Imaginaries*.

Tiwari, Shubha. *Indian Fiction in English Translation*.

Semester –II

Open Elective

16ENVO1: Environmental Issues

MM. Th 80+IA 20

Time : 3 Hours.

Note: 1. Seven questions will be set in all.

2. Question No. 1 will be objective covering the entire syllabus & compulsory. The remaining six questions will be set with two questions from each unit. The candidate will be required to attempt five in total, Question I and four by selecting at least one from each unit.

Unit-1

Global Environmental Issues: Green House effect – causes and associated hazards, Ozone layer depletion – causes and associated hazards, Deforestation, Human Population Growth. Environmental problems associated with urbanization, industrialization, modernization of agriculture

Unit-2

Regional Environmental Issues: Forest and Wildlife management, desertification, reclamation of degraded land; Human intervention on wetlands, siltation and eutrophication, reclamation of wetlands, Mining and Environment, Open cast mining, Oil exploration and transportation, Deforestation and their impact on environment.

Unit-3

Pollution: Air Pollution : Causes of air pollution, Some important pollutants of air (CO, SO_x, NO_x and HC and Particulates) – their sources and effects on living and non-living organisms. Water Pollution: Sources of pollution of surface and ground water, Types of water pollutants. Solid Waste – Sources, characterization, disposal and management. Soil Pollution sources of soil pollution, Pollution and residual toxicity from the application of insecticides, pesticides and fertilizers; Soil erosion.

List of Recommended Books

1. Fundamentals of Environmental Science: G. S. Dhaliwal, G. S. Sangha and P. K. Raina, Kalyani Publication
2. Environmental Chemistry : A. K. De
3. Environmental Chemistry : B.K. Sharma, and H. Kaur
4. Fundamentals of Ecology : E. P. Odum
5. Environmental Science (6th ed) (1997): Jr. G. T. Miller, Wadsworth Pub. Co.

Food Adulteration

PAPER CODE: 16FTEO1

There will be seven questions in all. The first question will be compulsory and short answer type covering the entire syllabus. The remaining six questions will be set with two questions from each unit. The candidate will be required to attempt question 1 and four more selecting atleast one from each unit. MM. Th 80+IA 20

Time: 3h

Unit I

Basic food groups, Function of foods and its general composition.

Food Quality & Safety, various aspects of food quality & safety, challenges of food safety.

Food adulteration and contamination, common food contaminants & adulterants

Unit II

Food Adulteration: Nature of adulterants, methods of evaluation of food adulterants and toxic constituents in foods, common food adulterants & their detection on various foods like

- a) Milk and Milk products
- b) Oils and fats
- c) Spice and condiments
- d) Wheat and other flours
- e) Sugar and Preserve
- f) Fruit and Vegetable products
- g) Beverages Alcoholic and Non-Alcoholic

Unit III

Food Laws and Regulation: Prevention of Food Adulteration Act 1954, Food Safety and Standards Act (2006), Food Safety and Standards Authority of India (FSSAI), BIS, FPO, APEDA.

Recommended Books:

1. Gould, W.A and Gould, R.W. (1998). Total Quality Assurance for the Food Industries, CTI Publications Inc. Baltimore.
2. Furia, T.E. Ed. 1980. Regulatory Status of Direct Food Additives. CRC Press, Florida.
3. Rekha S. Singhal , Pushpa R. Kulkarni, Dananesh V. Rege, (1997). Hand Book of Indices of food Quality and Authenticity, wood head Publishing Ltd.
4. Siva Kiran, R.R. (2012). Manual for Detection of Common Food Adulterants, First Edition, IAPEN.
5. Battershal, J.P. (2013). Food Adulteration & its detection, General Books LLC.
6. Prevention of Food Adulteration Act, 4th Edition, Ashoka Law House, 2002

Open Elective Paper (offered by Department of Genetics)

Paper Code: 16GENO1

Genetics & Society

Credits: 3

Time: 3 Hrs

Internal Assessment Marks: 20

Max. Marks: 80

Instructions

There will be a total of seven questions. Question No. 1 will be compulsory and shall contain eight to ten short answer type questions without any internal choice and it shall cover the entire syllabus. The remaining six questions will include two questions from each unit. The students will be required to attempt one question from each of the four units. The students will attempt four questions in all.

Unit I

Basic principles of inheritance of characters, Chromosomes and genes, pedigree-gathering family history symbols, construction of pedigree ; Consanguinity and its effects; Sex linked anomalies: Haemophilia, Colour blindness; Sex limited and sex influenced traits. Human Health and Disease: Common syndrome according to numerical and structural alteration: Klinefelter, Down's, Turner, Achondroplasia,; Inherited enzyme defects in man: Albinism, Galactosemia; Multifactorial disorders: Diabetes, Schizophrenia, Huntington's disease, Alzheimer's disease; Methods of genetic testing, Prenatal diagnosis, New born screening; DNA fingerprinting: Paternity testing, Individual Identification.

Unit II

GM World: Green revolution, Application r-DNA technology in agriculture: Transgenic crops, Gene gun, GM foods, Ht, Bt and others, Concerns about bio-safety of genetically modified organism (GMO) (Allergen, toxicity, impact on biodiversity etc.); Indian regulatory system for testing of GMOs in laboratory, field trials and commercial release of transgenic ; potential benefits of GMOs.

Unit III

Microbial innovations in pharmaceutical, health, agricultural and industrial sectors; Strategies for selection and improvement of industrial strains of microorganisms; Stem cell research, Cloning designer babies, Organ banking, Transgenic animals, Creating transgenic animals, In vitro fertilization, Genetic counseling and reproductive decisions, Eugenics;

Role of Genetics for the improvement of Health, Agriculture and environment.

Suggested books:

- 1 Principles of Genetics by D. Peter Snustad and Michael J Simmons
- 2 Genes in the Environment- Rosie S. Hails, Wiley-Blackwell Publications
- 3 The Science of Genetics by Alan G. Atherly, Jack R. Girton, John F. McDonald
- 4 Principles and branches of Medical Genetics, Emery and Rimoih, Churchill Livingstone, Newyork, Vol-1-3.
- 5 Industrial Microbiology, G. Reed (editor), CBS Publishers (A VI Publishing Company).
- 6 Modern Microbial Genetics (2002)-Streips U. N. and Yasbin R.E., Wiley-Liss
- 7 Plant Biotechnology (2006) - B. D. Singh, Kalyani Publishers
- 8 Plant Biotechnology-The Genetic Manipulation of Plants (2003) Slater A. Scott N. & Fowler M., Oxford University Press Inc Nigel Jen,
- 9 Animal Cell Biotechnology: Methods and protocols, Humana Press.
- 10 Genetics in Medicine 7th Ed (2007) - Thompson and Thompson, Saunders
- 11 Primose SB, Molecular Biotechnology, Panima, 2001

M.A. Geography Semester-II Session 2016-17 onwards
Open Elective: 16GEOO1
BASICS OF GEOINFORMATICS

Credit: 03 (3+0+0)
End Semester Exam: 80 marks
Internal Assessment: 20 marks
Total: 100 marks Time: 3hrs

Learning Objectives

This course is designed to give students an exposure to basics of geospatial technologies. It offers to learn the techniques of generation and management of earth surface information. An inter and multi disciplinary approach has been used to make subject interesting and useful for students. Latest technology of GPS is included to understand use of modern day navigation and surveying.

Learning Outcomes

Students will be able to learn the use of latest geospatial technology. It will help them to understand the spatial phenomena in a better manner with availability of real time and accurate information. These technologies being modern and interdisciplinary in nature will enable the students to apply this knowledge in various fields of life.

Unit – I

Aerial Photography

Aerial photography: history and development, advantages and limitations; Classifications of aerial photographs; Geometry of an aerial photograph; Scale of an aerial photograph; Availability and procurement of aerial photographs in India; Aerial photograph vs map.

Unit – II

Remote Sensing.

Introduction to Remote Sensing; electromagnetic radiation; stages of remote sensing; energy interactions in atmosphere; energy interactions with earth surface features and spectral signatures. Remote Sensing applications in land use/land cover, urban, environment, forest and disaster studies.

Unit – III

Remote Sensing

Remote Sensing platforms: airborne and space borne; satellite orbits: geostationary and near polar; Image data characteristics: resolutions- spatial, spectral, radiometric and temporal; Sensors and their types; Satellite missions of ISRO .

Unit – IV

GIS and GPS

Geographic Information System (GIS): definition and applications; GIS and remote sensing integration; components and elements of GIS; representation of earth surface features in GIS; introduction to Global Positioning System; GPS satellites constellations; GPS segments; Applications of GPS.

Note (i): Open Elective to be chosen from the basket of Open Electives (OEs) provided by the University.

(ii) The question paper will have five units. First four units of question paper will contain two questions from each unit. Candidate(s) are required to attempt one question from each unit. Unit-V shall be compulsory and shall contain eight short answer type questions covering entire syllabus. All questions carry equal marks.

Recommended Readings:

- [Paul Wolf](#), [Bon DeWitt](#), and [Benjamin Wilkinson](#). Elements of Photogrammetry with Application in GIS. USA: Mc-Graw Hill Education.2014.
- Avery, T.E., and G.L. Berlin. Fundamentals of Remote Sensing and Airphoto Interpretation, Macmillan, New York.1992.
- Campbell, J.B. Introduction to Remote Sensing, Guilford, New York.1996.
- Curran, Paul J. Principles of Remote Sensing, Longman, London & New York. 1985.
- Joseph, G. Fundamentals of Remote Sensing, Universities Press Hyderabad. 2005.
- Lillisand, T.M. and P. W. Kiefer. Remote Sensing and Image Interpretation, New York. John Wiley & Sons.1986.
- Burrough, P.A. and McDonnell, R.A. Principles of Geographic Information System. Oxford: Oxford University Press. 1998.
- Chang, Kang-tsung. Introduction to Geographic Information Systems. New Delhi: Tata McGraw-Hill.2006.
- Doberstein, Dan. Fundamentals of GPS Receivers: A Hardware Approach. New York: Springer

MA GEOGRAPHY SEMESTER-II SESSION 2016-17 ONWARDS

Open Elective16GEOO2

GEOGRAPHY OF INDIA: SYSTEMATIC AND REGIONAL

Credit: 03 (3+0+0)

Exam: 80 marks

Internal Assessment: 20 marks

Total: 100 marks

Time: 3 hrs

Learning Objectives

History, geography and culture have comprised to make India into a major force in South Asia. The course provides an insight into different aspects of India's regional vitality towards unity, stability and progress.

Learning Outcomes

The student will get familiarised with the geographic dimensions of India in terms of its political and administrative characteristics; aspects of its regional vitality; and formation of regions.

Unit-I

India: a historical-geographical expression; Size, location, and boundaries; Physical environment; Historical setting.

Unit-II

Unity in diversity of India: Unifying mechanism and divisive streaks; Evolution of the administrative map of India since Independence.

Unit-III

Regional vitality of India; multiculturalism in India; the Indian diaspora; India's cultural landscape.

Unit -IV

Regionalisation schemes of India: Physiographic (S.P. Chatterjee); Climatic (Koeppen and Trewartha); Agricultural (Jasbir Singh and C.B. Mamoria); and Industrial (B.N. Sinha).

Note (i): Open Elective to be chosen from the basket of Open Electives (OEs) provided by the University.

(ii) The question paper will have five units. First four units of question paper will contain two questions from each unit of the syllabus. Candidate(s) are required to attempt one question from each unit. The unit five shall be compulsory and shall contain eight short answer type questions covering entire syllabus. All questions carry equal marks.

Recommended Readings:

1. Ahmad, Aijazuddin. 1999. *Social Geography*. Rawat Publication, New Delhi.

2. Chandna, R.C. 2002. *Geography of Population*. 5th edn. Kalyani Publishers, Delhi.
3. Deshpande, C.D. 1992. *India: A Regional Interpretation*, ICSSR and Northern Book Center, New Delhi.
4. Hussain, M. 2014. *Geography of India*. 5th edn. McGraw Hill Education, New Delhi.
5. Singh, Jagdish. 2003. *India: A Comprehensive Systematic Geography*. Gyanodya Prakashan, Gorakhpur.
6. Spate O.H.K. & A.T.A. Learmonth. 1967. *Geography of India and Pakistan*, Methuen, London.
7. Sukhwal, B. L. 1971. *India: A Political Geography*. Allied Publishers, New Delhi.
8. Tirtha, Ranjit. 2000. *Emerging India*. Rawat Publications, Jaipur.
9. Tiwari, R.C. 1999. *Geography of India*. Prayag Publishers, Allahabad.
10. Wadia, D. N. 1953. *Geology of India*. Macmillan & Co., London.

HISTORY

Paper: Nationalism In India

Paper Code: 16HISO1

Max.Marks : 100

Theory : 80

I.A : 20

Time : 3 Hrs.

Note: Nine questions are to be set in all spreading into five units Each of the first four units shall contain two questions from each unit of the syllabus and Unit-V (Q. No. 9) which will be compulsory, shall contain eight short answer type questions (two marks each) covering the entire syllabus. The Candidates shall be asked to attempt five questions in all selecting one question from each unit including compulsory question. All questions shall carry equal marks.

Unit – I

1. Approaches to Indian Nationalism : Conceptual Debates.
2. Emergence of Organized Nationalism.

Unit-II

1. Trends till 1919
2. Gandhian Movements - Nature, Programme, Social Composition, Limitations and Challenges.

Unit-III

1. Revolutionary and Left Movements.
2. Subhash Bose and INA and Telengana.
3. States' Peoples' Movements.

Unit-IV

1. Working of Congress and Non-Congress Provincial Ministries.
2. Communal Politics and Partition.

Suggested Readings :

- Desai, A.R. : Social Background of Indian Nationalism, Bombay, 1949
- Tara Chand : History of the Freedom Movement Vol. I, II, III, IV (4 Vols.), Delhi, 1961
- Majumdar, R.C. : History of Freedom Movement Vol. I, II, III, Calcutta, 1962-63
- Chandra Bipan and others : Communalism in Modern India, New Delhi, 1987
- " : Struggle for Independence of Indi, New Delhi, 1987
- Dhankhar, Jaiveer S. : A Short History of Hindustan Socialist Republic an Association, Delhi, 2001
- " : Prelude to Pakistan, Delhi, 2000
- Mahrotra, S.R. : The Emergence of Indian National Congress, Delhi, 1971
- Sarkar, S. : Modern India 1885-1947, New Delhi, 1983

Note : In addition, students are advised to consult the current Research Journals of History.

Front Office & Guest Services Management 18MHMCTO1

External Marks: 80
Internal Marks: 20
Credits: 3-0-0

Introduction to Travel and Tourism: Overview, Evolution and constituents of travel and tourism industry. Five A's of Tourism, Types of Tourism.

Introduction to Hospitality Industry: Concept, scope and constituents. Evolution and growth of hotel Industry in the world.

Unit-2

Classification of Hotels: Need and criteria for the classification of hotels. Emerging concepts in hotels. Global trends that will impact hotel industry.

Hotel Organization: Need of organization in hotels. Hotel Organization, Job description, Job specification and various departments and sub departments of a hotel.

Unit-3

Introduction to Front office: Overview, Layout and different sections of front office department. Organization of front office staff, qualities of front office staff.

Knowledge about Accommodation product: Types of guest rooms, Meal plans and types of room rates.

Unit-4

Hotel Guest and Guest Relation: Guest, Guest expectations, Guest Satisfaction, Guest dissatisfaction, and Guest Relation Management.

Guest Services: Guest services and its importance, handling guest mails and messages, paging, safe deposit facility and other services

FUNDAMENTALS OF MANAGEMENT
Course Code: 16IMSO1

MM: Th 80+IA 20

Time: 3 hours

Course Objective:

The objective of this course is to expose the students to basic concepts of management and to enable them to gain appreciation for emerging ideas, techniques, procedures and practices in the field of management.

Unit -I

Introduction: concept and nature of management; evolution of management thoughts – traditional, behavioural, system and contingency viewpoints

Unit -II

Planning, decision making and organizing: nature and elements of planning, planning types and models; strategic planning – an overview; basic issues in organizing – work specialization, chain of command, delegation, decentralization, span of management, bases for departmentation

Unit -III

Leading: recognition of human factor, motivation models/approaches; leadership styles/behaviours, personal characteristics of effective leaders, leadership development

Unit -IV

Management control– concept and process, overview of control techniques, effective control system; evaluating corporate social performance; managing company ethics and social responsibility

Suggested Readings:

1. Robbins, S.P. and Decenzo, D.A. Fundamentals of Management , Pearson Education Asia, New Delhi
 2. Hellreigel, Management, Thomson Learning, Bombay
 3. Koontz, H and Wehrich, H; Management, Tata McGraw Hill
 4. Stoner, J et. al, Management, New Delhi, PHI, New Delhi
 5. Robbins & Coulter, Management, PHI, New Delhi
 6. Satya Raju, Management – Text & Cases , PHI, New Delhi
1. Richard L. Daft, Management, Thomson South-Western

Instructions for External Examiner: The question paper shall be divided in two sections. **Section ‘A’** shall comprise of eight short answer type questions from whole of the syllabus carrying two marks each, which shall be compulsory. Answer to each question should not exceed 50 words normally. **Section ‘B’** shall comprise 8 questions (2 questions from each unit). The students will be required to attempt four questions selecting one question from each unit. All questions will carry equal marks.

Journalism and Mass Communication
(Open Elective) [for students of other Dept.]

16JRM01
MEDIA & SOCIETY

2nd Semester

Marks: 100

Credits: 3:0:0

Time Allowed: 3 Hours

Theory Marks: 80

Internal Assessment Marks: 20

Unit I

1. Media Definition
2. Relationship of Media in Society
3. Impact of Media on society- recent trends
4. Media and Social Development

Unit II

1. Media Literacy
2. Impact of Media on children and youth
3. Media and gender issues
4. Media and Rural Society

Unit III

1. Media and Violence
2. Media and Rising Crime
3. Media and Democracy
4. Media and development of Scientific temperament
5. Media and environmental issues

Unit IV

1. Media accountability

2. Media and Economic development
3. Media and Nation building
4. Popular culture and media

LL.M.

Open Elective (Family Law)

PAPER CODE: 16LAWO1

MM: Th 80+IA 20

Time: 3 hours

NOTE FOR EXAMINER/PAPER SETTER

The question paper of each course will be divided into Five sections, each of the First Four Sections of the Question Paper will contain 2 questions respectively from Unit-1 to Unit-4 of the syllabus. The students will be required to attempt one question from each section. Section 5 of the question paper shall contain 8 short answer type questions of 3 marks each (without any choice) covering the entire syllabus. As such Section 5 will be compulsory. The examiner will be free to set the questions in problem forms based on case law.

NOTE FOR STUDENTS(ON QUESTION PAPER)

Attempt four questions from sections 1 to 4, selecting at least one question from each section. These questions shall carry 14 marks each. Section 5 is compulsory and each question in this section shall carry 3 marks.

UNIT-I

Application of Hindu Law, Sources of Hindu, Schools of Hindu Law, Hindu Joint Family, Features of Mitakshra and Dayabhaga Joint Families, Coparcenary, Classification of Property, Karta of Joint Family, Position, Liabilities and Powers of Karta. Karta's powers of Alienation, Coparcener's Power of Alienation, Coparcener's Right to Challenge Improper Alienation, Alienee's Rights and Remedies

Leading Case: Harihar Prasad V Balmika Prasad AIR 1975 SC 733

K.S. Subhiah Pillai V Commissioner of IT AIR 1999 SC 1220

UNIT-II

The nature and concept of Hindu Marriage, Evolution of the Institution of Marriage, The Hindu Marriage Act, 1955, Essential Conditions for Valid Hindu Marriage, Ceremonies of Marriage, Registration of Hindu Marriages, Remedy of Restitution of Conjugal Rights, Void and Voidable Marriages, Judicial Separation and Divorce, Various Types of Grounds for Divorce and Judicial Separation, Fair Trial Rule, Legitimacy of Children, Jurisdiction, Bars to Matrimonial Remedies, Ancillary Reliefs, Permanent Alimony and Maintenance, Custody etc.

Leading Case: Kailishwati V Ayudhia Parkash AIR 1977 PLR 216

Naveen Kohli V Neelu Kohli, (2006) 4 SCC 558

UNIT-III

The Hindu Succession Act, 1956, Effects of the Hindu (Succession) Amendment, 2005, Rules of Succession to the Property of Hindu Male, Succession to the Property of Hindu Female, Succession to the Mitakshara Coparcener's Interest, General Rules of Succession, Partition, Subject Matter of Partition, Persons who have a Right to Partition & Right to Share, Persons who are entitled to Share, if, Partition takes place, Modes of Partition, How Partition is effected, Partial Partition, Reopening of Partition, Re-Union.

Leading Case: Raghuvamma V Chenchamma AIR 1964 SC 136
Commissioner of Income Tax V Chandersen, AIR 1986 SC 1753

UNIT-IV

The Hindu Minority and Guardianship Act, 1956, Concept of Minority and Guardianship, Natural Guardians and their Powers, Testamentary Guardian: Appointment and Powers, Certified Guardian, Defecto Guardian, Guardian By Affinity, The Hindu Adoption & Maintenance Act, 1956, Nature of Adoption, Essential Conditions for Valid Adoption, Effects of Adoption, Registration of Adoption, Maintenance As Personal Obligation, Maintenance of Dependents, Quantum of Maintenance, Maintenance As a Charge on Property

Leading Cases: G. Appaswami Chettiar V R.Sarangapani AIR 1978 SC 1051
Githa Hariharan V Reserve Bank of India(1999)2 SCC 228

BOOKS RECOMMENDED

Mulla	-	<u>Principles of Hindu Law</u>
Dr. Paras Diwan	-	<u>Modern Hindu Law</u>
Mayne's	-	<u>Hindu Law and Usage</u>
Dr. U.P.D.Kesari	-	<u>Modern Hindu Law</u>
Basant Kumar Sharma	-	<u>Modern Hindu Law</u>

LL.M. SECOND SEMESTER EXAMINATION
Open Elective (General Principles of Criminal Laws)

PAPER CODE: 18LAWO2

MM: Theory 80 + IA

20 Time: 3 hours

Credits: 3:0:0

NOTE FOR EXAMINER/PAPER SETTER:

The question paper of each course will be divided into Five sections, each of the First Four Sections of the Question Paper will contain 2 questions respectively from Unit-1 to Unit-4 of the syllabus. The students will be required to attempt one question from each section. Section 5 of the question paper shall contain 8 short answer type questions of 3 marks each (without any choice) covering the entire syllabus. As such Section 5 will be compulsory. The examiner will be free to set the questions in problem forms based on case law.

NOTE FOR STUDENTS (ON QUESTION PAPER):

Attempt four questions from sections 1 to 4, selecting at least one question from each section. These questions shall carry 14 marks each. Section 5 is compulsory and each question in this section shall carry 3 marks.

Unit-I

Offence, Bailable Offence, Non-bailable offence, Cognizable offence, Non-Cognizable offence, Complaint, Inquiry, Investigation

Unit-II

Jurisdiction, Types of Jurisdiction, Summon Cases, Warrant Cases, Types of Courts

Unit-III

FIR, Powers of Police, Charge, Hurt, Grievous Hurt, Kidnapping

Unit-IV

Bail, Anticipatory Bail, Cases in which bail can be granted and bail can be refused.

16LISO1: Academic Integrity and Plagiarism

MM: Th 80+IA 20

Time: 3Hrs.

Note

The paper is divided into 4 units. The candidates are required to attempt 5 questions in all selecting 1 question from each unit (out of two internal choices). Question 1 is compulsory consisting of 8 short answer type questions spread over the whole syllabus. All questions carry equal marks.

Objectives

- to know about academic integrity;
- to identify instances and types of plagiarism;
- to get awareness about plagiarism;
- to identify "fair use" applications to the use of someone else's materials;
- to find information about the correct way to cite a reference;
- to begin to develop your personal philosophy on academic integrity; to
- be cautious enough to have deterrence strategies of plagiarism.

Outcomes

The course enables the students to get awareness about the nature and practice of academic integrity and its advantages. Further the completion of the course will guide the students and others to have deterrence policies and strategies to get away from plagiarism activities. After completion of the course, the learners will come to know, how citations are made properly. Over all awareness will be developed to maintain academic honesty with practical examples by the trainers.

Unit 1: Academic Integrity

Academic Integrity: meaning, definition and concept

Reasons: Individual reputation, personal integrity, professional competence, status or standing of the institution

Original writings and contribution to society

Writings and Impact: good and original writings bring credibility; good impact factors; writings meant for the readers and society

Unit 2:Plagiarism

Plagiarism basics: meaning, definition and concept

Plagiarism: concept, need and importance, definitions; types

Copyright and fair use

Hoes does it occur: intentional and unintentional; innocence vs. deception

Unit 3:Plagiarism Deterrence

Deterrence: avoidance, awareness

Guidelines: summarizing, paraphrasing, direct quotations, language and vocabulary

Citations: citation basics; citation styles: parenthetical and superscription

Style manuals : Chicago, APA, MLA, Harvard

Unit 4: Measures, initiative and university agencies

Research and Citation policies: formulation of research polices

Regular trainings & awareness; role of librarians; handling online resources

Anti-plagiarized software; Turnitin; I-authenticate; usefulness and limitations

Suggested Readings

Cvetkovic, Vibiana Bowman & Anderson, Katie Elson (Eds.) (2010). *Stop plagiarism: a guide to understanding and prevention*. New York: Neel-Schuman.

Lampert, Lynn D. (2008). *Combating student plagiarism: an academic librarian's guide*. Oxford: Chandos.

Posner, Richard (2007). *The little book of plagiarism*. New York: Pantheon Books.

Roth, Lorie (1999). Educating the cut-paste generation. *Library Journal*, 124(18), pp.42-44.

Scalon, Patrick (2003). Student online plagiarism: how do we respond? *College Teaching*, 51(4): pp. 161-65.

Swain, N.K. Publish or perish: What the Indian policy makers think about it? *University News*, 52.15 (April 14-20, 2014): pp. 23-28.

***Open Electives to be offered
by
Department of Mathematics***

Course Code	Title of the Course	Theory Marks	Internal marks	Practical Marks	Credits (L:T:P)
To be offered in 2nd Semester					
16MATO1	Mathematical Techniques and Applications	80	20	--	3:0:0
16MATO2	Parametric and Non-Parametric Tests	80	20	--	3:0:0

16MAT01: Mathematical Techniques and Applications
(To be offered in Even Semester)

Time: 03 Hours
MM. Th 80+IA 20
Time: 2 h
Credits : 3:0:0

Section - I

Idea of Real Number System, Sets, Relations and functions.
Solutions of linear and quadratic equations; Logarithms and Exponents. Trigonometric functions.

Section - II

Concepts of limit, Continuity and Differentiation. Slope of a straight line.
Increasing and Decreasing functions, Maxima and Minima.

Section - III

Integration - Simple techniques including integration by substitution and by parts for algebraic, exponential and logarithmic functions, Definite integrals. Differential Equation- Solution of first order linear differential equation.

Section - IV

Measures of Central Tendency and Dispersion. Linear Correlation and Regression.

Note : The question paper will consist of **five** units. Each of the first four units will contain **two** questions from unit **I , II , III , IV** respectively and the students shall be asked to attempt **one** question from each unit. Unit five will contain **eight to ten** short answer type questions without any internal choice covering the entire syllabus and shall be **compulsory**.

Books Recommended:

1. Maurice, Weir D., Hass J., Frank, Giordano R., Thomas' Calculus, Pearson.
2. Strang, G., Calculus, Wellesley-Cambridge Press.
3. Heinbockel, J.H., Introduction to Calculus, Vol - 1.,
<http://www.math.odu.edu/~jhh/Volume-1.PDF>
4. Goon, A.M, Gupta, M.K and Dasgupta, B, Basic Statistics, World Press.
5. Gupta, S.P, Statistical Methods, Sultan Chand & Sons, New Delhi.

16MATO2: Parametric and Non-Parametric Tests

(To be offered in Even Semester)

Time: 03 Hours

MM. Th 80+IA 20

Time: 2 h

Credits : 3:0:0

Section - I

Parameter and Statistic: Sampling distribution of a statistic, standard error and its utility. Tests of significance: Null and alternative hypotheses, Two types of error, Critical region and level of significance, One-tailed and two-tailed tests, Critical values, Procedure for testing of hypothesis.

Unit -II

Large Sample Tests: Tests of significance for single proportion and single mean, for difference of two proportions, two means and two standard deviations, related confidence intervals for population parameters. Chi-square tests for goodness of fit, Test of independence of attributes.

Unit -III

t-test for single mean, difference of means, F-test for equality of two population variances, related confidence intervals. Applications of ANOVA for one-way and two-way classified data.

Unit -IV

Non-parametric tests: Advantages and drawbacks of non-parametric tests over parametric tests, One sample and two sample sign tests, Median test, Wilcoxon-Mann-Whitney test, One sample runs test, Spearman rank correlation test.

Note : The question paper will consist of **five** units. Each of the first four units will contain **two** questions from unit **I , II , III , IV** respectively and the students shall be asked to attempt **one** question from each unit. Unit five will contain **eight to ten** short answer type questions without any internal choice covering the entire syllabus and shall be **compulsory**.

Books Recommended:

1. Mood, A. M., Graybill, F. A. and Boss, D. C., Introduction to Theory of Statistics, McGraw-Hill.
2. Goon, A. M., Gupta, M. K. and Das Gupta, B., Basic Statistics, World Press.
3. Gupta, S.C. and Kapoor, V. K., Fundamentals of Mathematical Statistics, S. Chand Pub., New Delhi.
4. C. R. Kothari, Research methodology, New Age International Publishers.

M.Sc. Medical Biotechnology Semester -II
Course Title: Principles of Medical Biotechnology-I

MM. Th 80 + IA 20

Course Code: 16MBT01

Time: 3h

NOTE: The examiner is required to set seven questions in all. Question No. 1 will be compulsory and short answer type covering the entire syllabus. The remaining six questions will be set with two questions from each unit. The candidate will be required to attempt Question 1 and four more selecting at-least one from each unit.

Theory

Unit -I

Innate and acquired immunity. Nature and Biology of antigens and super antigens. Antibody structure and function. Antigen - antibody interactions, ELISA, RIA, Western blot, Immunoprecipitation, Inflammation- Acute and chronic inflammation, Hypersensitivity. Blood group – ABO and Rh. Haemoglobin – Structure, biosynthesis and catabolism.

Unit -II

Different types of anaemia and their causes (Deficiency of iron, B12 and folic acid, hemolytic, aplastic and genetic disorders). Homeostasis – factors, mechanism, anticoagulants, procoagulants. Host microbe interactions, entry of pathogens, growth and multiplication of the pathogens, Endotoxins, Collection and transport of specimens for diagnosis

Unit -III

Methods of antimicrobial activity determination, types of epidemiology, tools of epidemiology, Recognition of an infectious disease in a population, types of epidemics, control of epidemics. General properties of viruses, viral multiplication, viral hemagglutination, Cultivation of viruses, Classification and nomenclature of viruses, host response to virus infection

Recommended Books

1. John E. Hall, Medical Physiology by Guyton, Saunders, 12th edition
2. Mims' Medical Microbiology By (author) Richard Goering, By (author) Hazel Dockrell, By (author) Mark Zuckerman, By (author) Ivan M. Roitt, By (author) Peter L. Chiodini Saunders (W.B.) Co Ltd.
3. Benjamin E. (1996), Immunology - A short course 3rd Edition, John Wiley, New York
4. Kuby J. (1997), Immunology, 3rd Edition, W.H. Freeman & Co., New York
5. Roitt, I.M. (1997), Essential Immunology, 9th Edition, Oxford Black Well Science, London
6. Tizard I.R. (1995), Immunology - An introduction, 4th Edition, Philadelphia Sauders College press.

(SEMESTER-II)

Open Elective: 18MCBO1: Microbes and Environment

Time: 03 Hours

MM. Th 80+IA 20

Time: 2 h

Credits : 3:0:0

Note: The question paper will consist of 9 questions. Students will have to attempt 5 questions in total - Question no. 1 will comprise of short answer questions covering the entire syllabus and will be compulsory. Two questions to be set from each Unit and students will have to attempt one from each Unit.

Unit – I

Systematics&Biodiversity:Classification and nomenclature of microorganism.Salient featuresof different groups: Acellularmicroorganisms (Viruses,Viroids, Prions) and Cellular microorganisms (Bacteria, Algae, Fungi andProtozoa) in reference to their distribution and occurrence, morphology, mode ofreproduction and economic importance.

Unit – II

Characteristics of extremophiles:Thermophiles, Methanophiles, Alkalophiles, Acidophiles, Halophiles and Barophiles: Classification, habitats, ecological aspects andapplications.

Unit – III

Microbiological techniques:Preparation of culture media, Pure culture isolation; cultivation,maintenance and preservation/stocking of pure cultures; cultivation of anaerobicbacteria, and accessing non-culturable bacteria. Physical and Chemical methods for the control of microorganisms

Unit – IV

Scope of Microbiology:Role of microorganisms in Food industry, Pharmaceutical industry, Production ofIndustrial enzymes, Agriculture: bio-fertilizers, bio-pesticides. Environment:bioremediation, bioleaching

Suggested readings:

1. Brock TD., Milestones in Microbiology, Infinity Books.
2. Pelczar M.J., Chan E.C.S. & Kreig N.R., Microbiology: Concepts and Application.,Tata McGraw Hill.
3. Stainier RY, Ingraham JL, Wheelis ML & Painter PR General Microbiology, Publisher: MacMillan.
4. Madigan M.T., Martinko J.M. and Parker J., Brock Biology of Microorganisms: Prentice-Hall , Inc USA.
5. Atlas R.M., Principles of Microbiology, Wm C. Brown Publishers.
6. Vandenmark P.V. and Batzing B.L., The Microbes – An Introduction to their nature and Importance: Benjamin Cummings. Microbiology

M.Sc. Physics Semester II
Open Elective – I Sources of

PAPER CODE: 16PHY01

Energy – I

Theory Marks: 80
Internal Assessment: 20
Time: 3 hours

Unit I

Introduction

Limitation of conventional energy sources, need and growth of alternative energy sources, basic scheme and application of direct energy conservation.

Solar Cells:

Solar energy: Introduction, The characteristics of the sun, Definitions related to solar radiations, solar radiation geometry, Estimation of daily solar radiation. Theory of solar cells. Solar cell materials, solar drying, solar furnaces, Solar cooking, solar green house technology, solar thermal power generation, solar cell array.

Unit II

Solar Thermal Energy:

Solar radiations, flat plate collectors and their materials, applications and performance, focusing of collectors and their materials, applications and performance; solar thermal power plants, thermal energy storage for solar heating and cooling, limitations.

Unit III

Geothermal Energy:

Resources of geothermal energy, thermodynamics of geo-thermal energy conversion-electrical conversion, non-electrical conversion, environmental consideration, estimates of geothermal power, nature of geothermal fields, advantages & disadvantages of geothermal energy forms, applications of geothermal energy. Geothermal power plant.

Fuel Cells:

Principle, working of various types of fuel cells, performance and limitations.

Unit IV

Wind Energy:

Wind power and its sources: Principle of working of Wind Energy, performance and limitations of energy conversion systems. Site selection, criteria, momentum theory, wind characteristics.

Text / References Books:

1. John Twideu and Tony Weir, "Renewal Energy Resources" BSP Publications, 2006
2. M.V.R. Koteswara Rao, "Energy Resources: Conventional & Non-Conventional" BSP Publications, 2006.
3. D.S. Chauhan, "Non-Conventional Energy Resources" New Age International.
4. C.S. Solanki, "Renewal Energy Technologies: A Practical Guide for Beginners" PHI Learning.
5. Peter Auer, "Advances in energy system and Technology" Vol I & II Edited by Academic Press.
6. G.D. Rai, "Non-conventional Energy sources" Khanna Publishers
7. Raja A.K., "Introduction to Non-Conventional Energy Resources" Scitech Publications.
Fahrenbruch and Bube, "Fundamentals of Solar cells. Photovoltaic Solar Energy"

SYLLABUS : M.A.(P) Sem-II Open Elective

Paper Code- 16PUBO1

Administrative Literacy

Total Credit: 4+0+0 =4

L+T+P

Total Marks = 100

Semester End Exam = 80

Internal Assessment = 20

Time = 3 hrs.

Note:

The question paper will consist of 5 units containing 9 questions. The students are required to attempt one question from each unit. Question no 9 consisting of eight short answer questions covering entire syllabus, is compulsory.

Unit-I

Administrative Structure at Central Level – Office of President, Prime Minister’s Office, Cabinet Secretariat & Central Secretariat

Unit-II

Administrative Structure at State Level – Office of Governor, Chief Minister’s Office, State Secretariat & Chief Secretary

Unit-III

Administrative Structure at Division & District Level: Divisional Commissioner, Deputy Commissioner, Superintendent of Police, District Rural Development Agency, Haryana Urban Development Authority, District Development & Panchayat Officer

Unit-IV

Flagship Programmes of Central Government: Mahatma Gandhi National Rural Employment Guarantee Scheme, Rashtriya Swasthya Bima Yojana, Pradhan Mantri Kaushal Vikas Yojana, Mid-day Meal, Integrated Community Development Scheme, Targeted Public Distribution System.

Suggested Readings:

1. Maheshwari, S.R., Evolution of Indian Administration, New Delhi: Orient Longman, 1974.
2. Maheshwari, S.R., Indian Administration, New Delhi: Orient Longman.
3. Arora, R.K. and Rajni Goyal, Indian Public Administration, New Delhi: Wishwa, 1997..
4. Misra, B.B., The Central Administration of East India Company, London: Manchester Press, 1959..
5. Sarkar, J.N., Mughal Administration, Calcutta: M.C. Sarkar, 1935.
6. Ray, Anirudh , Some Aspects of Mughal Administration, New Delhi: Kalyani 1984.
7. Khosla, R.P., Administrative Structure of the Great Mughals, Delhi: Kanti Publications, 1991.
8. Prasad K. Nayak, S. Sen and G.S. Mansukhani (Eds.), Indian Administration, New Delhi: Unique Publishers, 2007
9. Fadia, B.L., Indian Administration, Agra: Sahitya Bhawan, 2007.
10. Chand Ashok, Indian Administration, London: Allen and Unvin, 1967.
11. Singh Hoshiar, Indian Administration Allahabad: Kitab Mahal, 1998.
12. Kataria, Surender , Indian Administration, Jaipur: RSBA
13. Maheshwari, S.R., State Governments in India, New Delhi: Macmillan, 2000.
14. Padhi, A .P. State Administration in India, Delhi: Uppal, 1998.
15. Sharma, Ashok, Bharat Mein Prashashnik Sansthan, Jaipur: RSBA, 2003.
16. Arora, Ramesh and Geeta Chaturvedi, Bharat Mein Rajya Prashashan, Jaipur, RSBA, 2001
17. Sharma, Harish Chander, State Administration in India (Hindi) Haipur: College Book Deport, 2002.

M.A. Political Science
Semester II
(16POLO1)

Paper: Disaster Management-I (Open Elective A)

Max. Marks	: 100
Theory Paper	: 80
Internal Assessment	: 20
Time	: 3 Hrs

Note:

The question paper will be divided into five units carrying equal marks i.e. 16 marks. Students shall be asked to attempt one out of two questions from each unit. Unit five shall contain eight short answer type questions without any internal choice and it shall be covering the entire syllabus. As such, all questions in unit five shall be compulsory.

UNIT I

Disaster Management: Meaning, Concepts, Principles, Scope, Objectives and Approaches
Elements of Disaster Management

UNIT II

Disaster Mitigation: Hazard Assessment, Vulnerability Assessment, Risk Assessment, Protective

Measures and

Public Information

Disaster Preparedness: Disaster Plan, Damage Inspection, repair and Recovery procedures, Communication and Control Centers, Disaster Forecasting, Warning and Prediction

UNIT III

Disaster Relief: Rapid Damage Assessment operations, Evacuation and Shelter, Media Coverage, Relief Aid, Maintain

UNIT IV

Reconstruction Planning: Meaning and Economic and Social Rehabilitation

Essential Readings:

1. Beatley, Timothy (1998). *The Vision Burby, Raymond (ed.), Cooperating with Hazards with Land-Use Planning*
Washington, D.C., Joseph Henry Press.
2. David Godschalk, Timothy Beatley, Phil J. Kaiser (1998).
Natural Hazard Mitigation: Recasting
Island Press.
3. FEMA (2000). Planning for a Sustainable Hazard Mitigation and Livability. *Washington*
4. Godschalk, David R., Timothy Beatley, P Edward J. Kaiser

SYLLABUS FOR OPEN ELECTIVE (SANSKRIT)

Semester- II

Credit- 3

Course code- 18SKTO1

M.M-100

Theory-80

Internal Assessment-20

Ancient Indian Culture and Philosophy

1/4izkphu Hkkjrh; laLd`fr ,oa n"kkZu1/2

Unit I : General Study of Ramayana and Mahabharata 20

?kVd ,d % 1/4jkek;.k o egkHkkjr dk lkekU; v/;;u1/2

- (i) General Introduction 1/4lkekU; ifjp;1/2
- (ii) Recensions 1/4laLdj.k1/2
- (iii) Society 1/4lekt1/2
- (iv) Family Relations 1/4ikfjokfjd IEcU/k1/2
- (v) Education 1/4f"kk{kk1/2
- (vi) Politics 1/4jktuhfr1/2
- (vii) Economy 1/4vFkZO;oLFkk1/2
- (viii) Situation of Women 1/4fL=;ksa dh n"kk1/2

Unit II : Verses related to, the following headings of the Nitishtak 20 Murkhaninda, Vidhyamahima, Sajjanprashansa, Dhanamahima, Durjananinda, Propakarmahima, Bhagyamahima, Karmamahima, Dhīrpurushaprashansa

?kVd nks % नातरातक क अधालाखत शापका स
मुखाने, धन, सज्जनप्र, कर्म, धीरपुका

Unit III : Śrimadbhagavad Gītā – II Chapter 20

?kVd rhu Jhen~Hkxon~xhrc % f}rh; v/k;

Unit IV : Yoga Philosophy 20

?kVd pkj ;ksx n"kkZu

- (i) General Introduction to Yoga – Citta, Vritti, Iśvara
;ksx n"kkZu dk lkekU; ifjp; & fpUK] o`fUK] bZ"oj
- (ii) Yoga for Social Health – Maitri, Karunā, Muditā, Upekshā, Yama
;ksx ,oa lkekftd LokLFk; & eS=h] d#.kk] eqfnrk] mis{kk] ;e
- (iii) Yoga for physical health – Niyama, Āsana, Prānāyāma
;ksx ,oa "kkjhfd LokLF; & fu;e] vklu] izk.kk;ke
- (iv) Yoga for mental health – Pratyāhāra, dhāranā, dhyāna, samādhi.
;ksx ,oa ekufld LokLF; & izR;kgkj] /kkj.kk] /;ku] lekf/k

Guidelines : Students will be required to attempt five questions of 16 marks each.

fn"kk funsZ"kk &

Question no. 1 will comprise eight short answer type questions from all Units.

Guidelines for other Four questions are as under:

Unit I : One critical question out of two
Or

two shortnotes out of four.

16

Unit II : One critical question out of two
Or

two shortnotes out of four.

16

Unit III :	One critical question out of two Or two shortnotes out of four.	16
Unit IV :	One critical question out of two Or two shortnotes out of four.	16

Recommended Books (vuq"kaflr xzUFk) :

1. jkek;.k & xhrk izsl xksj[kiqj
2. egkHkkjr & xhrk izsl] xksj[kiqj
3. Srimad Valmikiya Ramayana with Commentaries in 6 Vols. Hkkjrh; fo|k izdk"ku] tokgj uxj] fnYyh & 7
4. Srimad Mahabharatam Ed. by T.R. Krishnacharya – Indian Book Centre, Sri Satguru Publications, 24/4, Shakti Nagar, Delhi.
5. Valmiki Ramayana me Varnit Arthik Jeevan – Kaveri Book Service
6. Valmiki Ka Rajdharma – Kaveri Book Service
7. Jhijke ds ;qx dk frfFk fu/kkZj.k % iq'dj HkVukxj] eksrhyky cukjlh nkl] fnYyh
8. Politics and Ethics in Ancient India (As depicted in Mahabharta) : M. Jauhari – Hkkjrh; fo|k izdk"ku] tokgj uxj] fnYyh
9. Religion and Society in Ancient India : Om Parkash - Hkkjrh; fo|k izdk"ku] tokgj uxj] fnYyh
10. jkek;.kdkyhu lekt ,oa laLd`fr % txnh" k pUnz HkV~V & Hkkjrh; fo|k izdk"ku] tokgj uxj] fnYyh
11. साक्षात्कार , संपादक प्राफसर सुरद्र कुमा। , प्रकाशक दवरा पाब्लक , नई द।
12. Jhen~Hkxon~xhrk & xhrk izsl] xksj[kiqj
13. A Bhagavad Gita : Kappuswami – pkS[kEck vkfj;.Vkfj;k] fnYyh
14. ikr×ty;ksxlw=e~ ¼O;kIHkk';e~½ & O;kCE czāyhueqfu
15. ikr×ty;ksxlw=e~ & O;kCE lqjs"kpUnz JhokLrO;
16. ikr×ty;ksxlw=e~ & O;kCE gfjgjkUUn vkj.;
17. O;k[;kdkjksa dh n`fV esa ikr×ty;ksx n" kZu & foeyk d.kkZVd
18. The Yoga System of Patanjali – J.H. Woods.
19. Essence of Yoga – Reflections on the Yoga Sutras of Patanjali by Bernard Bauan Chand – Indian Book Centre, Sri Satguru Publications, Delhi.
20. Meditative Yoga : Integrating Body, Breath and Mind by Are Holen and Terbojrn Hobbel : Motilal Banarsidass, Delhi.
21. The Art and Science of Raja Yoga by J. Donald Walters : Motilal Banarsidass, Delhi.

MA 2nd Semester (Open Elective Paper) to be chosen from the common pool of the University.

Sem	Paper No	Code	Nomenclature of Paper	Contact hours/L+T+P	Marks			Credit
					Theory	I.A	Total	
II	Paper	16SOCO1	Understanding Sociology	4:0:0	80	20	100	3

Scheme of Examination:

It is decided to adopt the new scheme of Choice Based Credit System of examination whereby all the papers have four units comprising of 80 marks and the Internal Assessment component will be of 20 marks in all the Semesters. In the theory paper students will be asked to attempt four questions from the four units selecting at least one question from each unit and the 5th question shall be compulsory which will cover all units in the format of short answer type questions comprising of about 50 to 60 words. Thus, the total marks for all the five questions i.e. four from the units (16x4=64) and the 5th compulsory question of short answer numbering eight of 2 marks each i.e (8x2=16) thus making the total weight age to 80 marks. The detail of Internal Assessment of 20 marks has been prescribed by the University is given below:-

(a) One Class Test	:	10 Marks
(b) One Assignment	:	5 Marks
(c) Attendance	:	5 Marks
Less than 65%	:	0 Marks
Up to 70%	:	2 Marks
Up to 75%	:	3 Marks
Up to 80%	:	4 Marks
Above 80%	:	5 Marks

M.A.(Sociology)
Semester-II
Open Elective Paper- -16SOC01
Understanding Sociology

Maximum Marks: 100
Theory: 80
Internal Assessment: 20
Time : 3 Hours

Note:

3. **Nine question would be set in all.**
4. **Question No. fifth shall be based on the entire syllabus and would be compulsory. It would contain eight short answer questions of two marks each.**
5. **There would be two questions (16 marks each) from each of the four units.**
6. **The candidate would be required to attempt four questions (one compulsory and other four questions selecting one from each unit).**

Unit-I

Sociology: Meaning and Definition, Beginning and Growth of Sociology; The Scope of Sociology; Relationship with History, Anthropology, Economics.

Unit-II

Society: Types of society; Community and its characteristics; Social Groups and their types; Social Control: Functions and forms.

Unit-III

Social Stratification: Its characteristics and Bases; Social Mobility: Meaning and its types, Socialization: Stages and agencies of socialization; Social Change: Meaning and factors.

Unit-IV

Family: concept, forms and changing pattern of families; Marriage: concept and forms; Kinship: terminology, usages and incest.

References:

- MacIver, R.M. and C.H.Page (1985), *Society*, New Delhi: Macmillan.
- Giddens, Anthony, (1993), *Sociology*. Cambridge: Polity Press.
- Spencer, Metta (1976), *Foundations of Modern Sociology*, New Jersey: Prentice-Hall
- Johnson, H.M. (1983), *Sociology: A Systematic Introduction*, New Delhi: Allied Publishers.
- Haralambos, M. (1989), *Sociology: Themes and Perspectives*, New Delhi: Oxford University Press.
- Fichter, Joseph H. (1957), *Sociology*, Chicago: The University of Chicago Press.
- Bottomore, T.B. (1972), *Sociology*, New York: Vintage Books.
- Davis, K. (1949), *Human Society*, New York: Macmillan.
- Moore, Wilbert E. (1974), *Social Change*, Englewood Cliffs: Prentice –Hall.
- Rawat, H.K. (2013), *Contemporary Sociology*, Jaipur: Rawat Publications. Singh, J.P. (1999), *Sociology: Concepts and Theories*, New Delhi: Prentice-Hall.

Quantitative Techniques Paper Code: 16STAO1

(2nd Semester)

Maximum Marks-80
Internal Assessment Marks—20
Time:-03 Hours
Credit: 03

Section –I

Classification of Data, variable and measurement scales. Presentation of Data. Measures of Central Tendency and Dispersion, Skewness and Kurtosis. Measures of Association of Attributes. Correlation and Regression. Principle of Least Squares , Multiple and Partial correlation. Fitting of Polynomial and Exponential Curves.

Section –II

Random variables. Probability mass function, Probability density function and Commulative distribution function. Expectation and its properties. Moments, moment generating function and probability generating function. Discrete Probability distributions: Bernolli, Bionomial, Poisson, Negative Binomial, Geometric and Uniform. Continuous Probability distributions: Normal, Exponential, Log Normal and Uniform, Fitting of Bionomial, Poisson and normal distribution.

Section –III

Index numbers: Types, uses and their construction. Cost of living index numbers. Test of adequacy of Index numbers.

Time Series: Components and Models of time series. Measurements of trend and seasonal indices, Forecasting and Estimation.

Section –IV

Statistical Quality Control. Purposes and construction of control charts for variables and attributes using 3 sigma limits and 6 sigma limits. Single and double Sampling Inspection plans. Natural tolerance limit and modified control limits.

Vital statistics: Methods of obtaining Demographic data, Measurement of Mortality and Fertility. Complete Life and Abridged Life Tables.

Books Recommended

- | | | |
|--|---|---|
| 1. Goon, A.M., Gupta, M.K. and Dasgupta, B. | : | Outline of Statistics Volume-I & II |
| 2. Goon, A.M., Gupta, M.K. and Dasgupta, B. | : | Fundamental of Statistics Volume-I &II |
| 3. Rohtagi, V. K. and Md. Ehsanes Saleh, A. K. | : | An Introduction to Probability and Statistics |
| 4. Mood, A.M., Graybill, F.A. and Boes, D.C. | : | An Introduction to Theory of Statistics |
| 5. Croxton, F.E. and Cowden, D.J. | : | Applied General Statistics |
| 6. Kendall S.M. and Stuart A. | : | The Advanced Theory of Statistics |

Note: The examiner is to set the question paper into five units- A, B, C, D & E. In each unit A, B, C & D, he/she has to set two questions of 16 marks each from section I, II, III, & IV respectively and the candidate will attempt one question from each unit. In unit E, there will be 8 short answered questions of 2 marks each, covering the whole syllabus and the candidate has to attempt all the questions.

Sampling and Estimation Techniques

PAPER CODE: 16STAO2

Maximum Marks-80
Internal Assessment Marks—20
Time:-03 Hours
Credit: 03

Section –I

Population, sample, sampling distribution, standard error. Testing of Hypotheses: Simple and composite hypotheses, Null and alternative hypotheses, two types of errors, critical region and level of significance, one tailed test, two tailed test, Test of significance (Single and two samples problems) for normally distributed data. Goodness of fit test.

Section –II

Sample versus Complete Enumeration. Designing of Sample Surveys, Sources of Errors in Sample Surveys, Types of Non-Response Errors.

Probability and Non-probability Sampling: Simple Random Sampling with and without replacement for the estimation of Mean and Total, Determination of Sample Sizes of specified precision.

Section –III

Stratified Sampling: Proportional and Optimum Allocation, Estimation of gain due to stratification, Construction of strata, Determination of number of strata. Systematic, Cluster and Probability Proportional to Size Sampling. Comparison of stratified sampling with simple random sampling.

Section –IV

Analysis of Variance: one- way, two -way (with one and multiple but equal number of observations per cell). Completely Randomized Designs, Randomized Block Designs and Latin Square Designs. Factorial Experiments: Definition, Estimation of factor's effect, Analysis of the factorial experiments, Confounding: complete and partial confounding.

Books Recommended

- | | | |
|---|---|--|
| 1. Mood A.M., Graybill, F.A. & Boes, D.C. | : | Introduction to the Theory of Statistics |
| 2. Goon, A.M., Gupta, M.K. and Dasgupta, B. | : | Fundamental of Statistics, Vol-II |
| 3. Singh D. & Chaudhary F.S. | : | Theory & Analysis of Sample Survey Designs |
| 4. Mukhopadhyay, Primal | : | Theory and Methods of Survey sampling |
| 5. Dass, M.N. and Giri, N.C | : | Design and Analysis of Experiments |

Note: The examiner is to set the question paper into five units- A, B, C, D & E. In each unit A, B, C & D, he/she has to set two questions of 16 marks each from section I, II, III, & IV respectively and the candidate will attempt one question from each unit. In unit E, there will be 8 short answered questions of 2 marks each, covering the whole syllabus and the candidate has to attempt all the questions.

M.D.UNIVERSITY, ROHTAK

16CSE01

Computer Science Principles (Open Elective)

MM:T80+IA20

Credit 3

Time: 3 Hr

Instructions for setting of paper: Nine questions are to be set in total. First question will be short answer question covering whole syllabus and will be compulsory to attempt. Next eight questions will comprise of two questions each from the four sections. Student will be required to attempt four more questions selecting one from each section. Each question will be of 16 marks

UNIT I

Fundamental of computer science and computational thinking: logical reasoning, problem solving, data representation, processing of data, abstraction, managing complexity, operation of computers and networks, effective Web searching, ethical, legal and social aspects of information technology.

UNIT II

HTML and XHTML basics- LIST – unordered list – nested and ordered list – Basic HTML Tables – Intermediate HTML table and Formatting – basic HTML Forms and Formatting – More Complex HTML Forms – Frameset Element – Nested Frameset. Style Sheets and Graphics: Introduction to Style sheets – Formatting Text by Using Style Sheets – Formatting Paragraphs by Using Style Sheets, Java Script Basics.

UNIT III

Data Mining: Introduction: Motivation, Importance, Knowledge Discovery Process, KDD and Data Mining, Data Mining vs. Query Tools, Kind of Data mining, kind of data, Functionalities, interesting patterns, Classification of data mining systems, Major issues, from Data warehousing to data Mining.

UNIT IV

Computer Networks: Network fundamentals: Local Area Networks (LAN), Metropolitan Area Networks (MAN), Wide Area Networks (WAN), Wireless Networks, Inter Networks. Reference Models: The OSI model, TCP/IP model. Operating Systems: Main functions of operating systems. Multi Programming, multiprocessing, and multitasking. Deadlock and CPU scheduling algorithms

TEXT BOOKS

1. Blown To Bits: Your Life, Liberty and Happiness After The Digital Explosion by Hal Abelson, Ken Leeden and Harry Lewis, 2010
2. Thomas A. Powell, McGraw-Hill "HTML & CSS: The Complete Reference", Fifth Edition (Complete Reference Series) Osborne Media; 5 edition, 2010.
3. Krzysztof J. Cios, Witold Pedrycz, Roman W. Swiniarski, "Data mining: a knowledge discovery approach", Springer, 2007

16CSEO2

**Software Engineering Practices
(Open Elective)**

MM:T80+IA20

Credit 3

Time: 3 Hr

Instructions for setting of paper: Nine questions are to be set in total. First question will be short answer question covering whole syllabus and will be compulsory to attempt. Next eight questions will comprise of two questions each from the four sections. Student will be required to attempt four more questions selecting one from each section. Each question will be of 16 marks

UNIT I

Software Engineering-Software Process- Generic process model-Prescriptive process model-specialized, unified process -Agile development-Agile Process- Extreme Programming- Other agile Process models-Software engineering Knowledge-core Principles-Principles that guide each framework Activity,

UNIT-II

Requirements Engineering-Establishing the Groundwork-Eliciting Requirements-Developing use cases- Building the requirements model- Negotiating, validating Requirements- Requirements Analysis- Requirements Modeling Strategies.

UNIT III

Design Process- Design concepts: Abstraction, Architecture, patterns, Separation of Concerns, Modularity, Information Hiding, Functional Independence, Refinement, Aspects, Refactoring, Object Oriented Design Concepts, Design Classes- Design Model: Data, Architectural, Interface, Component, Deployment Level Design Elements, Software Quality- Software Quality Dilemma- Achieving Software Quality .

UNIT IV

Testing: Strategic Approach to software Testing- Strategic Issues- Testing: Strategies for Conventional Software, Object oriented software, Web Apps-Validating Testing- System Testing- Art of Debugging, Software Maintenance-Software Supportability- Reengineering- Business Process Reengineering- Software Reengineering- Reverse Engineering- Restructuring- Forward Engineering- Economics of Reengineering

TEXT BOOKS

1. Roger S. Pressman, "Software Engineering – A Practitioner's Approach", seventh edition, 2010.
2. Ian Sommerville, "Software Engineering" Pearson Edu, 9th edition, 2010.
3. Hans Van Vliet "Software Engineering: Principles and Practices", 2008.

16MBTO1

**Business skills for Biotechnologists
(Open Elective)**

MM:T80+IA20

Credit 3

Time: 3 Hr

Instructions for setting of paper: Nine questions are to be set in total. First question will be short answer question covering whole syllabus and will be compulsory to attempt. Next eight questions will comprise of two questions each from the four sections. Student will be required to attempt four more questions selecting one from each section. Each question will be of 16 marks

Unit - I

Introduction: Creativity & Entrepreneurial personality and Entrepreneurship in Biotechnology, Concept and theories of Entrepreneurship, Entrepreneurial traits and motivation, Nature and importance of Entrepreneurs, Government schemes for commercialization of technology (e.g. Biotech Consortium)

Unit - II

Project management: Search for a business idea, concept of project and classification, project identification, project formulation, project design and network analysis, project report, project appraisal.

Unit - III

Financial analysis: Ratio analysis, Investment process, Break even analysis, Profitability analysis, Budget and planning process.
Sources of finance: Source of development finance, Project financing, Institutional financing to Entrepreneurs, Financial institutions, Role of consultancy organizations.

Unit - IV

Marketing channels: Methods of marketing, marketing channels, Marketing institutions and assistance.

Biotech enterprises: Setting up Small, Medium & Large scale industry, Quality control in Biotech industries, Location of an enterprise, steps for starting a small industry, incentives and subsidies, exploring export possibilities.

Text/References:

1. Innovation and entrepreneurship in biotechnology: Concepts, theories & cases by D. Hyne & John Kapeleris, 2006.
2. The Business of Biotechnology: From the Bench of the Street: By Richard Dana Ono Published Butterworth- Heinemann, 1991.
3. Entrepreneurship in Biotechnology: Managing for growth from start-up By Martin Grossmann, 2003.
4. Best Practices in Biotechnology Education: By Yali Friedman, Published by Logos Press, 2008.
5. Plant Development and Biotechnology: by Robert Nicholas Trigiano, Dennis John Gray; Published by CRC Press, 2004,
6. Dynamics of Entrepreneurial Development and Management, Vasant Desai, Himalaya Publishing House, 2005.
7. Projects: Planning Analysis, Selection, Implementation & Review, Prasannan
8. Chandra, Tata Mc Graw-Hill Publishing Co.

16MMEO1

OPERATIONS RESEARCH

MM:T80+IA20

Credit 3

Time: 3 Hr

Instructions for setting of paper: Nine questions are to be set in total. First question will be short answer question covering whole syllabus and will be compulsory to attempt. Next eight questions will comprise of two questions each from the four sections. Student will be required to attempt four more questions selecting one from each section. Each question will be of 16 marks

Unit I

Introduction : Definition, role of operations research in decisionmaking, applications in industry. Concept on O.R.model building - Types & methods. Linear Programming (LP) : Programming definition, formulation, solution - graphical simplex Gauss Jordan reduction process in simplex methods, BIG-M methods computational, problem.

Unit II

Deterministic Model : Transportation model-balanced & unbalanced; orth west rule, Vogel's Method, Least cost or matrix minimal, Stepperg stone method, MODI methods, degeneracy, assignment, travelling salesman, problem.

Advanced Topic of LP : Duality, PRIMAL-DUAL, reactions-its solution, shadow price, economic interpretation, dual simplex, post-optimality & sensitivity analysis, problems.

Unit III

Waiting Line Models : Introduction, queue parameters, M/M/1 queue, performance of queuing systems, applications in industries, problems. Unit VI Project Line Models : Network diagram, event activity, defects in network, PERT & CPM, float in network, variance and probability of completion time, project cost-direct, indirect, total optimal project cost by crashing of network, resources leveling in project problems. Coupling Principal Coordinates, Free Vibrations in Terms of Initial Conditions, Forced Harmonic Vibrations, Vibrations Absorber, Centrifugal Vibration Absorber, Vibration Damper.

Unit IV

Multi degrees of Freedom systems and Numerical Methods: Introduction Influence Coefficients, Stiffness Matrix, Flexibility Matrix, Naural frequancies and Normal Modes, Orthpgonality of Normal Modes, Dunkerley's Equation,Method of Matrix Iteration, The Holzer Type Problem Geared and Branched Systems, Beams.

Normal Mode Vibrations of Continuous System : Vibrating String, Longitudinal Vibrations of Rod, Torsional Vibrations of Rod, Lateral Vibrations of Beam.

Text Books :- 1. Theory of Vibration with Aplications W.T. Thomson, Prentice Hall of India.

2. Mechanical Vibration : G.K. Grover and S.P. Nigam, Nem Chand and Sons.

References Books : 1. Theory and Practice of Mecahnical Vibrations J.S. Rao and K. Gupta , Wiley Eastern Ltd.

2. Mecahnical Vibrations S.S. Raop, Addision - Wesley Publishing Company.

OPEN ELECTIVE COURSE

16ECE01 MULTIMEDIA COMMUNICATION

MM:T80+IA20

Credit 3

Time: 3 Hr

Instructions for setting of paper: Nine questions are to be set in total. First question will be short answer question covering whole syllabus and will be compulsory to attempt. Next eight questions will comprise of two questions each from the four sections. Student will be required to attempt four more questions selecting one from each section. Each question will be of 16 marks

UNIT I

Multimedia & Information Representation Multimedia Introduction: multimedia networks, Telephone networks, Data networks, Broadcast television networks, Integrated services digital networks, Broadband multiservice networks, types of Multimedia Applications: Movie on Demand, Near Movie on Demand, communication modes, multipoint conferencing, network QOS, Application QOS. Multimedia Information Representation: Digitization principles, Encoder Design, Decoder Design, Unformatted Text, Formatted Text, Hypertext, Images: Graphics, Digitized documents, Digitized pictures; Audio: PCM speech, CD-quality audio, Synthesized audio; Video: Broadcast television, Digital video, PC video, video content.

UNIT II

Text and Image Compression Compression Principles & Text Compression: Compression Principles: Source encoders and Destination decoders, Lossless and lossy compression, Entropy encoding, Source encoding; Text Compression: Static Huffman coding, Dynamic Huffman Coding, Arithmetic Coding. Image Compression: Graphics Interchange Format, Tagged image file format, digitized documents, digitized pictures.

UNIT III

Audio and Video compression: Audio Compression: Differential Pulse Code Modulation, Adaptive Differential PCM, Adaptive predictive coding, Linear Predictive coding, Code excited LPC, Perceptual Coding, MPEG Audio coders, Dolby audio coders Video compression: video compression principles, Motion Pictures Expert Group (MPEG), MPEG1, MPEG2.

UNIT IV

INTERNET AND DESIGNING FOR THE WORLD WIDE WEB The internet and multimedia: The internet, Internetworking: Internet addresses, connections, The Bandwidth Bottleneck, Internet services, MIME-Types, The world wide web and HTML, Dynamic web pages and XML, multimedia on the web, Tools for the World Wide Web: web browsers, web servers, web page makers and site builders, plug-ins and delivery vehicles. Designing For The World Wide Web: Developing for the web: HTML is a Markup Language, The Desktop Workspace, The Small Device Workspace, nibbling, Text for the web: making columns of text, flowing text around images; images for the web: GIF and PNG Images, JPEG Images, Using Photoshop, Backgrounds, clickable buttons, Client side image maps, sound for the web, animation for the web.

Text Books:

1. Fred Halsall, Multimedia Communications , Pearson
2. Tay Vaughan, Multimedia, making it work Eighth edition, Tata McGraw-Hill Edition

Reference Books

1. Rao, Bojkovic & Milovanovic, Multimedia Comm. System: Technology , Std. &Network , PHI
2. JohnF. Koegel Bufod, Multimedia Systems , Addison Wesley, Edition. 2000

**DEPARTMENT OF ZOOLOGY
M. Sc. ZOOLOGY**

Course no.: 16Z0001

Semester- II Course Title: Applied Zoology

MM: T80+IA20

Time: 3 Hr

Note: There shall be seven questions in total. One question will be compulsory (short answer type) covering the entire syllabus and remaining six questions will be set two from each unit. Students are required to attempt compulsory question and 04 more questions selecting at least selecting one from each unit.

Unit-I

Host – Definitive and intermediate, Parasitism, Symbiosis, Commensalism, Reservoir.
Transmission, prevention and control of diseases: Tuberculosis and Swine flu
Principles and applications of ECG, MRI, PET, and CAT.

Unit-II

Life history and pathogenesis of *Plasmodium* sp.
Life history, Medical importance and control of *Aedes* sp.
Life history, pathogenesis and control of *Taenia* sp.
Principles and applications of brain activity recording, and pharmacological testing.

Unit-III

Preservation of gametes in animal and artificial insemination.
Principles and management of Poultry.
Introduction and management of pisciculture
Genetic improvement in animals; Induced breeding in aquaculture.

***As per SOE Zoology**

**** Proposed maximum marks and subject to change in uniformity with other faculties of university**

List of Recommended Books

1. Dent, D. Insect Pest Management
2. Hill, D.S., Timber Press. Agricultural Entomology
3. David, B. V. & Ananthkrishnan. General and Applied Entomology . T. N., Tata McGraw-Hill Publishing.
5. Asa C. Chandler, Clark P. Read, Introduction to Parasitology, John Wiley and Sons., Inc., New York.
6. Thomas W.M. Cameron, Parasites and Parasitism, Billing and Sons Ltd. London,
7. Elmer R. Noble, Glenn A. Noble; Parasitology: The Biology of Animal Parasites, Lea and Febiger, Washington.
8. R.P. Hall, Protozoology, Prentice-Hall, Inc. Englewood Cliffs. N.J. Charles E. Tuttle Company, Tokyo
9. E.O. Wilson. The Diversity of Life (The College Edition), W.W. Northern & Co.
10. Molecular Biology of the Cell, B. Alberts, D. Bray, J. Lewis, M. Raff, K. Roberts and J.D. Watson. Garland Publishing Inc., New York.
11. Molecular Biology and Biotechnology. A comprehensive desk reference, R.A. Meyers (Ed.), VCH Publishers, Inc., New York.
12. Molecular Cloning: a Laboratory Manual, J. Sambrook, E.F. Fritsch and T. Maniatis, Cold Spring Harbor Laboratory Press, New York.
13. Gray's Clinical Neuroanatomy by Mancall **New Medical Pharmacology at a Glance (7th Ed.)**
14. Oxford Handbook of Neurology

8. Placements:

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Aero-gel assisted synthesis of anatase TiO₂ nanoparticles for humidity sensing application†

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Rakesh Kumar,^b Pramod Kumar Rai^b and Vijay K. Tomer^{b,*†}

Aero-gel based one-pot synthesis of anatase phase TiO₂ nanoparticles having a high surface area of 125 m² g⁻¹ has been reported in this work. The humidity sensing performance of the obtained porous TiO₂ nanoparticles exhibits a quick response (2 s) and fast recovery (1.5 s), negligible hysteresis (<1%) and good stability in the 11–98%RH range. The relationship between %RH and resistance was found to be linear while the sensitivity increases with increase in %RH.

Introduction

Nanotechnology has emerged as one of the important futuristic tools, which can actually revolutionize the fields of electronics, catalysis, sensors, adsorbents and energy storage. Humidity sensors have gained significant attention due to application in important areas such as food storage, electronic industries, agriculture, pharmaceuticals, aviation, *etc.*¹ An ideal humidity sensor should possess fast response and recovery, low hysteresis, repeatability, linearity, thermal stability, and work in a wider humidity range. Such types of sensors can be efficiently designed by using porous structured materials as they enable the water molecules to infiltrate and diffuse through their surface thus leading to an increase in the sensitivity of the material.² Moreover, specific surface area, large aspect ratio and ultrafine size are also anticipated to enhance

the sensitivity of materials by transferring the protons directionally.³

In the recent past, titanium oxide (TiO₂) has emerged as an important n-type semiconductor counterpart material in humidity/gas sensing applications.^{4–6} TiO₂ is hydrophilic in nature due to the dissociative transfer of water molecules over the interface of Ti³⁺/Ti⁴⁺ sites.⁴ Furthermore, as a consequence of its interesting properties like thermal stability, chemical resistance and mechanical strength, TiO₂ nanoparticles (NPs) have gained prominence as gas and %RH sensing materials.^{5,6} Hitherto, TiO₂ has been prepared by using sol-gel/hydrothermal or template/surfactant methods and coupled with various metals and metal oxides (ZnSnO₃/TiO₂,⁷ TiO₂/SBA-15,⁴ ZnO/TiO₂,⁷ V₂O₅/TiO₂:WO₃,⁸ rGO/TiO₂,⁹ Li⁺/ZrO₂-TiO₂,¹⁰ Cr/TiO₂,¹¹ poly(*o*-toluidiene)/TiO₂,¹²) for utilization in humidity sensing applications. In the sol-gel method the aging of the gel and surfactant/template removal unnecessarily increase the time duration of synthesis, while removal of surfactant with several times washing may lead to agglomeration and diminish the physical properties of nanoparticles, such as bulk density and, most importantly, porosity.

Referring to previously reported articles, the particle sizes of TiO₂ NP based humidity sensors were more than 5 nm having less porosity and clumsy structure. This will definitely diminish the efficiency of sensors. To overcome these obstacles, we have synthesized TiO₂ NPs using an aero-gel method in this work. This method has an advantage of creating huge porosity, extremely fine size and large aspect ratio, within a very little span of time. Such features are attributed to the supercritical drying process which results in lesser capillary action and the collapse of pores leads to the formation of low density, porous and ultrafine structure, containing defects such as crystal, corner, edges, kink and ion vacancies.¹³ The synthesized TiO₂ NPs possess mixed morphology (spherical, rectangular and hexagonal shape) having diameters in the range of 5–15 nm with large interlayer distance. The XPS study revealed both the trivalent and tetravalent electronic state of TiO₂ NPs with lattice oxygen and a large number of surface hydroxyl groups, which significantly influences their humidity

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† Electronic supplementary information (ESI) available: Process of fabrication and measurement of %RH. Figures showing N₂ adsorption-desorption isotherms, FTIR and PL spectra. See DOI: 10.1039/c8dt00106e

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sensing capability. The quick response time of 2 s and fast recovery time of 1.5 s over the wide range (11–98%) of applicability with low hysteresis (<1%) and long term stability represents TiO₂ NPs as an excellent humidity sensing material.

Experimental

Titanium isopropoxide (Sigma Aldrich) 40 mM and double distilled water (stoichiometric amount) were mixed with ethanol (99.9% pure) and toluene (HPLC grade) in 1:1.8 ratio. The mixture was stirred for 10 to 15 minutes and then placed into a Parr reactor. Initially, N₂ gas (200 psi) was poured and the aliquot was heated @ 2 °C min⁻¹. After reaching the temperature of 320 °C and pressure >1000 psi, the solvents were removed slowly and cooled down to room temperature. Finally a low density and extremely fine white powder (TiO₂ NPs) was obtained and placed in an air tight container for further application. The humidity sensing experiment was performed in the same way as reported in our earlier work and discussed in the ESL†¹⁴ The details about characterization instruments and the procedure for sample preparation are discussed in the ESL†

Results and discussion

Fig. 1(a) shows the crystal phase structure of TiO₂ NPs as determined by a powder X-ray diffraction pattern, which indicates diffraction peaks at (101), (004), (200), (105), (211), (204), (116), (220) and (215) planes. All the peaks were ascribed to the anatase phase of TiO₂ NPs according to JCPDS file no. #84-1286. The broadening in diffraction peaks could be attributed to the smaller crystal size of TiO₂ NPs. The high resolution transmission electron microscope (HRTEM) image in Fig. 1(b) revealed TiO₂ NPs with mixed morphology (spherical, hexagonal and rectangular shaped) in the range of 4–15 nm. The HRTEM image in Fig. 1(c) shows the clear presence of lattice fringes of TiO₂ NPs for which the *d*-spacing was calculated to be 0.318 nm. The selected area electron diffraction (SAED) pattern (inset) exhibited the crystalline nature of TiO₂ NPs. Fig. S1(a)† shows the morphology of the prepared TiO₂ NPs as obtained from SEM analysis. As can be seen, several spherical clusters of nanoparticles with particle sizes ranging from 5 to 15 nm were observed.

Fig. S1(b)† illustrates the N₂ sorption isotherms and pore size distribution (inset) curves for the TiO₂ NPs. As can be seen, the hysteresis loop represents a type IV mesopore structure and a H3 type hysteresis loop with narrow pore size distribution having slit pore geometry. The specific surface area and pore diameter was found to be 125 m² g⁻¹ and 11–12.7 nm, respectively. The TiO₂ NPs prepared using the aerogel method exhibit smaller particle size with higher surface area as compared to the TiO₂ NPs prepared by using conventional hydrothermal or solvothermal routes.¹⁵

The X-ray photoelectron spectroscopy (XPS) measurement was used to determine the valence state and composition of TiO₂ NPs. Fig. 2 represents the graph between binding energy

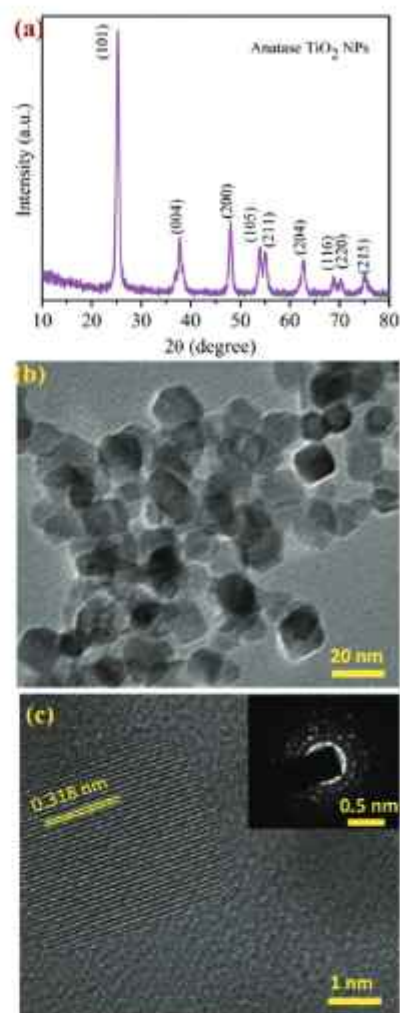


Fig. 1 (a) X-ray diffraction patterns of TiO₂ NPs; (b) HRTEM images of TiO₂ NPs; (c) interlayer distance and lattice fringes, (inset) selected area diffraction pattern of TiO₂ NPs.

and intensity of TiO₂ NPs and explains the elements and associated chemical bonds in the top few atomic layers of the material. The high resolution XPS spectrum in Fig. 2(a) indicates two peaks of the doublet of Ti 2p that arise from spin-orbit splitting, which could be further divided into four parts after deconvolution; (i) Ti 2p^{1/2} (464.2 ± 0.2 eV) and (465 ± 0.5 eV) representing Ti³⁺ [blue color in Fig. 2(a)] and Ti⁴⁺ [pink color in Fig. 2(a)], respectively, and (ii) Ti 2p^{3/2} (458.6 ± 0.5 eV) and (459.7 ± 0.2 eV) indicating Ti³⁺ and Ti⁴⁺, respectively.¹⁶ The O 1s spectrum in Fig. 2(b) displays the main peak around 529.9 ± 0.5 eV, which can be attributed to lattice oxygen and a second peak was observed at a slightly higher binding energy of 531.8 ± 0.2 eV, which corresponds to the surface hydroxyl group.¹⁷

The high surface wettability of TiO₂ NPs could be further substantiated using Fourier transform infrared (FT-IR) spectroscopy; Fig. S2† represents the inorganic vibrations bands such as O–Ti–O, around 430 cm⁻¹. The band peaks at 3383 and 1631 originate from the terminal hydroxyl groups of TiO₂ NPs or adsorbed water molecules, which are strongly deter-

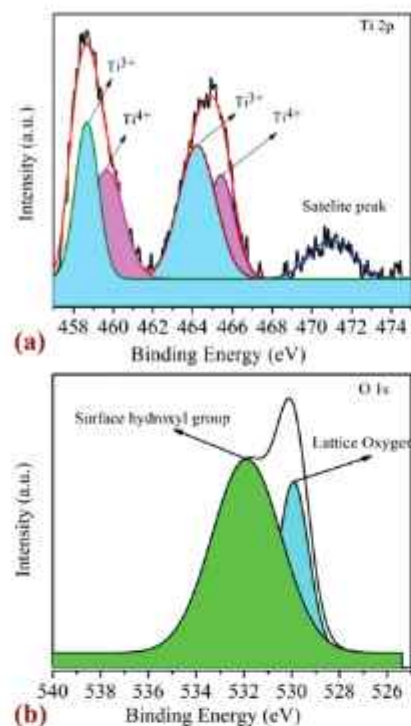


Fig. 2 (a) Ti 2p core level XPS spectrum of TiO₂ NPs; (b) O 1s spectrum of TiO₂ NPs.

mined by the RH environment surrounding the material.¹⁸ Fig. S3† shows the photoluminescence (PL) spectrum of the TiO₂ NPs excited at 250 nm. The small peak appearing at 406 nm is a characteristic peak for the surface recombination of anatase TiO₂ NPs.¹⁹ The two blue emission peaks centered at 437 nm and 498 nm and one green emission peak at 546 nm are assigned to the shallow trapped oxygen vacancy associated with Ti³⁺ centers.²⁰ The PL spectra indicate the presence of oxygen vacancies and defects on TiO₂ NPs and the high intensity of peaks indicates that the electron-hole pair recombination is quite easy in TiO₂ NPs, which significantly affects the electronic properties of materials and enhances the sensing nature of TiO₂ NPs.

The humidity sensing performance of TiO₂ NPs was measured in the 11–98%RH range using the resistance variance method and important sensing parameters such as response/recovery time, linearity, sensitivity, hysteresis loss and stability have been investigated. In the resistance variance method the polarization effect apparently decays the performance of the sensor and so to avoid this, a toggle switch between the source voltage and sensor electrodes with a toggling frequency of ~2 Hz (using manual switching) was used to evaluate the %RH sensing attributes. Therefore, as soon as there is an appearance of polarization the polarity reverses, which results in the opposite motion of charge carriers and the effect of polarization gets nullified.

The response and recovery times are defined as the time taken by the sensor to achieve 90% of the total resistance change during the process of adsorption and desorption,

respectively. Fig. 3(a) shows that the response time of TiO₂ NPs (humidification from 11 to 98%RH) was 2 s and the recovery time (desiccation from 98 to 11%RH) was 1.5 s. The results indicated that the TiO₂ NP sensor is characterized by fast response and rapid recovery time. A recovery time of a mere 1.5 s is appealing, which enables the sensor for the next measurement within a very little span of time. The outstanding response/recovery time for TiO₂ NPs could be attributed to the abundantly present oxygen containing hydroxyl groups and large interlayer distances, which enable water adsorption and desorption throughout the reaction.²¹ It was also observed that on changing the %RH level from 11% to 98%, the resistance value decreased monotonically because the adsorbed water molecules raise the dielectric parameter and drop the resistance by virtue of swelling or the capillary effect.² Furthermore, abundant adsorbed water molecules on the interface of TiO₂ NPs reinforce the space-charge polarization effect and enable the swift diffusion of water molecules into the pores of TiO₂ NPs, which significantly enhances proton formation between –OH groups.²² The excellent linearity exhibited by TiO₂ NPs has been portrayed in Fig. 3(b) and is calculated by using eqn (1):

$$\% \text{Linearity} = \frac{\left\{ \frac{Y_{\max} - Y_{\min}}{2} + Y_{\min} \right\} - Y_s}{\frac{Y_{\max} - Y_{\min}}{2} + Y_{\min}} \times 100 \quad (1)$$

where, Y_{\max} and Y_{\min} are the maximum and minimum values of the resistance obtained at 98 and 11%RH, respectively, and Y_s is the resistance mean value at the mean of the %RH. Fig. 3(c) shows the relationship between sensitivity and %RH and was calculated by using eqn (2). As can be seen, the %sensitivity increases with increase in %RH, which could be attributed to the attachment of water molecules with the H-bond through hydroxyl groups to the layer by layer infiltration of continuous water adsorption while increasing the %RH.

$$\% \text{Sensitivity} = \frac{\left\{ \frac{R_e - R_x}{R_x} \right\} - Y_s}{RH_x} \times 100 \quad (2)$$

where R_e represents the sensor resistance in the empty box and R_x represents the resistance in the respective %RH box (RH_x) (from 11 to 98%). Fig. 3(d) shows the dynamic response and recovery of the TiO₂ NP sensor whereby the sensor was exposed to repeated adsorption/desorption cycles between 11 and 98%RH. As can be seen, during the four loops of measurements (11%RH → 98%RH → 11%RH), the response was found to be remarkably reversible and the resistance values at 11 and 98%RH in each loop were realized accurately. A standard variation (S.D.) of 0.5% was obtained during the four loops of measurement, which also endorses the excellent reproducibility of the %RH response. A superlative humidity sensor should possess very small or negligible hysteresis; therefore, it is the most significant parameter of a sensing material, which indicates consistency by defining the maximum difference in values of %RH during adsorption and desorption processes.

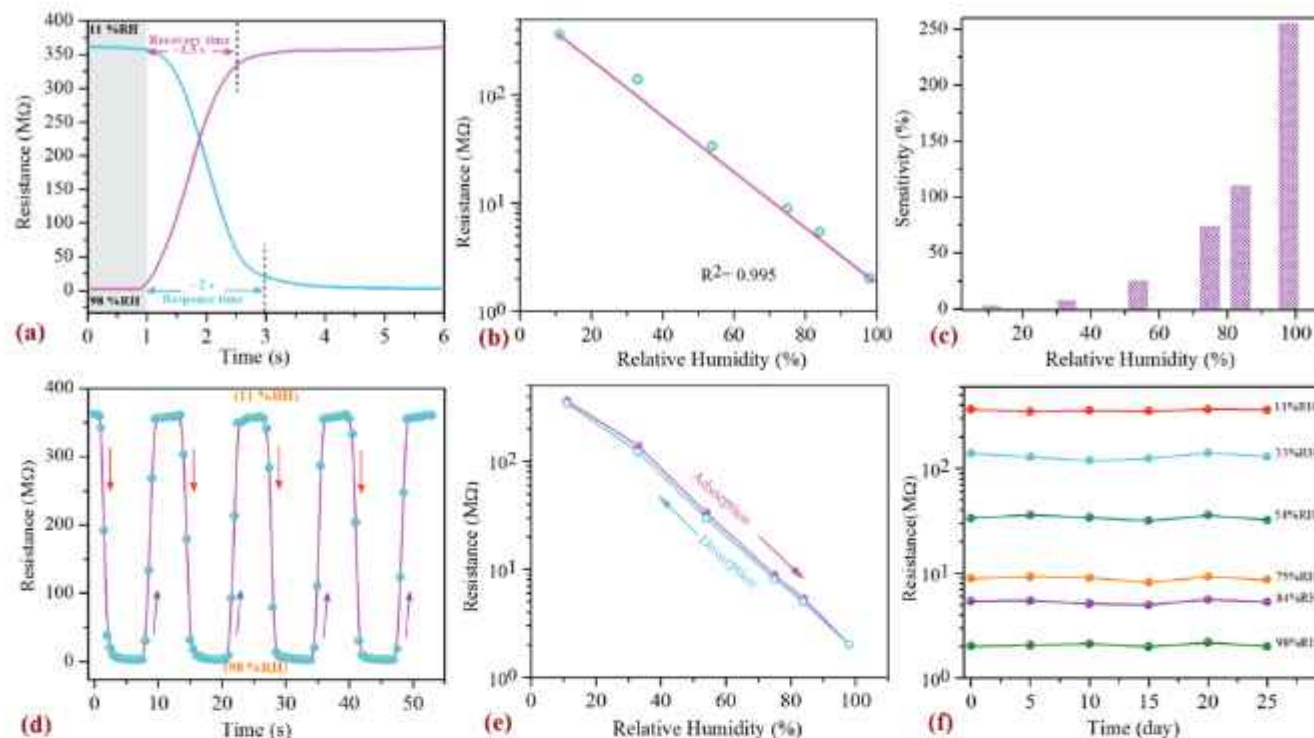


Fig. 3 (a) Response and recovery time of the TiO_2 NPs sensor for humidity levels between 11% RH and 98% RH; (b) linearity of TiO_2 NPs for humidity sensing; (c) sensitivity of TiO_2 NPs for humidity sensing; (d) repeated response and recovery characteristics of TiO_2 NPs; (e) hysteresis curve showing adsorption–desorption responses measured in the 11–98%RH range for TiO_2 NPs; (f) the response of TiO_2 NP sensor monitored under different humidity conditions for 25 days.

The hysteresis error (γH) was calculated using the expression, $\gamma H = \pm \frac{\Delta H_{\text{max}}}{2F_{\text{FS}}}$, where, ΔH_{max} is the difference in the output of adsorption and desorption processes and F_{FS} is the full scale output.²³ Fig. 3(e) indicates the typical hysteresis plot of a sensor based on TiO_2 NPs wherein the solid red and green lines correspond to adsorption (humidification) and desorption (dehumidification) processes, respectively. As can be seen, both the adsorption and desorption curves almost overlap and a low hysteresis of <1% was obtained, which indicates the good reliability of the sensor. The stability of the % RH sensor is a crucial feature for evaluating the potential of

humidity sensors in commercial applications. The long term stability was monitored over a period of 25 days by measuring the resistance variation once every 100 h at 11, 33, 54, 75, 84 and 98% of RH as depicted in Fig. 3(f). Excellent long term stability is clearly evident from this figure as the differences in values of resistance were negligible for a particular RH level. The sensor observes an S.D. of 1.9% during the entire span, which reveals the good stability of the sensor.

The humidity sensing mechanism of porous materials can be explained by water molecules adsorbed onto the surface and on capillary water condensation inside the pores of the sensing material.²⁴ Fig. 4 shows the adsorption phenomenon

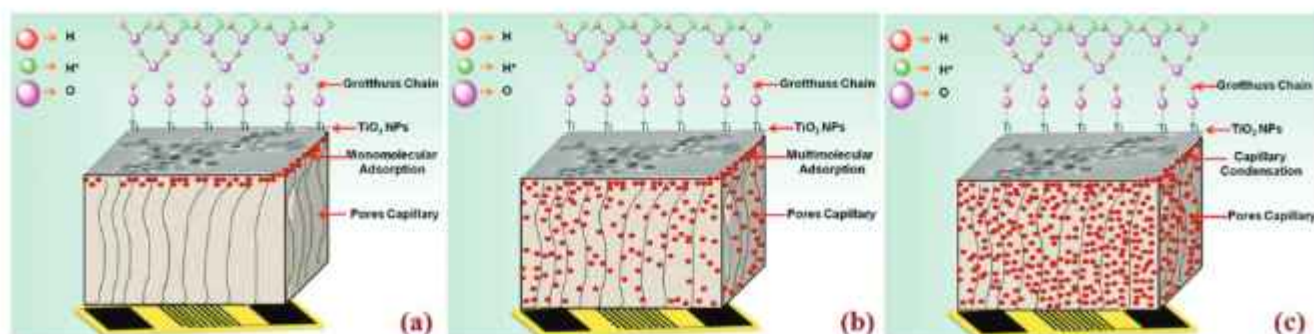


Fig. 4 Mechanism of humidity sensing using TiO_2 NPs, (a) at 11%RH; (b) at intermediate (33%RH) humidity; (c) at maximum (98%RH) humidity.

of water molecules under different %RH conditions. When water molecules get adsorbed onto the surface of a material, conduction is promoted by releasing H^+ and OH^- . Since water is highly polar and each molecule of water has two lone pairs of electrons, it can easily donate H^+ and electrons.²⁵ The adsorption of water on the surface of material is divided in two parts: (i) chemisorption and (ii) physisorption. The negatively charged oxygen atom gets attached to positively charged Ti^{3+}/Ti^{4+} ions and leads to the formation of an initial chemisorbed layer of water molecules between positively charged metal ions Ti^{3+}/Ti^{4+} and negatively charged oxygen atoms under the influence of a strong electrostatic field. At low %RH (Fig. 4(a)), dissociation of water molecules leads to the formation of hydroxyl ions at the surface of the sensing material²⁶ whereas, the charge transport is secured by the chemisorbed hydroxyl group and proton hopping. On further increase in %RH (Fig. 4(b)), the hydronium ions become the significant source of charge carriers as the multilayer physisorbed water molecules tend to condense in capillary pores. At highest humidity conditions (98%RH), the hydronium ions dissociate into H_2O and H^+ ions (Fig. 4(c)) and each water molecule is influenced by hydrogen bonding and electrostatic interactions between hydroxyl groups.²⁷ Under these conditions, the transportation of charge carriers is followed by the Grotthuss chain reaction where the hydronium ion releases H^+ to adjacent water molecules which on accepting it, transfer H^+ to their adjacent water molecules, thus initiating a chain process resulting in charge transportation across the sensor surface.

Conclusions

Anatase phase, porous, TiO_2 NPs with a high surface area of $125\text{ m}^2\text{ g}^{-1}$ and ultrafine size of 4–15 nm have been synthesized using a surfactant free one pot aero-gel method. The XPS study indicated both trivalent and tetravalent oxidation states of TiO_2 NPs containing a large number of surface hydroxyl groups. The prepared TiO_2 NPs exhibit excellent %RH sensing performance and a fast response time (2 s), swift recovery time (1.5 s), low hysteresis (<1%) and long term stability was observed in the 11–98%RH range of measurement. The excellent sensing performance of TiO_2 NPs could be attributed to the porous nature, high surface area, extremely fine size and large interlayer distance. The novel findings revealed in this study indicate that aero-gel based TiO_2 NPs hold the potential for the development of highly sensitive sensing materials.

Conflicts of interest

The authors declare no conflicts of interest.

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The Awakening: A Novel of Female Identity and Self-consciousness

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Abstract

The Awakening has been described as a case study of 19th-century feminism. One of the central themes in the novel is self-ownership. Also called bodily autonomy, self-ownership was a key tenet of 19th-century feminism. It signified a woman's right to have control over her own body and identity. So-called first-wave feminists argued that women could gain their freedom only by refusing to allow other people, namely, men—to exercise control over their bodies. They focused, in particular, on a wife's right to refuse sexual relations with her husband. They argued that a woman's service as a wife and mother entitled her to ownership of her body and, therefore, the right to refuse to have sex or be impregnated.

Key-Words : Self-consciousness, Society.

A past overview of nineteenth-century English literature certainly reveals an array of representations and impressions of femininity. Charlotte Brontë's *Jane Eyre*, an important example from the Victorian era is, labeled as a *bildungsroman*. In this novel, Charlotte depicts a distinctive, unruly and revolutionary viewpoint on a woman's life. She has devoted a considerable energy in forming women free from all bondages, her overcoming of gender-oriented norms and barriers, her rising in society. This new outlook of a free woman set a new subject of debates that challenged and problematized socially established female roles. When first published in 1899, the novel's original title was *A Solitary Soul*. Later on, it is renamed as *The Awakening*, it shocked readers with its honest treatment of female marital infidelity. As audiences were accustomed to the pieties of late Victorian romantic fiction. Readers were taken aback by Chopin's daring portrayal of a woman trapped in a stifling marriage, who seeks and finds passionate physical love outside the confines of her domestic situation.

The novel is widely acclaimed today as a master class literary piece of work, irrespective of its unusually free and frank treatment of a then-controversial topic. On the Last Cover Page of the novel, Edmund Wilson characterized it as a work "quite uninhibited and beautifully written, which anticipates D. H. Lawrence in its treatment of infidelity" (Chopin). Although the theme of marital infidelity no longer shocks, few novels have investigated the psyche of a woman indulged in an extra-marital relationship with the perfection, originality, and truthfulness that Kate Chopin brought to *The Awakening*. It is regarded as a great feminist novel of identity and self-consciousness, which still have relevance in the present time after its publication 120 years ago.

The novel opens on Grand Isle, a summer retreat for wealthy French Creoles from New Orleans, Léonce Pontellier, a forty-year-old businessman. He is married to Edna. She had married



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Key-Words: Society, Sexuality.

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Influenced by the magnanimity and the attitude of supreme sacrifice by the Punjabis to safeguard "the majestic fabric raised by Maharaja Ranjit Singh" (Grewal 127), Gurcharan Das pays homage to their sacrifices by portraying the mid-19th century colonial India. The

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International Trade and Foreign Policy in India and its Perspectives

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Abstract

The foreign or international trade policy of India relies solely on the Export Import simply known as the EXIM Policy of Govt. of India. This is being regulated and governed by the Act of Foreign Trade Development and Regulation Act, 1992. The key governing body which is directly associated with the EXIM Policy is the DGFT (Directorate General of Foreign Trade). The contemporary or recent act of Foreign Trade is under implementation after replacement of the earlier law which was Import and Exports (Control) Act, 1947. After independence, there were no specific or strict rules regarding the EXIM protocols. In the new Foreign Trade Policy which is known as FTP 2015 - 2020, it is broadcasted that there will be the special incentives and promotions for the exporters in different streams. Govt. of Indian is promoting and attracting the domestic experts to work on 'Make in India' so that the Indian products can be sold in International Market and overall economy can be strengthened.

Key-Words : EXIM Policy, Foreign Policy of India.

Introduction

Govt. of India is predicting the exports of more than 900 billion dollars by year 2025 after implementation of the new foreign trade policy. In this research work, the empirical review on the trade policies of India with respect to the global market is addressed. In this paper, it is depicted that Indian economy is one of the growing economy with the new foreign trade policy. In the scope of future work, the current clients of EXIM banks can be fetched from the live market and then the satisfaction level can be analyzed using statistical tools.

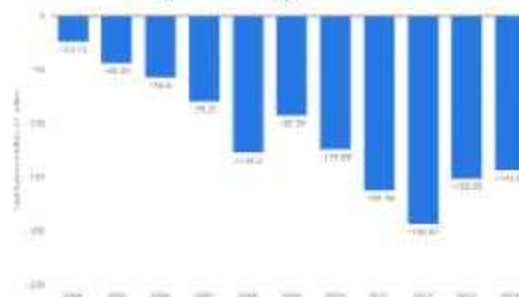


Figure 1.1 – Trade Balance of India (Billion Dollars)
[Source - World Trade Organization]

Analysis of International Investment AND Trade Policies of Government of India

India is one of the countries in BRICS Nations which is one of the competent nation in international trade

BRICS refers to the alliance of five key emerging economies of the world which includes Brazil, Russia, India, China and South Africa. Earlier, the term was named as BRIC and later South Africa was included in year 2010. The major factor or aspect which associates or joins these countries are huge extent growing economies, influence on international trading affairs. The countries in BRIC are the members of G-20 group which makes the formation very effective and changing the scenario of global trade in assorted domains. Currently, Russia is holding the chair of BRICS with the hosting of seventh summit recently in 2015. In this work, an effective analysis on the growth and its impact on global and respective economies are investigated. The proposed work includes the historical analysis and prediction of the growth rate by which the national and international trade can be influenced for the upliftment of general economic aspects.

The growth rate and related economic escalation is moving on with the BRICS countries in assorted sectors. These countries are being associated in multiple domains and alliances so that the escalation of overall world economy can be implemented.

As far as the statistics is there, BRICS countries are having more than 300 crores of people which are around 42 percent of the global population.

The system for collaboration inside of this gathering advanced soon into the summit arrangement of pioneers' meeting. Yet the BRICS remains a feebly systematized structure and follows up on a casual premise. Indeed, even thus, the gathering has seen its motivation and fundamental exercises broaden. The outcome has been engagement of a more extensive scope of official powers of the part states, agents of the scholastic group and business structures. Services of money, financial aspects and farming and national security foundations soon joined discretionary offices in multilateral BRICS interviews. Research organizations and business gatherings are routinely sorted out in conjunction with summits.

It is most likely an extraordinary political articulation, especially during a period when the Bretton Woods establishments - International Monetary Fund (IMF, or simply the 'Trust') and International Bank for Reconstruction and Development (World Bank, or simply the 'Bank') — have neglected to respond to the inexorably louder voices of creating nations in a quickly changing worldwide financial request. India however, must consider what focal points this conveys to its own particular exchange and industry before consenting to assist China with accomplishing the goal of gradually supplanting the US dollar with the yuan as the store coin. Plus, despite the fact that India's own particular conversion scale is pegged to a wicker bin of coinage, and not simply to the US dollar, exchanging the nearby money does not add to effectiveness absolutely from the fiscal approach perspective, given the complexities of swapping scale administration.

Analysis of Export Import Bank in India

Export-Import Bank of India (EXIM Bank) is a specialized financial institution, wholly owned by Government of India, set up in 1982, for financing, facilitating and promoting foreign trade of India. Including the share capital of 1,300 crore received during the year from Government of India, the paid up capital as on March 31, 2015, stood at 5,059 crore and the Net Worth stood at ₹ 9,902 crore. Profit after tax of the Bank for the year 2014-15 amounted to 726 crore.

EXIM Bank extends Lines of Credit (LOCs) to overseas financial institutions, regional development banks, sovereign governments and other entities overseas, to enable buyers in those countries to import developmental and infrastructure projects, equipments, goods and services from India, on deferred credit terms. EXIM Bank has laid strong emphasis on enhancing

project exports, the funding options for which have been enhanced with introduction of the Buyer's Credit-National Export Insurance Account (BC-NEIA) program. The Bank facilitates two-way technology transfer by financing import of technology into India, and investment abroad by Indian companies for setting up joint ventures, subsidiaries or undertaking overseas acquisitions. To promote hi-tech exports from India, the Bank has a lending programme to finance research and development (R&D) activities of export-oriented companies. During the year ended 31st March, 2015, EXIM Bank sanctioned loans of ' 57,684 crore, while disbursements amounted to ' 38,508 crore. Loan Assets stood at ' 86,953 crore as on March 31, 2015.

During the year, the Bank issued India's first USD denominated Green bonds with a benchmark size of US\$500 million. During the year, an Export Development Fund [EDF] facility, a special fund, established by Gol under the Exim Bank Act and administered by Exim Bank, to sanction loans in the interest of international trade towards meeting strategic objectives was put to use. Exim Bank under the Gol's 'Act East Initiative' undertook a Mission to CLMV countries, consequent to which a Project Development Company is being set up, to be followed by a Project Development and Facilitation Framework. Exim Bank, IL&FS, AfDB and SBI jointly floated a Project Development Company in Africa, based in Mauritius.

The Bank has entered into a Cooperation Agreement on Innovation with the four major development Banks of the BRICS countries which is expected to promote intra-BRICS cooperation in innovation financing. The Bank, with its diverse programmes, caters to different segments of exporters and the export cycle. The Bank provides assistance in helping Indian firms in their globalization efforts by locating overseas distributor(s)/ buyer(s)/ partner(s) for their products and services. Exim Bank also lays special emphasis on enhancing export capabilities and international competitiveness of Indian companies through its various Advisory Services.

Foreign trade makes a significant contribution to the economy growth of a country. The policy regime in India with regard to liberalization of the external sector has brought tremendous changes in India's foreign trade. So, the present study attempts to analyse the trend and composition of foreign trade and also to analyse the impact of trade on the economic growth of India. The study reveals that though the total exports and imports both have increased but the growth rate of imports is more than the growth rate of exports. It is also found that manufactured goods compose major portion of the export goods while petroleum and crude products contribute major portion of the imported goods. The study also reveals that import has a negative influence on economic growth while export and economic openness are positively related with the economic growth of India.

The highest share in total export is of manufactured goods followed by primary goods. But it is also observed that from 2000-01, share of manufactured goods is continuously falling. On the other hand, from the same year the percentage share of petroleum products to total export is increasing continuously. It is also seen that over the periods 1991-92 to 2012-13, primary products experience fluctuations in its share to total export and the percentage of other exported goods constitutes a small share to the total export. The primary products are composed of agriculture and allied products and ores and minerals while the manufactured goods are composed of leather and manufactures, chemicals and related products, engineering goods, gems and jewellery, handicrafts, textile and textile products and other manufactured goods.

Total bulk imports are composed of petroleum, crude and products, bulk consumption goods which includes cereals and cereal preparations, edible oils, pulses etc. and other bulk imported items while the non-bulk imports are composed of capital goods, export related items which includes pearls and precious stones, organic and inorganic chemicals, textile yarn, fabrics,

made ups etc., and sugar, and finally other imported non-bulk items. It is observed that the share of non-bulk imports to total import is higher than the share of bulk imports to total imports. Under bulk imports share of petroleum, crude and products is the highest followed by other bulk items. The share of bulk consumption goods to total bulk imports is the lowest. It is also seen that under non-bulk imports, the share of capital goods is the highest followed by share of other items. Share of export related goods and other non-bulk imports experience fluctuations in its share to total non-bulk imports. Bulk consumption goods capture the lowest share in total imports

Impact of Trade on Economic Growth

Using non-stationary variables in the model might lead to spurious regression which cannot be used for precise prediction. Hence, our first step is to determine whether the variables have unit roots, that is, whether it is stationary and the order of integration. In order to identify the stationary of the variables under study Augmented Dickey-Fuller (ADF) test is applied. Table below shows the result of unit root test and the order of integration. It is seen that all the variables are stationary.

GDP Growth Parameters

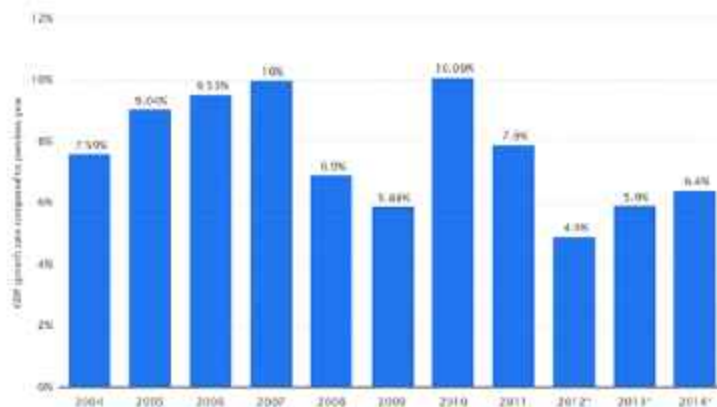


Figure 1.2 – Real GDP Growth (Source - Economic Times)

Analysts project India's GDP to reach double-digit growth and reach \$5-6 trillion in 5-10 years from \$2 trillion now. Since equity market tend to have a correlation with GDP in a longer time horizon, stocks would be the right choice to capture that growth.

The Indian equity market has been sluggish over the past one year, and the only two sectors that outperformed were consumer durables and healthcare & pharma themes. Going forward, economy-related themes like realty and infrastructure are expected to outperform other sectors in the long run.

Despite global headwinds, such as the uncertainty around US Fed rate hike and the overhang of China slowdown, analysts are confident that India would be able to revive its GDP growth in the coming years and outperform other emerging market economies.

In the past decades, FDI was concerned only with highly industrialized countries. US was the worlds largest recipient of FDI during 2006 with an investment of 184 million from OECD (Organization for Economic Co-operation and Development) countries. France, Greece, Iceland, Poland, Slovak Republic, Switzerland and Turkey also have a positive record in FDI investments.

Now, during the course of time, FDI has become a vital part in every country more particularly with the developing countries. This is because of the following reasons:

- Availability of cheap labor.
- Uninterrupted availability of raw material.
- Less production cost compared with other developed countries.
- Quick and easy market penetration.

The size of India's retail industry is expected to more than double to \$1.3 trillion by 2020, led by an estimated 25 percent average annual growth in organised retail if overseas investment is permitted in the sector, an industry body has said.

"The Indian retail is poised to become a \$1.3 trillion opportunity by 2020. With the current market size estimated at \$500 billion, this translates to an additional \$800 billion in the next eight years," said R.V. Kanoria, president of the Federation of Indian Chambers of Commerce and Industry (FICCI). [Source : India's retail industry to grow to \$1.3 trillion by 2020: FICCI]

FDI provides a win – win situation to the host and the home countries. Both countries are directly interested in inviting FDI, because they benefit a lot from such type of investment. The 'home' countries want to take the advantage of the vast markets opened by industrial growth. On the other hand the 'host' countries want to acquire technological and managerial skills and supplement domestic savings and foreign exchange.

Moreover, the paucity of all types of resources viz. financial, capital, entrepreneurship, technological know- how, skills and practices, access to markets- abroad- in their economic development, developing nations accepted FDI as a sole visible panacea for all their scarcities. Further, the integration of global financial markets paves ways to this explosive growth of FDI around the globe. Under the new foreign investment policy Government of India constituted FIPB (Foreign Investment Promotion Board) whose main function was to invite and facilitate foreign investment through single window system from the Prime Minister's Office. The foreign equity cap was raised to 51 percent for the existing companies. Government had allowed the use of foreign brand names for domestically produced products which was restricted earlier. India also became the member of MIGA (Multilateral Investment Guarantee Agency) for protection of foreign investments. Government lifted restrictions on the operations of MNCs by revising the FERA Act 1973. New sectors such as mining, banking, telecommunications, highway construction and management were open to foreign investors as well as to private sector.

The Scenario and Impact on Global Market

The rapid growth of world population since 1950 has occurred mostly in developing countries. This growth has not been matched by similar increases in per-capita income and access to the basics of modern life, like education, health care, or - for too many - even sanitary water and waste disposal.

FDI has proven — when skillfully applied — to be one of the fastest means of, with the highest impact on, development. However, given its many benefits for both investing firms and hosting countries, and the large jumps in development were best practices followed, eking out advances with even moderate long-term impacts often has been a struggle. Recently, research and practice are finding ways to make FDI more assured and beneficial by continually engaging with local realities, adjusting contracts and reconfiguring policies as blockages and openings emerge.

A recent meta-analysis of the effects of foreign direct investment on local firms in developing and transition countries suggests that foreign investment robustly increases local

productivity growth. The Commitment to Development Index ranks the "development-friendliness" of rich country investment policies.

As a part of the national accounts of a country, and in regard to the national income equation $Y=C+I+G+(X-M)$, I is investment plus foreign investment, FDI refers to the net inflows of investment (inflow minus outflow) to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, other long-term capital, and short-term capital as shown the balance of payments. It usually involves participation in management, joint-venture, transfer of technology and expertise. There are two types of FDI: inward and outward, resulting in a net FDI inflow (positive or negative) and "stock of foreign direct investment", which is the cumulative number for a given period. Direct investment excludes investment through purchase of shares. FDI is one example of international factor movements. Foreign direct investment is nothing but increase the country's economy.

Globalization can be described as 'a widening, deepening and speeding up of worldwide interconnectedness in all aspects of contemporary social life, from the cultural to the criminal, the financial to the spiritual' (Held and McGrew 1999:). FDI in China, also known as RFDI (renminbi foreign direct investment), has increased considerably in the last decade, reaching \$59.1 billion in the first six months of 2012, making China the largest recipient of foreign direct investment and topping the United States which had \$57.4 billion of FDI. During the global financial crisis FDI fell by over one-third in 2009 but rebounded in 2010.

International trade is the cross-border trade in goods and services. On these pages, it is measured by the sum of imports and exports, divided by the GDP of a national economy. The growth of international trade is a straightforward indication of economic globalization. When US residents, for example, read labels on their clothes showing they are made in China, Malaysia or Mexico, or decide to purchase a car made in South Korea, their sense of global connectedness is immediate.

Investment is the conversion of money into some form of property from which an income or profit is expected to be derived. Foreign direct investments (FDI) are flows of money into a country that purchase a lasting stake in an enterprise for a foreign investor. These investments are direct in the sense that the investor purchases ownership rights in a specific company, rather than in a portfolio of stocks held by a broker, say. FDI does not include short-term investments, portfolio investments or currency flows.

Foreign Direct Investment is an indication of growing transnational ownership of production assets. It is a leading edge of economic globalization in the sense that increasing foreign ownership of productive may give direct influence over livelihoods and production. The implications of foreign ownership of production may include both positive and negative elements, depending on the perspective of the observer. Foreign investment has often been an important avenue for the transfer of skills and technology. At the same time, foreign investment puts workers under foreign control, and leads to foreign appropriation of profits.

Implications and Limiting Factors In FDI

Foreign direct investment may be politically controversial or difficult because it partly reverses previous policies intended to protect the growth of local investment or of infant industries. When these kinds of barriers against outside investment seem to have not worked sufficiently, it can be politically expedient for a host country to open a small "tunnel" as a focus for FDI. The nature of the FDI tunnel depends on the countries or jurisdiction's needs and policies. FDI is not restricted to developing countries. For example, lagging regions in the France, Germany, Ireland,

and USA have for a half century maintained offices to recruit and incentivize FDI primarily to create jobs. China, starting in 1979, promoted FDI primarily to import modernizing technology, and also to leverage and uplift its huge pool of rural workers.

To secure greater benefits for lesser costs, this tunnel need be focused on a particular industry and on closely negotiated, specific terms. These terms define the trade offs of certain levels and types of investment by a firm, and specified concessions by the host jurisdiction. The investing firm needs sufficient cooperation and concessions to justify their business case in terms of lower labor costs, and the opening of the country's or even regional markets at a distinct advantage over (global) competitors. The hosting country needs sufficient contractual promises to politically sell uncertain benefits—versus the better-known costs of concessions or damage to local interests.

The benefits to the host may be: creation of a large number of more stable and higher-paying jobs; establishing in lagging areas centers of new economic development that will support attracting or strengthening of many other firms without so costly concessions; hastening the transfer of premium-paying skills to the host country's work force; and encouraging technology transfer to local suppliers.

Concessions to the investor commonly offered include: tax exemptions or reductions; construction or cheap lease-back of site improvements or of new building facilities; and large local infrastructures such as roads or rail lines; More politically difficult (certainly for less-developed regions) are concessions which change policies for: reduced taxes and tariffs; curbing protections for smaller-business from the large or global; and laxer administration of regulations on labor safety and environmental preservation. Often these un-politic "cooperation" are covert and subject to corruption. The lead-up for a big FDI can be risky, fraught with reverses and subject to unexplained delays for years. Completion of the first phase remains unpredictable — even after the contract ceremonies are over and construction has started. So, lenders and investors expect high risk premiums similar to those of junk bonds. These costs and frustration have been major barriers for FDI in many countries.

On the implicit "marriage" market for matching investors with recipients, the value of FDI with some industries, some companies, and some countries varies greatly: in resources, management capacity, and in reputation. Since, as common in such markets, valuations can be mostly perceptual, and then negotiations and follow-up are often rife with threats, manipulation and chicanery. For example, the interest of both investors and recipients may be served by dissembling the value of deals to their constituents. One result is that the market on what's hot and what's not has frequent bubbles and crashes.

Conclusion

It may be concluded that developing countries has make their presence felt in the economics of developed nations by receiving a descent amount of FDI in the last three decades. Although India is not the most preferred destination of global FDI, but there has been a generous flow of FDI in India since 1991. It has become the 2nd fastest growing economy of the world. India has substantially increased its list of source countries in the post – liberalization era. India has signed a number of bilateral and multilateral trade agreements with developed and developing nations. India as the founding member of GATT, WTO, a signatory member of SAFTA and a member of MIGA is making its presence felt in the economic landscape of globalised economies. The economic reform process started in 1991 helps in creating a conducive and healthy atmosphere for foreign investors and thus, resulting in substantial amount of FDI inflows in the country. No doubt, FDI plays a crucial role in enhancing the economic growth and development of the country.

Moreover, FDI as a strategic component of investment is needed by India for achieving the objectives of its second generation of economic reforms and maintaining this pace of growth and development of the economy. The government needs to provide financial institutions with additional regulatory powers to deal with rising NPAs (Non Performing Assets), which threaten to derail economic progress and increase the burden on their credit aspects. Over the study period it has been observed that total exports of India has increased after the adoption of New Economic policy in India. Although India is facing continuous deficit in its balance of payment but the overall prosperity is unbounded. In spite of fluctuations in GDP growth rate, the volume of trade is increasing day by day. The composition of India's exports has grown up significantly. The export of petroleum has shown a considerable increasing trend. Major portion of Indian exports is in manufactured goods. The composition of India's imports has also grown up significantly. It has also shown a positive and increasing trend during the period under study. The share of imports of petroleum and crude products and other non-bulk items have increased significantly while the imports of food grains and export related items have declined. The study also indicates that post liberalization era has certainly helped India in achieving high growth in the economy as there has been a rapid growth of imports of capital goods and technical raw materials to meet the requirement of industrialization and growing imports of petroleum products for meeting industrial and consumption requirement. It is also found that though import has a negative influence on economic growth, the volume of trade reflected by economic openness have a positive impact on the economic growth of India and its magnitude is increasing continuously.

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Key Trends of Foreign Direct Investments in India

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Abstract

The foreign or international trade refers to the exchange or transmission of goods, capital or specific services beyond the international territory with the prior authentication from the government authorities. The gross domestic product (GDP) of most of the countries is having key relationship with the international trade. If the historical scenarios are fetched, the international trade is not new and was being implemented even in thousands years back to improve and strengthen the relationship between the countries in terms of social, economical as well as political relations. A product or service that is transmitted to the international market refers as an Export while the Import refers to buying the product or service from beyond the international border. A recent meta-analysis of the effects of foreign direct investment on local firms in developing and transition countries suggests that foreign investment robustly increases local productivity growth. The Commitment to Development Index ranks the “development-friendliness” of rich country investment policies.

Key-Words : Foreign Direct Investment, FDI in India

Introduction

One of the most striking developments during the last two decades is the spectacular growth of FDI in the global economic landscape. This unprecedented growth of global FDI in 1990 around the world make FDI an important and vital component of development strategy in both developed and developing nations and policies are designed in order to stimulate inward flows. In-fact, FDI provides a win – win situation to the host and the home countries. Both countries are directly interested in inviting FDI, because they benefit a lot from such type of investment. The 'home' countries want to take the advantage of the vast markets opened by industrial growth. On the other hand the 'host' countries want to acquire technological and managerial skills and supplement domestic savings and foreign exchange.

Models and Theories of International Trade

- Adam Smith's model
- Ricardian model
- Heckscher–Ohlin model
- Gravity model
- Free-Trade Theory
- International production fragmentation trade theory
- Ricardo-Sraffa trade theory

- Neo-Ricardian trade theory

Moreover, the paucity of all types of resources viz. financial, capital, entrepreneurship, technological know-how, skills and practices, access to markets-abroad- in their economic development, developing nations accepted FDI as a sole visible panacea for all their scarcities. Further, the integration of global financial markets paves ways to this explosive growth of FDI around the globe. Under the new foreign investment policy Government of India constituted FIPB (Foreign Investment Promotion Board) whose main function was to invite and facilitate foreign investment through single window system from the Prime Minister's Office. The foreign equity cap was raised to 51 percent for the existing companies. Government had allowed the use of foreign brand names for domestically produced products which was restricted earlier. India also became the member of MIGA (Multilateral Investment Guarantee Agency) for protection of foreign investments. Government lifted restrictions on the operations of MNCs by revising the FERA Act 1973. New sectors such as mining, banking, telecommunications, highway construction and management were open to foreign investors as well as to private sector.

Foreign Direct Investment and The Globalization

As a part of the national accounts of a country, and in regard to the national income equation $Y=C+I+G+(X-M)$, I is investment plus foreign investment, FDI refers to the net inflows of investment (inflow minus outflow) to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, other long-term capital, and short-term capital as shown the balance of payments. It usually involves participation in management, joint-venture, transfer of technology and expertise. There are two types of FDI: inward and outward, resulting in a net FDI inflow (positive or negative) and "stock of foreign direct investment", which is the cumulative number for a given period. Direct investment excludes investment through purchase of shares. FDI is one example of international factor movements. Foreign direct investment is nothing but increase the country's economy.

Globalization can be described as 'a widening, deepening and speeding up of worldwide interconnectedness in all aspects of contemporary social life, from the cultural to the criminal, the financial to the spiritual' (Held and McGrew 1999:). FDI in China, also known as RFDI (renminbi foreign direct investment), has increased considerably in the last decade, reaching \$59.1 billion in the first six months of 2012, making China the largest recipient of foreign direct investment and topping the United States which had \$57.4 billion of FDI. During the global financial crisis FDI fell by over one-third in 2009 but rebounded in 2010.

International trade is the cross-border trade in goods and services. On these pages, it is measured by the sum of imports and exports, divided by the GDP of a national economy. The growth of international trade is a straightforward indication of economic globalization. When US residents, for example, read labels on their clothes showing they are made in China, Malaysia or Mexico, or decide to purchase a car made in South Korea, their sense of global connectedness is immediate.

Investment is the conversion of money into some form of property from which an income or profit is expected to be derived. Foreign direct investments (FDI) are flows of money into a country that purchase a lasting stake in an enterprise for a foreign investor. These investments are direct in the sense that the investor purchases ownership rights in a specific company, rather than in a portfolio of stocks held by a broker, say. FDI does not include short-term investments, portfolio investments or currency flows.

Foreign Direct Investment is an indication of growing transnational ownership of production assets. It is a leading edge of economic globalization in the sense that increasing foreign ownership of productive may give direct influence over livelihoods and production. The implications of foreign ownership of production may include both positive and negative elements, depending on the perspective of the observer. Foreign investment has often been an important avenue for the transfer of skills and technology. At the same time, foreign investment puts workers under foreign control, and leads to foreign appropriation of profits.

Completion of the first phase remains unpredictable — even after the contract ceremonies are over and construction has started. So, lenders and investors expect high risk premiums similar to those of junk bonds. These costs and frustration have been major barriers for FDI in many countries.

On the implicit “marriage” market for matching investors with recipients, the value of FDI with some industries, some companies, and some countries varies greatly: in resources, management capacity, and in reputation. Since, as common in such markets, valuations can be mostly perceptual, and then negotiations and follow-up are often rife with threats, manipulation and chicanery. For example, the interest of both investors and recipients may be served by dissembling the value of deals to their constituents. One result is that the market on what’s hot and what’s not has frequent bubbles and crashes.

Because ‘market’ valuations can shift dramatically in short times, and because both local circumstances and the global economy can vary so rapidly, negotiating and planning FDI is often quite irrational. All these factors add to the risk premiums, and remorse’s, that block the realization of FDI potential.

Most Attractive Location of Global FDI

It is a well-known fact that due to infrastructural facilities, less bureaucratic structure and conducive business environment China tops the chart of major emerging destination of global FDI inflows. The other most preferred destinations of global FDI flows apart from China are Brazil, Mexico, Russia, and India. The annual growth rate registered by China was 15%, Brazil was 84%, Mexico was 28%, Russia was 62%, and India was 17% in 2007 over 2006. During 1991-2007 the compound annual growth rate registered by China was 20%, Brazil was 24%, Mexico was 11%, Russia was 41% (from 1994), and India was 41%. India’s FDI need is stood at US\$ 15 billion per year in order to make the country on a 9% growth trajectory (as projected by the Finance Minister of India in the current Budget). Such massive FDI is needed by India in order to achieve the objectives of its second generation economic reforms and to maintain the present growth rate of the economy. India’s share in world FDI inflows has increased from 0.3% to 1.3% from 1990-95 to 2007. Though, this is not an attractive share when it is compared with China and other major emerging destinations of global FDI inflows.



Figure 1.1 – World FDI and India (Source: compiled from the various issues of WIR, UNCTAD, World Bank)

FIPB is mandated to play an important role in the administration and implementation of the Government's FDI policy. It has a strong record of actively encouraging the flow of FDI into the country through speedy and transparent processing of applications, and providing on-line clarification. In case of ambiguity or a conflict of interpretation, the FIPB has always stepped in with an investor-friendly approach. The e-filing facility is an important initiative of the Secretariat of the FIPB to further enhance its efficiency and transparency of decision making. Any suggestions to improve the e-filing system and FIPB procedure are welcome.

Starting from a baseline of less than \$1 billion in 1990, a recent UNCTAD survey projected India as the second most important FDI destination (after China) for transnational corporations during 2010–2012. As per the data, the sectors that attracted higher inflows were services, telecommunication, construction activities and computer software and hardware. Mauritius, Singapore, US and UK were among the leading sources of FDI. Based on UNCTAD data FDI flows were \$10.4 billion, a drop of 43% from the first half of the last year. India disallowed overseas corporate bodies (OCB) to invest in India.

On 14 September 2012, Government of India allowed FDI in aviation up to 49%, in the broadcast sector up to 74%, in multi-brand retail up to 51% and in single-brand retail up to 100%. The choice of allowing FDI in multi-brand retail up to 51% has been left to each state. But Government of India does not allow foreign e-commerce companies to pick-up 51% stake in multi-brand retail sector in business-to-consumer space citing regulatory issues, problems in checking inter-state transactions in e-commerce activities.

In its supply chain sector, the government of India had already approved 100% FDI for developing cold chain. This allows non-Indians to now invest with full ownership in India's burgeoning demand for efficient food supply systems. The need to reduce waste in fresh food and to feed the aspiring demand of India's fast developing population has made the cold supply chain a very exciting investment proposition.

Foreign investment was introduced by Prime Minister Manmohan Singh when he was finance minister (1991) by the government of India as FEMA (Foreign Exchange Management Act). This has been one of the top political problems for Singh's government, even in the current (2012) election.

FDI Inflows by Sector

Cumulative FDI inflows reached just over US\$60 billion between August 1991 and July 2007. Since 2002, some sectors such as electrical equipment, services, drugs and pharmaceuticals, cement and gypsum products, metallurgical industries have also been doing very well in attracting FDI. The electrical equipment sector and the services sector in particular received the largest shares of total FDI inflows between August 1991 and July 2007. These were followed by the telecommunications, transportation, fuels, and chemicals sectors. The Department of Industrial Policy and Promotion has recently modified the classifications of the sectors and data released from August 2007 has been based on the new sectoral classifications.

According to that classification, the top performers are the services and computer software & hardware sectors. Clearly, India has attracted significant overseas investment interest in services. It has been the main destination for off-shoring of most services as back-office processes, customer interaction and technical support (UNCTAD, 2007). Indian services have also ventured into other territories such as reading medical X-rays, analyzing equities, and processing insurance claims. According to some reports, however, increasing competition is making it more difficult for Indian firms to attract and keep BPO employees with the necessary skills, leading to increasing wages and other costs.

Table 1.1 – Evaluation of the Countries by the International Trade

Country	Foreign Trade (Billion Dollars)
European Union	4,485.00
China	4,201.00
United States	3,944.00
Germany	2,866.00
Japan	1,522.40
France	1,212.30
United Kingdom	1,189.40
South Korea	1,170.90
Hong Kong	1,088.40
Netherlands	1,041.60
Italy	948.6
Canada	947.2
India	850.6
Russia	844.2
Singapore	824.6
Mexico	813.5
Switzerland	721.8
UAE	676.4
Belgium	663.6
Spain	655.2
Taiwan	595.5

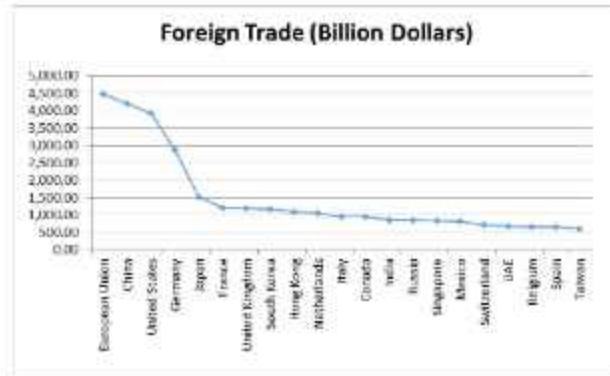


Figure 1.2 - Evaluation of the Countries by the International Trade

Significance

Foreign Direct Investment includes the cross border investment, where foreign assets are invested

into the organizations of the domestic market excluding the investment in stock. FDI brings the private funds from overseas into products or services. The domestic company in which foreign currency is invested is usually being controlled by the investing foreign company. Many policy makers and academics contend that foreign direct investment (FDI) can have important positive effects on a host country's development effort. In addition to the direct capital financing it supplies, FDI can be a source of valuable technology and know-how while fostering linkages with local firms, which can help jumpstart an economy. Based on these arguments, industrialized and developing countries have offered incentives to encourage foreign direct investments in their economies. This work highlights the impact and future prospects of FDI in the Indian Market. The work enlighten the spectrum and scintillation of the foreign direct investment in India Foreign direct investment is in contrast to portfolio investment which is a passive investment in the securities of another country such as stocks and bonds.

Conclusion

Foreign direct investment can take on many forms and so sometimes the term is used to refer to different kinds of investment activity. "Commonly foreign direct investment includes "mergers and acquisitions, building new facilities, reinvesting profits earned from overseas operations and intra-company loans." However, foreign direct investment is often used to refer to just building new facilities or Greenfield investment, creating figures that although both labeled FDI, can't be side by side compared. The foreign or international trade refers to the exchange or transmission of goods, capital or specific services beyond the international territory with the prior authentication from the government authorities. The gross domestic product (GDP) of most of the countries is having key relationship with the international trade. If the historical scenarios are fetched, the international trade is not new and was being implemented even in thousands years back to improve and strengthen the relationship between the countries in terms of social, economical as well as political relations.

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Enhanced Sensing Performance of Relative Humidity Sensors Based on Mn/KIT-6 Hybrid Nanocomposite

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In this work, we report a hydrothermally synthesized hybrid nanocomposite Mn/KIT-6 material for relative humidity (%RH) sensing at room temperature. The hybrid nanocomposite Mn/KIT-6 material possess mesoporous structure, high surface area and pore volume which is characterized by the Powder X-ray Diffraction, High Resolution Transmission Electron Microscopy and N₂ adsorption-desorption method. Humidity sensing performance of the nanocomposite sensor shows an excellent response (9 s) recovery (12 s) with a negligible hysteresis and long-term stability in the range of 11–98 %RH. A 4.5 orders magnitude change in resistance was observed over complete %RH range. This work demonstrates that hybrid nanocomposite Mn/KIT-6 materials be a tread in the advancement of excellent humidity sensor exhibiting exceptional sensing features.

Keywords: Relative Humidity, Sensor, Nanocomposite, Hydrothermal Synthesis, KIT-6.

1. INTRODUCTION

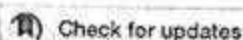
The ability of mesoporous sensors in detecting and controlling humidity plays an important role in our daily routine like electronics, food processing, paper/packaging, pharmaceutical/medical industries and environmental fields [1–3]. During the last few decades, various metal oxides and mesoporous silica's like (Santa Barbara Amorphous) SBA-15, SBA-16 and (Korea Advanced Institute of Science and Technology) KIT-6, etc. with the fine 2D and 3D structure and immense surface area have gained significant attention in the development of high-performance humidity/gas sensors [4–7]. The new generation sensors are expected to have fast response and recovery time, high sensitivity and selectivity, wide range of operating temperature, low hysteresis, good linearity and stability. In order to meet these characteristic several materials such as ceramics, electrolytes, organic and inorganic hybrid composites and metal oxide have been reported [8–11]. However, it is very difficult for a single polymeric material possess low cost and easy production to accomplish all the

needs of high performance RH sensor. On the other hand, a hybrid composite material based RH sensors exhibit excellent chemical and thermal stability with a good linearity. Regardless of the sensing principle, most RH sensors are based on the interaction of water molecules with the surface of solid material [12, 13]. Extensive efforts have been directed towards the rational design and fabrication of humidity sensors possessing high sensing characteristics with the exposure of highly ordered mesoporous silicas.

It has been recently reported by many researchers that the mesoporous materials because of their large surface area, performs very well against the relative humidity sensing [14–16]. KIT-6 is getting special attentions from researchers in applications like catalysis, optical devices, medical diagnosis, nanomaterials fabrication and sensors [7, 17, 18]. The highly porous structure of KIT-6 increases the adsorption efficiency of water molecules and long uniform pore channels provide an easy path for free travelling of charged ions in the mesoporous framework [19, 20]. In spite of these characteristics, pure KIT-6 does not show a better RH response in high humidity conditions [4]. In order to enhance the sensing properties of RH sensors, metallic nanoparticles (Zn, Mn, NaCl, SnO₂,

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Aero-gel based CeO₂ nanoparticles: synthesis, structural properties and detailed humidity sensing response

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In this work, we present aero-gel based cerium oxide (CeO₂) nanoparticles for the relative humidity (%RH) sensing application. X-ray diffraction (XRD) and N₂ adsorption-desorption isotherms revealed that the synthesized CeO₂ nanoparticles (NPs) possessed a face centered cubic (fcc) structure with a high surface area (268 m² g⁻¹). The high resolution transmission electron microscopy (HRTEM), scanning electron microscopy (SEM), and selected area electron diffraction (SAED) studies confirmed that the shape of CeO₂ NPs was spherical and they possessed a polycrystalline nature. X-ray photoelectron spectroscopy (XPS) studies revealed the presence of both trivalent (Ce³⁺) and tetravalent (Ce⁴⁺) oxidation states of ceria. The CeO₂ NPs' response towards %RH was explored by measuring the important sensing attributes (response/recovery, linearity, hysteresis, repeatability and stability) at 11–98%RH and at room temperature. An impressive impedance change of 4.5 orders of magnitude was observed along with a swift response (4.6 s) time and rapid recovery (2.7 s) time. Moreover, the prepared sensor showed negligible hysteresis, excellent stability and good reversible response in the complete 11–98%RH range.

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1. Introduction

During the last two decades, metal oxides with a fine structure and immense surface area have attracted noteworthy attention for the development of high-performance humidity/gas sensors.^{1–3} Sensors are electronic devices showing an exclusive performance to generate innovative ways for the comfortable life by acting as a bridge between digitalization and modernity.^{4,5} Humidity measurement and control remain as a research hotspot due to its adverse effect on many manufacturing processes in the industries like semiconductor, aviation, textile, paper, automobile, and food, and in chemical monitoring, agriculture, climatology and

pharmaceutical field.^{6,7} In order to control the humidity levels, a variety of relative humidity (%RH) sensors based on different materials (metal oxides, silica, organic-inorganic nanohybrids, polymers, carbon based materials and electrolytes) have been produced by following state of the art micro-fabrication technologies.^{8,9} However, the utility of these sensors is highly dependent on the distinctiveness of materials and they have their own advantages and specific conditions of applications. In the process of quality control or environmental monitoring, the ideal %RH sensor should acquire desirable attributes, such as high sensitivity, linear response, fast response/recovery, high stability, low hysteresis, wide humidity range, room temperature operation, reasonable size/mass and low cost.^{10,11} In the quest for the development of high performance %RH sensors, materials possessing high surface area with diverse morphologies, such as nanoparticles, nanorods, nanowires, nanofibers, nanocubes, nanowires and conducting nanofibers have been synthesized.^{12,13} Muckley *et al.* prepared 2D Ti₃C₂ MXene that demonstrated an impedance change of 3 orders of magnitude in 0.1–95%RH range.¹ In another work, Wang *et al.* developed %RH sensors using carbon nanocoils (CNCs) on a flexible liquid crystal polymer substrate, which displayed a fast response time (1.9 s) and recovery time (1.5 s), a broad RH detection range (4–95%), linearity, repeatability and stability.² Similarly, Pan *et al.* had prepared a heterojunction of ZnO/porous

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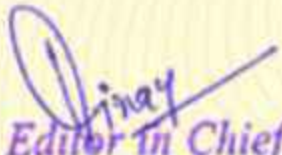
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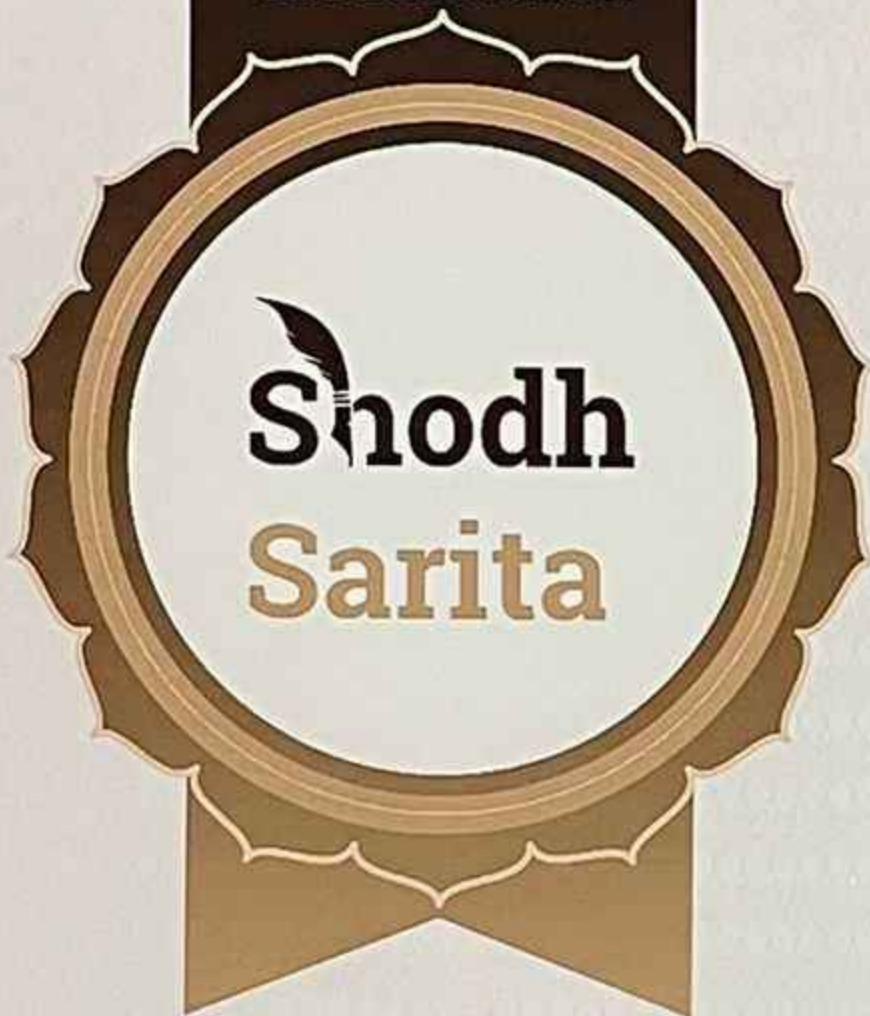
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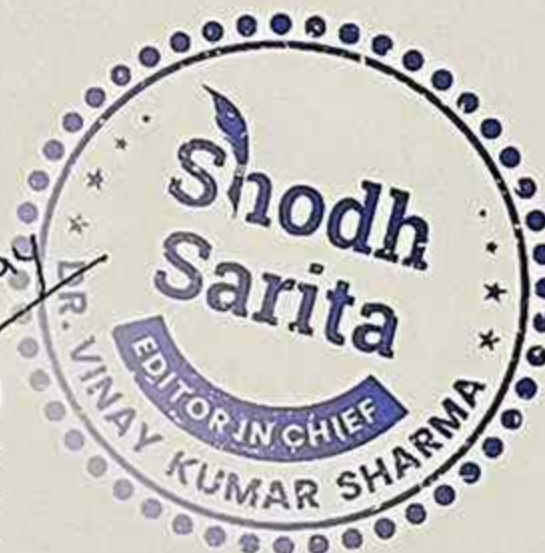
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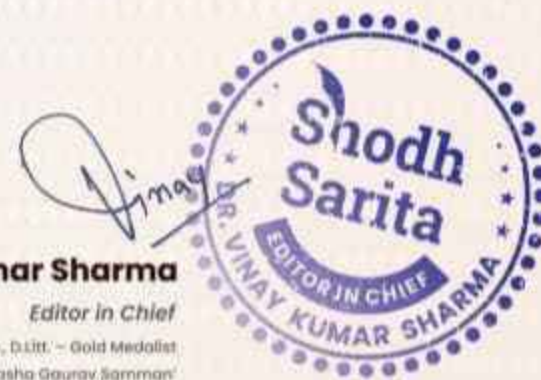
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संपादक

डॉ. आशीष कंधवे

Identity
Subjectivity in
Laxmi
Narayan
Tripathi's *Me
Hijra, Me
Laxmi*

—Neetu Kundu
—Dr. Anu Rathee

The identity term itself is complicated to describe as it has manifolds; everyone has their thoughts and personality, which never match others' expectations. Society sets many parameters to define identities, like caste, class, family, religion, and sexuality. Community plays a crucial part in determining identities and acceptance of the person.

Abstract

Humankind makes a difference and supports individuals who need caring love, help, and attention. Literature comprehends shaping our behavior and human nature. One of the concerned social issues within India alarming the country's progress is 'the identity of transgender.' Nowadays, across the world, people have started raising their voices against the injustice done to transgender. Transgender people do not fit the gender binary of male and female society. Transgender people have been with us since the ancients, but till the day, they are not accepted because of their uniqueness created by god. Transgender (unique gender) identity is known as 'Third Gender.' The issues, challenges, and problems they faced were neglected before, but now they are supported by familiar people and the government. The transgender community is rejected chiefly and excluded from any social, political, or cultural activity and mainly marginalized and excluded because of their identity. This paper will specifically look upon the issue of identity faced by the third gender in their daily routine. The paper looks at Laxmi Narayan Tripathi's autobiography *Me Hijra, Me Laxmi*, as a critical intercession in the identity discourse. The paper aims to bring into viewpoint the plight of the third gender. The objective of this paper is to prospect the identity questions done to transgender people in the light of the autobiographical work *Me Hijra, Me Laxmi*. The present paper will also define third-gender culture, life, pain, desires, trauma, exclusion, experience, and silence faced by them and the behavior of how people treat them.

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संपादक
डॉ. आशीष केशव

Exploring Space, Identity and Family Values in Vivek Shanbagh's *Ghachar Ghochar*

-Manisha
-Dr. Anu Rathee

The mass population of Haryana has preserved their classical social traditions in the form of folk songs and they participate in these songs with an unparalleled delight. Also, the celebration of different festivals with boundless enthusiasm and traditional fervor represents the significant influence of cultural history on its subjects.

Abstract:

Shanbagh's critically acclaimed novella, *Ghachar Ghochar*, has been translated by Srinath Perur from Kannada to English. The title *Ghachar Ghochar* precisely summarises the Narrator's status quo. This paper attempts to explore the concepts of space identity and family values as presented by Shanbagh in his psychological novella *Ghachar Ghochar*. This novella showcases that identity cannot be defined in concrete terms and is subject to various factors. This paper also aims to comprehend the parallel between the physical and the psychological space of the characters in the novella.

Keywords: space, identity, family, violence, values.

Introduction

Vivek Shanbagh is an Indian fiction writer and playwright who writes in Kannada. He has to his credit- five short story collections, two dramas, and three novels. He has also edited two anthologies. Shanbagh primarily writes in Kannada, but his works have been translated into English and other Indian languages. Shanbagh's writings have appeared in *Granta*, *Seminar*, *Out of Print* and *Indian Literature*. Many of Shanbagh's stories have been adapted for the stage, and "Nirvana" has been adapted into a short film. He founded the pioneering Kannada literary journal *Desha Kaala* and edited it for seven years.

Shanbagh's critically acclaimed novella, *Ghachar Ghochar*, has been translated by Srinath Perur from Kannada to English. The title *Ghachar Ghochar*

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संपादक

डॉ. आशीष कंधवे

Perceiving
Marriage
Through
Virmati's Life
in Manju
Kapur's
*Difficult
Daughters*

-Prikshit Singh
-Dr. Naresh Rathee

As a way out of an unfulfilling marriage, the professor's connection to her is also a source of isolation and confinement because of the way their relationship is kept under wraps. It takes a long time to build the self-confidence essential to develop one's own business.

Abstract

Marriage creates a hole in life, nothing more than a confused sense of loss. This sense of identity crisis and the resulting anxiety has been critical for the contemporary woman's existential perspective. This quest for identification serves as the novel's leitmotif. Her heroine is befuddled; she is always on the run from what she does not understand. She engages in a crazy race, whether in her educational pursuits or marital modifications. She lacks focus in her head. Regrettably, she encounters discord and failure. Her existence crumbles under the weight of illusions, disappointments, social expectations, and an unknown future, all of which wreak havoc on her brain. This explains her scepticism toward established social standards and even against existence. It allows her to rebel against societal and family norms and pursue her identity search.

Keywords: Marital, Modifications, Disappointments, Indomitable, Family, Identity.

Manju Kapur exposes patriarchal society's constraints and praises women's rebellion against conventions and restrictions. *Difficult Daughters* (1998) is the story of Virmati, a woman from an 'austere household' who demonstrates indomitable courage in defying her parents' and family's authority to marry Harish, an Oxford-educated professor, and father of two children; but who reveals herself to be a pale, insipid shadow of a woman when it comes to asserting herself before her lover. The eternal female aspires to be like her man, whereas the eternal male is concerned with his wants and desires. Harish's behaviour from the start indicates that Virmati is a means to a goal. Throughout her struggle to preserve

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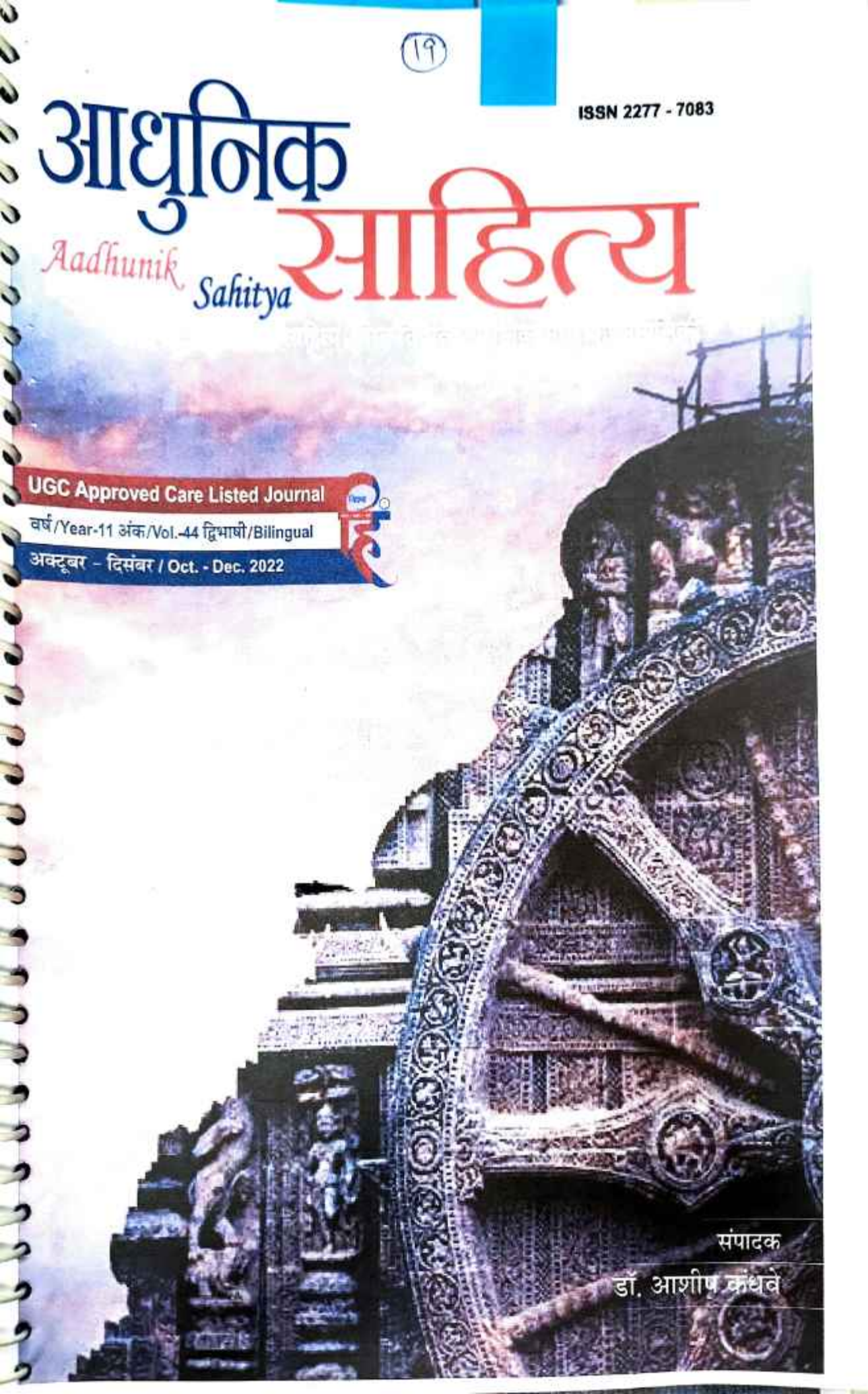
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संपादक

डॉ. आशीष कंधवे



Exploring the Cultural Consciousness: A Study of Sudha Murthy's *Doller Bahu*

—Monika

✓—Dr. Naresh Rathee

Many Indian writers try to depict social and cultural realities through their writings. Sudha Murthy is a well-known educator and author who has contributed a lot to Indian English writings by picking up the themes related to social, cultural, and economic concerns.

Abstract

Culture plays an essential part in the growth of society. Culture reflects social ideology, political discourses, historical structure, and all the practices people share in any community. Sudha Murthy, the contemporary writer in Indian writings, is famously known for her social works and community service. As a writer, she cherishes and celebrates the richness of long-established Indian values or reflects the traditional sensibilities, religious beliefs, and mythologies in almost all her works. The paper aims to analyze her select work's social and cultural phenomena. The study will be a comprehensive attempt to discover the cross-cultural conflicts and identity crises through the characters of *Doller Bahu*. The paper is an effort to study Sudha Murthy's *Doller Bahu* from the standpoint of cultural theory and social-psychological dimension.

Keywords: cultural consciousness, positionality, identity crisis, cultural conflict.

Introduction: -

The word culture originates from the Latin "Colere," which means "to cultivate." Culture is an umbrella term that accommodates ideology, habits, norms, systems, beliefs, attitudes, ideas, and symbols. According to Milton Bennett,

Cultural studies are concerned with all the practices, institutions, and systems of classification through which there are inculcated in particular population values, beliefs, competencies, routines of life, and habitual forms of conduct (Bennett, 1998:28).

In other words, culture means sharing the same history and thoughts. Culture is essential for human

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