

KUMAUN UNIVERSITY NAINITAL



Directorate of Research & Extension

INFORMATION BROCHURE

for

Ph. D. Entrance Test & Admissions
2009-2010
and
Research Ordinance-2009

Prof. V.P.S. Arora
Vice Chancellor



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Message

I am delighted to learn that the Directorate of Research and Extension of Kumaun University is publishing the Information Brochure containing the Kumaun University Research Ordinances, rules and regulations for the purpose of admissions to various Ph.D. programmes of the University along with other details such as syllabi of various subjects for the Entrance Test. Keeping in view the directions issued by the University Grants Commission, I am sure that this process will certainly help in enhancing the qualitative research work in various departments of the University.

On this auspicious occasion, I congratulate Prof. C.S. Mathela, Director Research and Extension and his team in the Directorate. I also send my good wishes to all aspiring candidates who are appearing in the entrance test.

(V.P.S.Arora)

Nainital
Dated: 24.2.2010

Introduction

Kumaun University, established in 1973, is comprised of three campuses at Nainital, Almora and Bhimtal at present. It has been accredited by NAAC in 2000 at four star level and is member of Association of Indian Universities. It has the faculties of Arts, Science, Commerce & Management, Education, Law, Medicine and Technology. Most of the teaching departments under these faculties have facilities for carrying out research in different fields of interest. Chemistry, Botany & Forestry, Geology, Physics and Geography had or still have FIST programmes of Department of Science & Technology, Government of India and have research projects from various funding agencies. Chemistry has an Advanced Centre for Researches on Aromatic & Medicinal Plants. Geology and Physics have been recipients of SAIP & DSA Programmes of UGC. The Geography department has NRDMS Centre at SSJ Campus.

Over two dozen UG and PG colleges besides Professional Institutes are affiliated to the Kumaun University. The teaching faculties of about one dozen affiliated colleges are also involved in supervising research leading to Ph.D. degree of Kumaun University.

The details of the teaching faculty members involved in researches in the University campuses along with the possible number of vacancies under different research supervisors and their specializations/ topics of research are give in this brochure. Based on the information received from the Principals of affiliated colleges, the information on the vacancies for admission in research along with subjects etc. have also been given. This shall help the candidates in deciding about their place of work. While all care has been taken in compiling the information received from different Campus Departments and affiliated colleges, some changes in the number of vacancies and supervisors may take place because of changes in the teaching staff.

The syllabi of different subjects along with the Entrance Test Form and general information about the conduct of examination are also given in this Brochure.

The Application Form along with the Brochure is available from the University office. The candidates may also wish to down load the the Form and related information from the Kumaun university Website.

I wish the candidates good luck in their efforts for admission for research degree (Ph.D.) of Kumaun University.

February 20, 2010

Professor C.S. Mathela
Director
Research & Extension
Kumaun university

Preface

The University Grants Commission enacted regulations called UGC (Minimum Standards and Procedure for award of M.Phil./ Ph.D. degree), Regulations 2009 vide a notification in the Gazette of India, dated July 17, 2009 which is applicable to every university established or incorporated by or under a Central Act, Provincial Act or a State Act, every institution including a constituent or affiliated college recognized by the Commission or every institution deemed to be an university. Keeping this in view, the Kumaun University has framed and implemented new Research Ordinances called 'Kumaun University Research Ordinance-2009'.

As provided in the Ordinance, the admissions shall be made through the Entrance Test to be conducted by the university.

The entrance test is being conducted on 28th of March. The details of the syllabi etc. are given in this brochure which would also be available in the Kumaun University website for the convenience of the candidates.

February 20, 2010

**Sudhir Budhakoti
Registrar
Kumaun University
Nainital**

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- B. Details of vacancies for admission to Ph. D. degree
 - 1. DSB Campus, Nainital
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 - 3. Affiliated College
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- 1 चित्रकला एवं विजुअल आर्ट्स
- 2 Economics
- 3 English
- 4 Geography
- 5 हिंदी
- 6 History
- 7 Political Science & Public Administration
- 8 Psychology
- 9 Sanskrit
- 10 Sociology

FACULTY OF COMMERCE AND MANAGEMENT

- 1 Management
- 2 Commerce

FACULTY OF SCIENCE

- 1 Botany
- 2 Biotechnology
- 3 Chemistry
- 4 Computer Science
- 5 Forestry
- 6 Geology
- 7 Information Technology
- 8 Mathematics
- 9 Physics
- 10 Statistics
- 11 Zoology

FACULTY OF LAW

FACULTY OF EDUCATION

D. KUMAUN UNIVERSITY ORDINANCES – 2009 for Ph.D., D.Litt. and D.Sc. degree Programme

E. Directorate of Research & Extension

F. Important Phone Numbers

Important Information Concerning the Entrance Test

1. Written Test: 100 marks; Duration of Examination: 2hrs
Subject knowledge (objective / multiple – choice type)

(a) Paper shall contain **100 questions** with **no negative marking**.

(b) **Reservation Policy of the state of Uttarakhand** shall be followed.

A candidate who has qualified NET-JRF or equivalent national test or hold M. Phil degree shall be considered for direct admission but shall apply by filling the form within due date.

2. There shall be a **single paper** (on the concerned subject) of **2 hours duration** ..
 3. Examination shall be conducted on **28th March, 2010** at **DSB Campus, Nainital** at **1-3 PM**.
 4. The candidates may **procure the Admission Form** along with the Brochure from the Kumaun University office **after 8th March, 2010** or preferably **down-load** the application form from the **University website**.
 5. The **last date of the receipt of the applications** in the university office, complete in all respect (including the **bank draft of Rs. 2000/-**), is **22nd March, 2010**.
 6. The **Admit Cards** may be collected by the candidates on the day of examination **i.e. 28th March, 2010 between 9AM and 12 Noon from the counters at DSB Campus, Nainital**. The candidates, if they wish, may also collect the **Admit cards from the university office after 24th March, 2010**.
 7. The **candidates are advised to frequently visit the university website**. The details about the examination etc., shall be communicated through the website.
- 8. Eligibility Criteria**
- (a) A candidate for the Ph.D. degree must have a Master's degree of the Kumaun University (hereafter referred to as University) or of any other University incorporated by the law in force and recognized by the Executive Council; provided also that the candidate either,
 - (i) has secured at least fifty five percent (55%) marks or a grade point average equivalent of 55% marks at the Master's Degree examination. For S.C./S.T. Candidates, the minimum marks shall be 50%.
 - or
 - (ii) is a regularly appointed teacher in the University or a College affiliated to the University.
 - or
 - (iii) M. Phil in the subject concerned.
 - (b) A Candidate shall ordinarily be permitted to work for the Ph.D. Degree in the subject in which he/she has obtained Master's Degree, but also that research work leading to Ph.D. Degree may be allowed in allied subjects in the same or an other Faculty, if the Research Degree Committee (RDC) concerned is satisfied that the candidate possesses the requisite qualifications to take up the proposed work. Allied subjects for the above stated purpose must have been approved by the Academic Council of the University.

Kumaun University, Nainital

Application form for Research Degree Entrance Test- 2009

Note: The candidates are required to go through the information brochure before filling the form.

Admission Category (Tick \checkmark the appropriate box)

RDET

RDET Exempted

Name of the Subject for Ph. D. degree

Affix a
Photograph of
passport size
attested by a
gazetted officer

1. Name of the Candidate.....

2.

3. Father's Name.....

4. Date of Birth.....

5. Nationality.....

6. Permanent Address (in BLOCK Letters)

.....Pin.....

Phone.....Mobile.....

7. Mailing Address (in BLOCK Letters)

.....Pin.....

Phone.....Mobile.....

8. Category: Please tick (\checkmark) the appropriate box.

General

OBC

SC

ST

8. Academic Qualification (Attach self attested copies of all supported documents):

Exam Passed	Board/ University	Year	Max. Marks	Mark obtained	% of Marks	Division / Grade	Subject offered
High School							
Inter (10+2)							
B.A./B.Sc./B.Com./ B.C.A./ B.B.A.							
M.A./M.Sc./M.Com. /M.C.A./M.B.A./ L.L.M.							
M.Phil.							
NET/SLET/GATE							
Any Other							

9. Declaration by the Candidates

I..... an applicant for Ph.D. programme do hereby solemnly affirm that all the particulars given by me in the application above are true. I have carefully read and understood the terms and condition laid down in the brochure and agree to abide by them. I have satisfied myself that I fulfill all the eligibility requirement for this test. If at any stage it is found that I do not fulfill the admission eligibility requirement then my claim for admission shall automatically stand cancelled.

Place.....

Date.....

Attestation by
Head of the Institute (Present or
Last attended)/ Gazetted Officer

(Signature of candidate)

Attach Demand Draft of Rs. 2000/- in favour of Finance officer, Kumaun University, Nainital.

Procedure for Admission

The candidates shall be selected for registration into the Ph.D. degree (i) Through Research Entrance Test (RDET), or (ii) Direct Admission (without appearing in RDET). Procedure for admission will be as follows:

(i) Through Research Entrance Test (RDET):

Written Test: 100 marks; Duration of Examination: 2hrs

Subject knowledge (objective / multiple – choice type)

- (a) Paper shall contain **100 questions** from the syllabus and each question shall carry one mark with **no negative marking**.
- (b) No scrutiny / revaluation of the answer sheet of the written test shall be conducted.
- (c) The **Qualifying Percentile of Marks** in the entrance examination **would be 50**.
- (d) Admission to the Ph.D. programme in each subject shall be made strictly according to RDET merit against the available seats in the concerned subject in the university campus and affiliated colleges.
- (e) **Reservation Policy of the state of Uttarakhand** shall be followed.

(ii) Direct Admission (Without appearing in RDET):

A candidate who has qualified NET-JRF or equivalent national test or hold M. Phil degree shall be considered for direct admission to the Ph. D. programme without appearing in Research Degree Entrance Test (RDET) but shall apply by filling the form within due date.

Other Information Concerning the Entrance Test

9. There shall be a single paper (on the concerned subject) of **2 hours duration**.
10. The question paper shall be based on the Syllabus of the concerned subject.
11. Examination shall be conducted on **28th March, 2010** at **DSB Campus, Nainital** at **1-3 PM**.
12. Admissions shall depend upon the vacancies at the Campus/ department/ / college concerned which may change depending upon the expertise and facilities available there.
13. The candidates may procure the Admission Form along with the Brochure from the Kumaun University office or down-load the application form from the University website.
14. The **last date of the receipt of the applications** in the university office, complete in all respect, is **22nd March, 2010**.
15. The **Admit Cards** may be collected by the candidates on the day of examination **i.e. 28th March, 2010 between 9AM and 12 Noon from the counters at DSB Campus, Nainital**. The candidates, if they wish, may also collect the Admit cards from the university office after **24th March, 2010**.
16. The candidates are advised to frequently visit the university website. The details about the examination etc., shall be communicated through the website.

List of documents to be enclosed with the application form

1. Self attested copies of mark-sheets and certificates
2. Certificate in support of reservation category
3. Self attested copy of NET-JRF etc.
4. Character certificate from the institution last attended.

Details of vacancies for admission to Ph. D. degree (DSB Campus, Nainital) 2009-2010

FACULTY OF ARTS

1. Department of Economics:

S. No.	Name of the Faculty Member	Specialization	Vacancies
1.	Prof. Nrimala Bora	Agricultural Economics	06
2.	Prof. R.S. Jalal	Rural Credit & International Economics	06
3.	Prof. Rajnish Pandey	Labour Economics	07
4.	Dr. M.C. Pant	Local Finance	04
Total			23

2. Department of English:

S. No.	Name of the Faculty Member	Specialization	Vacancies
1.	Prof. R.K. Rastogi	Literary theory & E.L.T.	05
2.	Prof. H.P. Shukla	Overhead Poetry	07
3.	Prof. Rajnish Pandey	19 th Century American Fiction	08
Total			20

3. Department of Geography:

S. No.	Name of the Faculty Member	Specialization	Vacancies
1.	Prof. G.L. Shah	Regional Development/ Remote Sensing & G.I.S. Applications	04
2.	Prof. P.C. Tiwari	Environmental & Natural resource Management/ Land use Planning/ Disaster Management/ Rural Development/ Climate Change/ Food, Livelihood & Gender Issues/ R.S. & G.I.S. Applications	08
3.	Dr. Anita Pande	Environmental Geomorphology/ Landuse Planning/ R.S. & G.I.S.	03
Total			15

4. Department of Sociology:

S. No.	Name of the Faculty Member	Specialization	Vacancies
1.	Prof. S. S. Pandey	Studies on rural society	06
2.	Prof. Indu Pathak	Studies on gender and weaker section	03
3.	Prof. D. S. Bisht	Rural Society	04
4.	Dr. Jyoti Joshi	Tribal and Gender Society	06
Total			19

5. Department of Political Science:

S. No.	Name of the Faculty Member	Specialization	Vacancies
1.	Dr. M. Padalia	Indian administration, western thought	03
2.	Dr. Neeta Bora Sharma	Indian Political system/ International politics	05
3.	Dr. M. kumar	International Politics/ Comparative politics	06
4.	Dr. R. Pant	Indian Political System	02
Total			16

6. Department of history:

S. No.	Name of the Faculty Member	Specialization	Vacancies
1.	Dr. A. K. joshi	Modern Indian History with special emphasis on journalism, urban studies, health and hygiene under British rule, Social changes in Uttarakhand	02
2.	Dr. Girija Pandey	Modern Indian History with special emphasis on environmental History, History of Science and Technology, regional studies	01
3.	Dr. Sanjay Ghildiyal	Modern Indian History, peasant movements, histereography	06
Total			09

7. Department of Hindi:

S. No.	Name of the Faculty Member	Specialization	Vacancies
1.	Prof. Neeraja Tandon	-	01
2.	Prof. Uma Bhatt	-	03
3.	Prof. Madhubala Nayal	-	03
4.	Prof. Manavendra Pathak	-	05
5.	Prof. Chandrakala Rawat	-	05
6.	Dr. Nirmala Dhaila	-	03
7.	Dr. Shreesh mourya	-	02
8.	Dr. Shubha Matiyani	-	04
Total			26

8. Department of Sanskrit:

S. No.	Name of the Faculty Member	Specialization	Vacancies
1.	Prof. Kiran Tandon	-	10
2.	DR. Jaya Tewari	-	08
3.	Prof. D.R. Tripathi	-	09
Total			27

FACULTY OF SCIENCE**1. Department of Geology:**

S. No.	Name of the Faculty Member	Specialization	Vacancies
1.	Prof. C.C.Pant	-	07
2.	Prof Santosh Kumar	-	06
3.	Prof. A.K.Sharma	-	08
4.	Dr. G. K. Sharma	-	05
5.	Dr. P. D. Pant	-	05
6.	Dr. Pradeep Goswami	-	04
7.	Dr. Rajeev Upadhyay	-	04
8.	Dr. S. N. Lal	-	03
9.	Dr. B. S. Kotlia	-	04
Total			46

2. Department of Physics:

S. No.	Name of the Faculty Member	Specialization	Vacancies
1.	Dr. H. C. Chandola	High Energy Physics	04
2.	Dr. Sanjay Pant	Spectroscopy (Experimental)	01
3.	Dr. Suchi Bisht	High Energy Physics	01
4.	Dr. Bimal Pandey	High Energy Physics/ Solar Physics (theoretical)	02
5.	Dr. Alok Durgapal	Astrophysics (Observational)	04
6.	Dr. P. S. Negi	Astrophysics	04
7.	Dr. P. K. Mishra	Condensed matter physics	04
Total			21

3. Department of Botany:

S. No.	Name of the Faculty Member	Specialization	Vacancies
1.	Prof. Uma Palni	Mycology/ Plant Pathology/ Microbiology	05
2.	Prof. Neeraj Pande	Bryology and Ecology	03
3.	Prof. S. C. Sati	Mycology/ Plant Pathology and Lichens	06
4.	Dr. Y. S. Rawat	Ecology	02
5.	Dr. Kiran Bargali	Forest Ecology and Ethnobotany	02
6.	Dr. Sushna Tamta	Plant Tissue Culture	02
Total			20

4. Department of Chemistry:

S. No.	Name of the Faculty Member	Specialization	Vacancies
1	Prof. Ganga Bisht	Natural Product Chemistry (Phytochemistry)	05
2	Prof. S. P. S. Mehta	Chemical kinetics	06
3	Prof. A. B. Malkani	Natural Product Chemistry (Terpene Chemistry)	06
4	Prof. C. K. Pant	Bioorganic	06
5	Dr. Puspa Joshi	Natural Product Chemistry (Essential oils)	06
6	Dr. Chitra Pande	Natural Product Chemistry(Essential oil and bioactivity, Soil Chemistry)	04
7	Dr. Gita Tiwari	Natural Product Chemistry(Essential oil and bioactivity, Soil Chemistry, Heavy Metals)	03

8	Dr. Shaharaj Ali	Physical Chemistry	04
		Total	40

5. Department of Zoology:

S. No.	Name of the Faculty Member	Specialization	Vacancies
1.	Prof. M. L. Bisht	Fish Biology	04
2.	Prof. B. R. Kaushal	Entomology, earthworm Ecology	08
3.	Prof. M. N. Jayal	Entomology	08
4.	Prof. B. K. Singh	Drosophila Systematics and Cytogenetics	05
5.	Prof. P. K. Gupta	Limnology/ Fish and Fisheries	03
		Total	28

6. Department of Forestry:

S. No.	Name of the Faculty Member	Specialization	Vacancies
1.	Dr. Jeet Ram	Forest Ecology and Biodiversity/ Seed Science and Technology	04
2.	Dr. A. K. Yadava	Forestry/ Agro forestry	06
3.	Dr. L. S. Lodhiyal	Forest ecology and Biodiversity/ Social, Agro Forestry and Plantation/ Water shade Management and J.F.M	01
		Total	11

7. Department of Mathematics:

S. No.	Name of the Faculty Member	Specialization	Vacancies
1.	Prof. M. C. Joshi	Nonlinear analysis	02
		Total	02

8. Department of Statistics:

S. No.	Name of the Faculty Member	Specialization	Vacancies
1.	Dr. M. K. Pande	Sampling	01
2.	Dr. Surinder Kumar	Sequential Analysis/ reliability theory	01
		Total	02

9. Department of Biotechnology:

S. No.	Name of the Faculty Member	Specialization	Vacancies
1	Dr. Tapan Nailwal	General Biotechnology, Plant Biotechnology	02
2	Dr. Mahejibin Khan (on leave)	Microbiology, Molecular Biology	04
		Total	06

FACULTY OF COMMERCE**1. Department of Commerce:**

S. No.	Name of the Faculty Member	Specialization	Vacancies
1.	Prof. N. S. Bisht	Finance H. R. Marketing and Commerce	02
2.	Prof. N. S. Rana	Commerce Management and Business laws	06
3.	Prof. P. S. Anand	Commerce Management and Insurance	07
4.	Prof. B. D. Kavidayal	Commerce Management and Finance	03
5.	Prof. L. S. Bisht	Commerce Management and Cooperation	06
6.	Dr. Arti Pant	Commerce Management and Stock Market	03
7.	Dr. K. N. Badhani	Finance, Accounting	02
		Total	33

2. Department of Management Studies:

S. No.	Name of the Faculty Member	Specialization	Vacancies
1.	Dr. Amit Joshi	Marketing	03
		Total	03

Note: The number of vacancies may change as on the date of admission and subject to eligibility of research supervisor as per provision of Kumaun University Research Ordinance 2009. The detail information can be had from the concerned department.

DETAILS OF VACANCIES (S. S. J. CAMPUS, ALMORA)

FACULTY OF ART

1. Department of Hindi

S. No.	Name of the faculty members guiding research	Specialization / Areas of research	Vacancies
1	Prof. S. S. Bisht	Krishna Bhakti Sahitya/ Kavya Shastra/ Sumitranandan Pant/ Kumauni Lok Shahitya	04
2	Prof. Deeva Bhatt	Adhunic Kavita, Katha Sahitya	02
Total			06

2. Department of Economics

S. No.	Name of the faculty members guiding research	Specialization / Areas of research	Vacancies
1	Prof. L. S. Bisht	1. Macro Economics 2. International Economics	06
2	Dr. Deepa Dubey	1. Economics Development and planning	06
3	Dr. H. C. Joshi	1. Public finance 2. Industrial Economics	05
Total			17

3. Department of English

S. No.	Name of the faculty members guiding research	Specialization / Areas of research	Vacancies
1	Dr. S. A. Hamid	Translation / Indian Literature in English	04
2	Dr. Nirmala Pant	Indian Literature in English	02
3	Dr. A. S. Adhikari	American Literature	02
Total			08

4. Department of Geography

S. No.	Name of the faculty members guiding research	Specialization / Areas of research	Vacancies
1	Prof. A. K. Singh	-	08
2	Prof. S. K. Singh	-	01
3	Prof. J. S. Rawat	Phy. Geog. GIS/ RS	02
Total			11

5. Department of Art

S. No.	Name of the faculty members guiding research	Specialization / Areas of research	Vacancies
1	Prof. Krishna Bairathi	Painting, History of Art, Handicraft, Folk & Tribal art	08
2	Prof. Shekhar Chandra Joshi	Painting, History of Art, Handicraft, Folk & Tribal art	06
Total			14

6. Department of History

S. No.	Name of the faculty members guiding research	Specialization / Areas of research	Vacancies
1	Prof. Daya Pant	World History, History of Uttarakhand	05
2	Prof. G. M. Jaiswal	Medieval and Modern Indian History	07
3	Dr. V. D. S. Negi	Ancient Indian History and Archeology	02
Total			14

7. Department of Psychology

S. No.	Name of the faculty members guiding research	Specialization / Areas of research	Vacancies
1	Dr. M. Ghufuran	Social and Personality Psychology	02
2	Dr. H. S. Asthana	Neuropsychology	04
3	Dr. Madhu Nayal	Abnormal and Personality Psychology	04

4.	Dr. P. D. Bhatt	Psychometrics and Sport Psychology	04
		Total	14

8. Department of Political Science

S. No.	Name of the faculty members guiding research	Specialization / Areas of research	Vacancies
1	Dr. Meena Pathani	Politics of Uttarakhand State	04
2	Dr. Neeta Bharati	Political Views	04
		Total	08

9. Department of Sociology

S. No.	Name of the faculty members guiding research	Specialization / Areas of research	Vacancies
1	Dr. Himanshu Shekhar Jha	Cultural and Social Problems	02
2	Dr. Ela Sha	Kumaoni Society and Culture	04
3	Dr. Priyanka Neeraj Rubali	Sociology	04
		Total	10

10. Department of Sanskrit

S. No.	Name of the faculty members guiding research	Specialization / Areas of research	Vacancies
1	Prof. Pushpa Awasthi	Literature, Pali, Natural and Ved	04
2	Prof. K. N. Pandey	Indian Philosophy and Literature	03
3	Dr. Shamila Tabashum	Literature	04
		Total	11

11. Faculty of Commerce and Management Studies

S. No.	Name of the faculty members guiding research	Specialization / Areas of research	Vacancies
1	Prof. B.D. Awasthi	Accounting/Applied Commerce	04
2	Prof. P.C. Kavidayal	Human Resource Management/ Applied Commerce	03
3	Prof. B. P. Singhal	Marketing Management/ General Management	03
4.	Prof. K.C. Joshi	Banking and Finance/Applied Commerce	03
5.	Prof. M. M. Jinnah	Accounting/Applied Commerce	01
6.	Prof. Atul Joshi	Industrial Relation/ Applied Commerce	04
		Total	20

FACULTY OF SCIENCE**1. Department of Physics**

S. No.	Name of the faculty members guiding research	Specialization / Areas of research	Vacancies
1	Dr. B. C. Joshi	Spectroscopy and condensed matter Physics	05
2	Dr. O.P.Negi	Theoretical and high energy Physics	03
3	Dr. P.S. Bisht	Theoretical and high energy Physics	02
		Total	10

2. Department of Chemistry

S. No.	Name of the faculty members guiding research	Specialization / Areas of research	Vacancies
1	Prof. N. D. Kandpal	Physical Chemistry (Solution Chemistry & Kinetics)	03
2	Prof. N. S. Bhandari	Inorgani Chemistry (Hydrogeo Chemistry)	02
3	Dr. S. K. Joshi	Physical and Inorganic Chemistry (Kinetic Solution Chemistry)	04
4	Dr. G. C. Sah	Organic Chemistry (Natural Products)	02
5	Dr. D. L. Verma	Organic Chemistry (Natural Products)	01
6	Dr. Robina Aman	Organic Chemistry (Eleminto organic)	05
7	Dr. Priyanka Sagar	Inorganic Chemistry (Catalytic reaction)	03
		Total	20

3. Department of Zoology

S. No.	Name of the faculty members guiding research	Specialization / Areas of research	Vacancies
1	Dr. S. K. Agrawal	Fish Biology	07

2	Dr. J. C. Pant	Fish Biology	01
3	Dr. Ila Bisht	Fish Biology	03
		Total	11

4. Department of Mathematics

S. No.	Name of the faculty members guiding research	Specialization / Areas of research	Vacancies
1	Dr. V. P. Pande	Special Functions and Mathematical Statistics	08
2	Dr. Jaya Upreti	Differential Geometry	07
3	Dr. B. C. Tiwari	Theory of relativity	05
		Total	24

5. Department of Statistics

S. No.	Name of the faculty members guiding research	Specialization / Areas of research	Vacancies
1	Dr. Neeraj Tiwari	Sampling theory, Environmental Statistics and Geostatistics	01
		Total	01

5. Department of Botany

S. No.	Name of the faculty members guiding research	Specialization / Areas of research	Vacancies
1	Dr. P.C. Pandey	Taxonomy, Traditional Knowledge	01
2	Dr. Hema Joshi	Ecology	02
3	Dr. S. S. Gahalagan	Genetics	02
		Total	05

5. Department of Information Technology

S.No.	Name of faculty member guiding research	Specialization/Areas of Research	Vacancies
1.	Prof.H.S.Dhami Coordinator, IT	Natural language processing, Information Retrieval and Computer aided algebra	01
		Total	01

FACULTY OF EDUCATION

S. No.	Name of the faculty members guiding research	Specialization / Areas of research	Vacancies
1	Prof. Sudha Durgapal	Educational Philosophy	04
2	Prof. N. C. Dhoundiyal	Educational Philosophy	04
3	Prof. G.S. Nayal	1. Environmental education 2. Distance education 3. Educational Sociology	05
4	Prof. Vijaya Dhoundiyal	Womens studies, literacy, Extension education, Population an environment education	04
5	Prof. R.S. Pathani	Guidance and counseling technology	01
6	Dr. Bheema Manral	Guidance and counseling(Development of education in India) History, (Educational History) Philosophy	01
		Total	19

FACULTY OF LAW

S. No.	Name of the faculty members guiding research	Specialization / Areas of research	Vacancies
1	Dr. D. K. Bhatt	Constitutional Law, Laws relating to social justice	01
2	Dr. J. S. Bisht	Law relating to social justice	03
		Total	04

Note: The number of vacancies may change as on the date of admission and subject to the eligibility of research supervisor as per provision of Kumaun University Research Ordinance 2009.

Details of Vacant Seats (Govt. P.G. Colleges/ Affiliated Colleges)

1. Govt. P.G. College Ranikhet

S.No.	Subject	No. of vacant seats
1	Mathematics	02
2	Chemistry	02
3	Political Science	09
4	History	01
5	Geography	04
6	English	05
Total		23

2. Govt. P.G. College Bageshwer

S.No.	Subject	No. of vacant seats
1	Hindi	08
2	Zoology	04
4	History	04
5	Geography	12
6	Botany	04
7	Chemistry	04
Total		36

3. L.S.M. Govt. P. G. College Pithoragarh

S.No.	Subject	No. of vacant seats
1	Zoology	10
2	Botany	09
3	Chemistry	04
4	Sanskrit	06
Total		29

4. R.H. Govt. P.G. College Kashipur

S. No.	Subject	No. of vacant seats
1	Mathematics	05
2	Economics	10
3	Sociology	04
4	Political Science	09
5	Hindi	12
6	Zoology	08
7	Commerce	12
Total		60

5. H.N.B. Govt. P. G. College Khatima

S. No.	Subject	No. of vacant seats
1	Hindi	04
3	History	04
4	Political Science	02
5	Education	04
6	Chemistry	03
7	Physics	02
8	Zoology	02
Total		21

6. Govt. P. G. College Dwarahat

S. No.	Subject	No. of vacant seats
1	Sociology	02
Total		02

7. MBPG College Haldwani:

S. No.	Subject	No. of vacant seats
1	English	03

2	Sociology	14
3	Hindi	15
4	Psychology	07
5	Political Science	03
6	History	03
7	Mathematics	04
8	Chemistry	10
9	Physics	04
10	Botany	08
11	Commerce	08
	Total	79

8. **Govt. P.G. College Rudrapur:** Subjects: Sociology, Political Science, Hindi, Economics, Physics, Chemistry, Statistics, Zoology, Botany, Commerce, Geography, Mathematics, Psychology, and English, but the number of vacancies have not been provided by the college.

9. **Govt. PG College Lohaghat:** Information not available.

10. **Govt. PG College Berinag:** Information not available.

Note:

- The vacancies available for admission shown in colleges are based on the information received from respective colleges and are subject to fulfillment of eligibility as per KU Ordinance.
- The number of vacancies may change as on the date of admission.
- The specializations/ Topics for research in the department of the affiliated colleges can be had from the concerned colleges.

RESEARCH ENTRANCE TEST, 2009-2010

SYLLABUS

FACULTY OF ARTS

- 11 चित्रकला एवं विजुअल आर्ट्स
- 12 Economics
- 13 English
- 14 Geography
- 15 हिंदी
- 16 History
- 17 Political Science & Public Administration
- 18 Psychology
- 19 Sanskrit
- 20 Sociology

1 चित्रकला एवं विजुअल आर्ट्स

- 1 कला दृश्यकला के मूलाधार – स्थान, रूप, आकार, रेखा रंग संतुलन, संयोजन आदि।
- 2 भारतीय चित्रकला प्रागैतिहासिक काल, अजन्ता कला शैली, बाघ कला, जैन कला, दक्षिणी शैली, मुगल कला, राजस्थानी कला एवं पहाड़ी चित्रकला शैली आदि।
- 3 आधुनिक भारतीय चित्रकला कम्पनी स्कूल, कालीघाट, राजारवि वर्मा तथा इनके समकक्ष, बंगाल स्कूल एवं बंगाल शैली के चित्रकार।
- 4 स्वतंत्रता प्राप्ति पश्चात के चित्रकार अम्रता शेरगिल, एम० एफ० हुसेन, एम० सेजां, प्रदोष दास गुप्ता, वी० सी० सानियाल, दिनकर कौशिक, मजूमदार, परितोष सेन, अकबर पद्मसी, राम कुमार, एन० एस० बेन्द्रे, के० के० हैब्र, के० जी० सुब्रामन्यम, के० एस० पाणिकर, जे० स्वामी नाथन, ज्योति भट्ट, ए० रामचन्द्रन, विकास भट्टाचार्य, भूपेन खक्कर, अंजली इला मेनन, अर्पीता सिंह, गोगी सरोज पाल, अपर्णा कौर, जै० राम पटेल, नलनी मालनी, विवान सुन्दरम्,
- 5 मैथड एण्ड मैटीरियल जल रंग, तैल रंग, ऐकैलिक पेस्टल एवं मिक्स मिडिया आदि का प्रयोग टेम्परा एवं फ्रस्को चित्रण शैली के पारम्परिक एवं अपारम्परिक तरीके।
- 6 ट्राइबल, फोक आर्ट (लोक कला) पट्टचित्रकला, मधुबनी कला, रंगोली, मांडना, ऐपण, थारू, बोक्सा, भोटिया एवं जौनसारी एवं अन्य भारतीय लोक एवं जनजातिय कलायें आदि।
- 7 ऐस्थेटिक्स– भारतीय सौन्दर्य शास्त्र षड्ग, रस, ध्वनि, भाव, अनुभाव, विभाव, संचारी भाव, अलंकार, रस सिद्धान्त, कला एवं सौन्दर्य आदि। पाश्चात्य सौन्दर्य शास्त्र प्लेटो, अरस्तु, कोचे, काण्ट, हीगल, बाउमगार्तेन, टालस्टाय आदि।

- 8 **पाश्चात्य चित्रकला का इतिहास** प्रागैतिहासिक काल, मिश्र, मैसेपोटामिया, शास्त्रीय कला, यूनानी कला, प्रारम्भिक इसाई कला, बाइजेन्टाइन कला, गोथिक कला, रोमनस्क कला,
- 9 **पाश्चात चित्रकला का इतिहास** उत्तरार्ध बरोक कला, रोकोको कला, नव शास्त्रीय वाद, यथार्थ वाद, रोमांसवाद, ।
- 10 **आधुनिक यूरोपीय चित्रकला** प्रभाववाद, नव प्रभाववाद, उत्तर प्रभाववाद फाववाद, घनवाद, अभिव्यंजनवाद, अतियथार्थवाद, वस्तु निरपेक्ष, भविष्य वाद, पॉप कला आदि।

2. ECONOMICS

1. **Basic Economics Concept:** Micro Economics Theories of Consumption Production Cost, General Equilibrium.
2. **Pricing and Output under different market structure:** Factor Pricing. Welfare Economics.
3. **Macro Economics:** National Income Accounts classical. Neo classical, New classical. Keynesian, Post Keynesian.
4. **Money:** Supply debate, Old & Modern Quantity Theories. Interest Rates, Business Cycle theories, Banking.
5. **Growth Development Planning:** Concepts, Approach, Growth Theories & Models.
6. **Public Finance:** government Economic Activities, Expenditure, Revenue, Taxation, Debt. Fiscal Policy, Federalism, Decentralization.
7. **International Economics:** Trade Theories, Terms of Trade, Balance of Payment, Foreign Exchange, Economic Integration.
8. **Indian Economy & Development Policy:** Characteristics, Economic Trends, Plans.
9. **Current Economic Issues:** National, Regional, Global, Economic Programmes, Policies, Debates.
10. **Quantitative Methods:** Mathematical & Statistical Methods.

3. ENGLISH

1. English Literature till fifteenth century.
2. Elizabethan Age.
3. Jacobean to Restoration Period.
4. Neo-Classical Age & Pre- Romantic Period.
5. Romantic Revival.

6. Victorians & Pre- Raphaelites.
7. The Modern Age.
8. Post-Modernist / Contemporary English Literature.
9. Indian English Literature / American Literature.
10. Literary Criticism & Theory.

4. GEOGRAPHY

1. **Advanced Geomorphology:** Fundamental concepts of geomorphology; Endogenetic and exogenetic forces; Denudation: Weathering and erosion; Geosynclines, Continental drift, Plate tectonics, Concept of geomorphic cycle, Landforms associated with fluvial, arid, glacial coastal and karst cycles.
2. **Atmosphere and Climatology :** Composition and structure of atmosphere; Heat budget of the earth; Distribution of Temperature; Atmospheric pressure and general circulation of winds; Monsoon and jet stream; Tropical and temperate cyclones; Classification of world climates; Koppen's and Thornthwaite's schemes.
3. **Oceanography:** Ocean deposits; Coral reefs; Temperature and salinity of the oceans; Density of sea water; Tides and ocean currents
4. **Evolution of Geographical Thoughts:** General character of Geographical knowledge during ancient and medieval periods; Foundation of modern geography; Determinism and possibilism; Aerial differentiation and spatial organization.
5. **Population and Settlement Geography:** Population: Patterns of world distribution, growth, density, migration and demographic transition; Settlements: site, situation, type, size, spacing and internal morphology of rural and urban settlements; City region, primate city, rank size rule, settlement hierarchy, Christaller's Central Place Theory, August Losch's theory of market centres.
6. **Resource and Economic Geography:** Natural resources: renewable and non-renewable; Ecology and Ecosystem; Sectors of economy; primary, secondary, tertiary and quaternary; Measurement of agricultural productivity and efficiency; crop combination and diversification; Von Thunen's Model; Classification of industries: Weber's and Losch's approaches; Resource based industries; Models of transportation and transport cost: Accessibility and connectivity.
7. **Political, Social and Cultural Geography:** Heartland and Rimland theories; Boundaries and frontiers; Nature of administrative areas and Geography of public policy and finance; Ethnicity; tribe; dialect; language; caste and religion; Concept of social well-being; Culture: Areas and cultural regions; Human races; Habitat; economy and society of tribal groups.
8. **Regional Planning:** Concept of region in geography; Concept of planning regions; Types of regions; Methods of regional delineation; Regional planning in India; Indicators of development; Regional imbalances: Evolution, nature and scope of town planning with special reference to India, and Fundamentals of Town and Country Planning.

- 9. Advanced Geography of India:** Physiographic divisions; Climate: Its regional variations; Vegetation types and vegetation regions; Major soil types; Irrigation and agriculture; Population distribution and growth; Settlement patterns; Mineral and power resources; Major industries and industrial regions.
- 10. Cartography and Statistical Techniques:** Types of maps: Techniques of spatial patterns of distribution; Mapping of location-specific data; Accessibility and flow maps; Remote sensing and computer application in mapping; Digital mapping; Geographic Information System (GIS); Sources and types of data; Frequency distribution and cumulative frequency; measures of central tendency; measures of dispersion and concentration; Lorenz curve; Coefficient of correlation; Multiple correlation; Regression analysis; Nearest Neighbour analysis; Scaling techniques; Rank score; Weighted score etc.

5 हिंदी

- 1 प्राचीन हिंदी काव्य (संवत् 1050—1375 तक)
- 2 मध्यकालीन हिंदी काव्य (संवत् 1375—1700 तक)
- 3 रीतिकालीन हिंदी काव्य (संवत् 1700—1900 तक)
- 4 आधुनिक हिंदी काव्य (संवत् 1050—1375 तक)
- 5 हिंदी कथा एवं नाटक साहित्य
- 6 हिंदी निबंध एवं स्मारक साहित्य
- 7 हिंदी साहित्य का इतिहास (आदिकाल, मध्यकाल, रीतिकाल, आधुनिक काल)
- 8 भारतीय एवं पाश्चात्य काव्य शास्त्र और आलोचना
- 9 हिंदी भाषा एवं भाषा विज्ञान
- 10 कुमाउनी भाषा एवं साहित्य तथा लोकसाहित्य

6. HISTORY

1. Pre and Proto History of India
2. Political and Economic History of India (600 B.C-1200 A.D)
3. Political and Economic History of India (1200 A.D-1707 A.D)
4. Political and Economic History of India (1707A.D-1950A.D)
5. Indian Culture from beginning till 1200- A.D.
6. Indian Culture (1200 A.D-1707 A.D)
7. Indian National Movement and Constitutional Development.
8. History and Culture of Uttarakhand.

9. World History (1453A.D-1789A.D)
10. World History (1789 A.D-1945 A.D)

7. POLITICAL SCIENCE & PUBLIC ADMINISTRATION

1. **Political Theory:** Nature of Political Theory, its main concerns, decline and resurgence since 1970s Liberalism and Marxism, Individual and Social Justice, Role of Ideology, Theories of change: Lenin, Mao, Gandhi.
2. **Political Thought:** Plato and Aristotle, Machiavelli, Hobbes, Locke, Rousseau and J.S. Mill, Karl Marx, Gandhi, M.N. Roy, Aurobindo Ghosh.
3. **Comparative Politics and Political Analysis:** Approaches to the study of Comparative Politics, Constitutionalism in theory and practice, Executive, Legislature and Judiciary and with special reference to India, USA, UK and Switzerland, Party system and role of opposition, Electoral Process, Separation of Powers, Rule of Law and Judicial Review.
4. **Political Development:** Political Modernization, Political Socialization and Political Culture, Power and Authority, Political Elite.
5. **Making of the Indian Constitution:** Fundamental Rights and Duties and Directive Principles, Union Executive, Parliament, Supreme Court, Judicial Activism, Indian Federalism, Theory, Practice and Problems.
6. **Dynamics of State politics:** Local Governments, Rural and Urban, Political Parties, Pressure Groups and Public Opinion, Elections, Electoral Reforms, Class, Caste, Gender, Dalit and Regional Issues, Problems of Nation-Building and Integration
7. **Growth of Public Administration as a discipline and New Public Administration:** Theories of Organization (Classical, Scientific, Human Relations) Principles of Organization, Chief Executive, Control over Administration, Judicial & Legislative, Bureaucracy.
8. **Development Planning and Administration in India:** Bureaucracy and Challenges of Development, Administrative Culture, Administrative Corruption and Administrative Reforms, Panchayati Raj, Impact of Liberalization on Public Administration
9. **Theories of International Relations:** Ideology, Power and Interest, Conflicts and Conflict-Resolution, Changing concept of National Security and Challenges to the Nation-State System, Arms and Arms-control, India's foreign Policy, India and Regional Organizations (SAARC, ASEAN).
10. **Major Issues of Hill Region of Uttarakhand:** Problem of deforestation, Ecology, Problem of Unemployment, Problems of Ex-servicemen, Disaster management, Political Pressure groups operating in the Hill Region, Working of local Self-Government in the Hill Region.

8. PSYCHOLOGY

1. **Experimental Approach:** Perception: Gestalt, Behaviouristic and Psychological approaches; Perception of form, Perceptual constancies; Depth and space perception;

Movement perception; real and apparent; Perceptual defense; Perceptual vigilance' Time perception. Effects of set and motivational variables on perception, Learning: Theories of Learning: Thorndike, Tolman, Hull skinner and Guthrie. Conditioning: Classical and Operant: Phenomenon and its different paradigms; Differences between classical and operant conditioning, and extinction of conditioned response. Generalization and discrimination Types and patterns of reinforcement., Memory and Forgetting: Sensory, short term and long term memories: Material and methods. Concept and causes of forgetting. Retroactive and proactive inhibitions. Information Processing Model. Motivation: Definition, Types of motives: Biogenic, sociogenic motive: Theories of motivation- Maslow's need hierarchy theory, Herzberg's two factor theory, McClelland's need theory. Measurement of motives. Emotion: Concept of emotion and physiological correlates of emotion. Theories of emotion: James Lange, Cannon- Basrd and Activation theory.

2. **Basic social processes:** Introduction: Subject matter and definition of social psychology, historical sketch of social psychology, importance of social psychology as an applied science. Methods of social psychology: Field study, Field experiment, Sociometric and Survey. Socialization: Meaning, stages and process of socialization. Theories of socialization: Psychodynamic, Social learning, symbolic- cognitive and Durkheim. Principles and agencies of socialization. Principles of Social Behaviour: Nature, types and laws or principles of imitation, importance of imitation in social life. Meaning and classification of suggestion. Conditions for effective suggestion, role of suggestion in social life. Nature and types of sympathy, role of sympathy in social life. Social Motives: Meaning of social motivation. Types of social motives- achievement, approval, power and aggression motives. Measurement of social motives. Attitude: Nature of attitude, affiliation, formation of attitude, factors affecting attitude change, Theories of attitude change. Measurement of attitude. Social Norms and Conformity: Meaning, characteristics and formation of social norms. Nature and characteristics of conformity behavior. Factors influencing conformity, Theories of conformity, Compliance and obedience. Interpersonal Attraction: Meaning of interpersonal, attraction, determinants of interpersonal attraction, and theories of interpersonal attraction: Balance, Reinforcement Exchange, Equity and Complimentary need theory. Social Change: Nature, Type and characteristics of social change, Theories of social change, factors of social change resistance to change. Social change in Indian Perspective. Role of Sanskritization, modernization, westernization in social change. Present Social Problems: Meaning and characteristic of social problem. Types: Poverty, deprivation, social tension, communalism, hindrances in the way of national integration and problems in promoting national integration. Ethnicity and Ethnic identity.
3. **Statistics in Psychology:** The Basis of Statistical Inference: Basic issues in inference, meaning, concept and importance, Estimation of parameters, Basis for choosing appropriate statistical test for analysis of data. Parametric Statistics: Reliability of mean and other statistics, concept, meaning and computation of standard error of Mean, Standard deviation, Percentage and Coefficient of correlation. Hypothesis Testing: One tailed and two tailed test, Type-I and Type-II errors, Basic concept of difference between means, critical ratio and t-test assumptions, uses, calculation. Analysis of variance: One way and two way. Non-Parametric Statistics: Distinctive features of parametric and non-parametric statistics and

their uses. Concepts, uses and calculation of chi-square, Median test, Sign-test and Mann Whitney U-test. Measures of Relationship: Calculation and uses of product moment, biserial, point- biserial, tetra choric coefficient, and contingency coefficient of correlation. Significance of co-relational analysis in psychological research, regression and prediction. Multivariate Statistics: Nature and importance of multivariate analysis in Social Science Research. Factor analysis- assumptions, methods and interpretation.

4. **Research Methods:** Nature of Psychological Research: Nature and purpose of Psychological research, Problems, Hypothesis, Variables, Types of research: Experimental, Co relational and Ex-post facto research. Experimental Control: The nature and problem of experimental control, manipulation of independent and dependant variables, Techniques of control. Research Design: Meaning, purpose and principles of research design. Between group design- Single factor designing. Randomized block design, Factorial design and Nested Design. Sampling: Meaning and purpose, Types of sampling techniques: Simple random, Stratified, Cluster, Quota, Purposive and Accidentals sampling, Sampling error. Methods of Data Collection: Experimental, interview, Observation , Questionnaire, Q Methodology and Sociometry. Qualitative Research: Meaning and futures of qualitative research, Content analysis, Case, Study and Action research. Report Writing: Steps and style of report writing (APA) interpretation of research data. Ethical issues in Psychological Research.
5. **Assessing human personality:** Introduction: Concept of personality, definition, nature and scope and issues of personality. Determinants of Personality: Biological, Psychological, Environmental: Social and Cultural Cognitive: Cognitive Style and Locus of Control Theoretical Approaches: Psychoanalytical: Freud, Adler, Jung & Neo Freudian. Dispositional approaches: Allport, Cattell, Eysenck, Murray's need theory, McClelland, Atkinson. Behavioural and Cognitive Approach Mischel, Skinner, Dollard & Miller Bandura & Festinger. Phenomenological Approach Centered Kelly & Rogers and Maslow. Techniques of Measurement: Psychometric and Projective techniques.
6. **Guidance and Counseling:** Introduction: Meaning and definition of guidance, aim and purpose of guidance, basic principles of guidance, types of guidance, group guidance. Psychological Bases of Guidance: Intelligence, personality, aptitude and interest. Areas and technique of Guidance: Vocational and educational guidance program in schools and colleges, Importance scope and problem of vocational and educational guidance, Techniques of collecting information about the individual for guidance and counseling. Counseling: Meaning and definition of counseling, aim and purpose of counseling, characteristics of counseled and counselors, role and function of the counselor, systematic counseling. Areas and approaches of Counseling: Educational, vocational, family, behavioural, drug ad, mental retardation, marriage and Career Counseling. Psychoanalytic. Client- centered, Existential and Behavioural. Counseling process: External conditions and preparation, structuring the counseling relationship, counseling interview and degree lead by counselor, nonverbal behavior, group counseling approach. Evaluation of counseling: Nature and purpose, steps in evaluation and outcome research Follow- up and Termination of Counseling.
7. **Psychopathology:** Approaches of Psychopathology: Psychodynamic approach,

Behaviouristic approach, Humanistic approach, Existential approach, Cognitive approach
 Classifications in Psychopathology: W.H.O. classification (ICD-10), Multi-axial System (DSM-IV-R)
 Anxiety Disorders: Nature, Etiology and Symptoms of panic, phobic, generalized anxiety disorders, Obsessive-compulsive disorder. Somatoform Psychological Disorders: Nature, Etiology and Symptoms of Conversion and dissociative disorder. Nature and types of psycho-physiological disorder, Etiology and symptoms of gastro-intestinal, respiratory, cardiovascular and skin disorders. Schizophrenia and Delusional Disorders: Types, symptoms and etiology of schizophrenia and paranoia. Mood Disorders: Etiology, and symptoms of uni-polar, bi-polar depressive disorders. Personality Disorders: Meaning and types of personality disorders. Etiology of impulsive control disorders, substance related disorders (alcoholic and nicotine), sexual disorders. Organic Mental Disorder: Clinical features of organic mental disorders, organic system syndrome, delirium & dementia and Alzheimer.

8. **Clinical Assessment:** Introduction: Brief history and scope of Clinical psychology, the current status of Clinical psychology, role of Clinical psychologists, professional ethics. Clinical Assessment: Nature and purpose of Clinical assessment formal and informal assessment, different stages in assessment process. Tests in Clinical Use: Role of psychological test in psycho diagnosis; Different tests in clinical uses: The Wechsler; Adult Intelligence Scale (WAIS), MMPI, TAT and Rorschach. Psychotherapy: Nature of Psychotherapy, Client- Therapist relationship, biological based therapies, Psychodynamic Therapy: Freudian Psychoanalysis. Behaviour Modification: Extinction Systematic desensitization, aversion therapy, modeling, token economy, assertiveness and biofeedback, Cognitive Behaviour Therapy: Rational emotive therapy, cognitive therapy. Humanistic Therapy: Existential Therapy: Person centered therapy, Gestalt therapy, Group Therapy: Encounter group therapy, Psychodrama, Sensitivity Training.
9. **Organizational behaviour:** Historical Context of organizational behaviour: History of Industrial and Organizational Psychology, scope, role of psychologist in organization, Organization: Nature, structure, and issues of organization; methods to study organization, significance of organization in human affairs, status of organizational behaviour in India. Theoretical Framework: Contribution of Taylor, Weber, Fayol in the development of Industrial Psychology and Organizational Behaviour: Modern organizational theories: Diagnosis and linking- Pin. Organizational Development: Meaning and assumption; the process of organizational development and its characteristics; structural and human process, intervention techniques of organizational development. Organizational Culture: Meaning and characteristics, maintenance and function, process of developing organizational culture, approaches to change in organizational culture, Organizational Effectiveness: Job Design- Concept and approaches, Job enhancement, Job enrichment and quality of work life. Approaches to organizational effectiveness- function and system resource approaches.
10. **Human Resource Management:** Introduction: Origin and nature of Human Resource Management: Definition and Characteristics of HRM and personnel management, Functions of HRM. Human Resource Planning: Definition, New steps of human resource planning: process, factors influencing human resource planning, Development of Human Resources: Nature of HRD, relationship of HRD to other HRM function and Identification and purpose of need assessment; the training methods; Enhancement of training programs. Recruitment

and Selection: Stages of recruitment and selection; recruitment process, steps in recruitment process, elements of good recruitment policy; Criteria of effective selection devices. Performance Management: Process and functions of performance appraisal; Criteria for a good appraisal system; What to measure in appraisal; Methods of appraising performance-objective and subjective, enhancing performance appraisal system and potential evaluation. Compensation and Benefit Programs: Job evaluation- Concept, methods and problems, pay structure- Methods of payment; Barriers to pay for performance success. The role of benefits in reward systems and type of benefits, Safety and Health: Stress and Job burnout: Nature causes, consequences and management.

9.संस्कृत

1 संहिताएँ : निम्नलिखित सूक्तों का अध्ययन : ऋग्वेद—अग्नि, वनो, उशस्, मण्डूक, अथर्ववेद—नासदीय, राष्ट्रविवर्धन, संवादसुक्तः वि वामित्र—नदी, यम—यमी

2 वैदिक साहित्य का इतिहास तथा वैदिक साहित्यः वैदिक काल के विशय में विभिन्न सिद्धान्त वैदिक कालीन देवताओं का सामान्य परिचय : ऋग्वेद का क्रम

3: वेदांगः वेदांगों का सामान्य और संक्षिप्त परिचय ि िक्षा, कल्प, व्याकरण, निरुक्त, छन्द, ज्योतिष (सामान्य अध्ययन) पाणिनीय ि िक्षा, निरुक्त, (प्रथम और द्वितीय अध्याय), चार पद—नाम का विचार; आख्यात का विचार; उपसर्गों का अर्थ; निपातों की कोटियाँ, क्रिया के छः रूप (षड्भावविकार), निरुक्त के अध्ययन के उद्देश्य, निर्वचन के सिद्धान्त निम्नलिखित शब्दों की व्युत्पत्तियाँ: आचार्य; वीर; हृद; गो; समुद्र; वृत्र; आदित्य; उषस्; मेघ; वाक्; उदक; नदी; अश्व; अग्नि; जातवेदस्; वैश्यानर; निघण्टु

4 व्याकरणः महाभाष्य (पस्पशाहिक) शब्द की परिभाषा शब्द एवं अर्थ सम्बन्ध व्याकरण के अध्ययन के उद्देश्य व्याकरण की परिभाषा साधु शब्द के प्रयोग का परिणाम व्याकरण की पद्धति सिद्धान्तकौमुदी: तिङन्त (भू एवं एध् मात्र) कृदन्त (कृत्य प्रक्रिया मात्र) कारक प्रकरण(सिद्धान्त कौमुदी) स्त्री प्रत्यय (सिद्धान्त कौमुदी) भाषाविज्ञान : भाषा की परिभाषा भाषाओं की वर्गीकरण (आकृतिमूलक एवं पारिवारिक) संस्कृत ध्वनियों के विशेष सन्दर्भ में मानवीय ध्वनि—यंत्र ध्वनि—परिवर्तन के कारण अर्थपरिवर्तन की दिशाएँ तथा कारण वाक्य का लक्षण तथा भेद भारोपीय भाषा परिवार का सामान्य एवं संक्षिप्त परिचय

5 द निः व्याख्या एवं समीक्षात्मक प्रश्नए ईश्वरकृष्ण की सांख्यकारिकाए सदानन्द का वेदान्तसारए तर्कभाषा

6 लौकिक साहित्यए रामायणए रामायण का क्रमए रामायण में आख्यानए रामायणकालीन समाजए परवर्ती गन्थों के लिए रामायण एक प्रेरणा—स्रोतए रामायण का साहित्यिक महत्व महाभारतए महाभारत का क्रमए महाभारत में आख्यानए महाभारतकालीन समाजए परवर्ती गन्थों के लिए महाभारत एक प्रेरणा—स्रोतए महाभारत का साहित्यिक महत्व

7 स्मृति एवं अध्यायः श्रीमद्भगवद्गीता(प्रथम चार अध्याय) मनुस्मृति (प्रथम, द्वितीय तथा सप्तम अध्याय)

8 पद्ये रघुवंश (प्रथम तथा द्वितीय सर्ग)ए किरातार्जुनीय (प्रथम सर्ग)ए मेघदूतम् नैषधीयचरित (प्रथम सर्ग) गद्य दशकुमारचरितम् (अष्टमोच्छ्वासः) हर्षचरितम् (प्रथमोच्छ्वासः) कादम्बरी (राजकुलवर्णनपर्यन्त) काव्यशास्त्र : काव्यप्रकाश-काव्यलक्षण; काव्यप्रयोजन; काव्यहेतु; काव्यभेद; शब्दशक्ति; अभिहितान्वयवाद; अन्विताभिधानवाद; रसस्वरूप एवं रससूत्रविमर्श; रसदोष; काव्यगुण अलंकार- अनुप्रास; श्लेष; वक्रोक्ति; उपमा; रूपक; उत्प्रेक्षा; समासोक्ति; अपहृति; निदर्शना; अर्थान्तरन्यास; दृष्टान्त; विभावना; विशेषोक्ति; संकर; संसृष्टि ध्वन्यालोक (प्रथम उद्योत)

9 नाटक-मृच्छकटिकम्; अभिज्ञानशाकुन्तलम्; उत्तररामचरित; रत्नावली नाट्यशास्त्र-भरत-नाट्यशास्त्र (प्रथम, द्वितीय); दशरूपक (प्रथम तथा तृतीय प्रकाश)

10 संस्कृत साहित्य का इतिहास तथा भारतीय संस्कृति महाकाव्य, खण्डकाव्य, चम्पूकाव्य, गीतिकाव्य, गौड आसंस्कार, वर्णाश्रम व्यवस्था, पुरुशार्थचतुष्टय तथा प्राचीन भारतीय शिक्षा।

10. SOCIOLOGY

2. **Definition, Scope, Nature of Sociology:** Basic Concepts – Society, Community, Institution, Association and Culture , Status, Status set, Status sequence. Role, Multiple roles, Role set, and Role Conflict, Social Group – Meaning and Types : Primary-Secondary, Formal-Informal, Ingroup-Outgroup, Reference Group, Social Institutions – Marriage, Family and Religion, Socialization- Socialization, Anticipatory socialization, Agencies of socialization, Theories of socialization, Social Stratification – Social differentiation, Hierarchy, Forms of stratification : Caste, Class, Gender, Ethnic, Theories of Social Stratification, Social Change and Social mobility – Concepts and Types: Evolution, Diffusion, Progress, Revolution, Theories: Dialectical and Cyclical, Social Mobility concept and types.
3. **Structural and functional Theory:** Nadel, Radcliffe Brown, Levi-Strauss, Malinowski, Durkheim, Parsons, Merton, Interactionist – Social action: Max Weber, Pareto, Symbolic interactionism : G. H. Mead, Blumer, Conflict Theory – Karl Marx, Dahrendorf, Coser, Phenomenology and Ethno methodology - Alfred Shultz, Peter Berger and Luckmann, Garfinkel and Goffman, Neo-functionalism and Neo-Marxism – J. Alexander, Habermas, Althusser, Structuration and Post-Modernism – Giddens, Derrida, Foucault.
4. **Social Research:** Nature of Social phenomena, The problems in the study of social phenomena: objectivity and subjectivity, The scientific method, Social Survey-Research Design and its types, Hypothesis, census and sampling, Types of Data-Primary and Secondary. Techniques of Data collection: Observation, Questionnaire, Schedule, interview, Case Study, Content analysis, Statistics in Social Research-Measures of Central Tendency: Mean, Median, Mode, Measures of dispersion, Correlational analysis, test of significance, Reliability and Validity, G.S. Ghurye-Caste and Kinship, Tribe, Culture and Civilization. Louis Dumont – Homo Hierarchicus: The Caste System and its Implications, Theory of Varnas, M.N. Srinivas-Sanskritization, Dominant Caste, Westernization, Secularization, S.C. Dube-Tradition and Change, Modernization and Development D.P. Mukherjee – Modern Indian Culture, Role of New Middle Class. A.R. Desai-Village Structure, Indian Nationalism, Peasant Struggles
B.R. Ambedkar-State and

5. **Contemporary Socio-cultural Issues:** Poverty, Inequality of caste and gender, Regional, ethnic and religious disharmonies, family disharmony: (a) Domestic violence (b) Dowry (c) Divorce (d) Intergenerational conflict, Contemporary Developmental Issues - Poverty, Regional disparity, slums, Displacement, ecological degradation and environmental pollution, Health problems, Issues Pertaining to Deviance – Deviance and its forms, Crime and delinquency, White collar crime and corruption, Changing profile of crime and criminals, Drug addiction, Suicide, Current Debates – Tradition and Modernity in India, Problems of Nation Building : Secularism, Pluralism and Nation Building, Challenges of Globalization, Conceptual Perspectives on Development: Economic Growth, Human Development, Social, Development, Sustainable Development, Social Structure and Development: Social Structure as a Facilitator/ Inhibitor, Paths of Development: Socialist, Gandhian, Problems of Developed and Developing Societies.
6. **Rural Sociology:** Definition, Scope and Importance, Rural Urban Continuum, Basic Concept: the Little Community, Peasant Society and folk Culture, dominant caste, Rural faction, Little and Great Tradition, Social Institution: Joint Family, Caste and Jajmani System, Community development programmes and Panchyati Raj.
7. **Industrial Sociology:** Industrial Society in the Classical Sociological Tradition– Division of labour, Bureaucracy, Rationality, Production relations, Surplus value, Alienation Industry and Society – Factory as a social system, Formal and informal organization, Impact of social structure on industry, Impact of industry on society, Industrial Relation – Changing profile of labour - Changing labour-management relations, conciliation, adjudication, arbitration, collective bargaining, Trade unions, Workers participation in management (Joint Management Councils), Quality circles, Industrialization and Social Change in India - Impact of industrialization on family, education and stratification class and class conflict in industrial society, obstacles and limitations of industrialization, Industrial Planning – Industrial Policy, Labour legislation, Human relations in industry
8. **Gender:** Social Construction of Gender: Gender vs. Biology, Approaches to the Study of Women: Marxian and Feminist, The Changing Status of Women in India: Pre-Colonial, Colonial and Post-Colonial, Women's movements in 19th and 20th Centuries, The Status of health and Education among Women in India, Development of Women: Economic and Political participation of Women
9. **Tribes in India:** Definition, Characteristic and Geographical Distribution, Approaches to the Study of Tribal Society in India, Cultural and Economic Classification of Tribes in India, Tribal Culture and the Various Forms of Tribal Social Institution: Marriage, Kinship, Clan, Youth Dormitory, Status and Role of Women in Tribal Society, Socio-economic Profile and Development of Tribes and Backward Classes of Uttarakhand- With special Reference to Bhotiyas, Rajis, Tharus, Buxas, Khasis (Tribes) and the Anwals, Giris and Nayaks, Tribal Development Programme: National Perspective and Appraisal of Different Development Programmes.
10. **Urban Sociology:** Meaning, Nature and Scope; It's Relation with Other Social Science, Urban Sociology in India; Emerging Trends in Urban Sociology in India, Meaning, Development and Classification of Urban Centers, Urban Social Structure: Family, marriage, Kinship, Dimensions of Urbanization and the Social Consequences of Urbanization.

- 11. Sociology of environment:** The Rise, Decline and Resurgence of Sociology of Environment, Interrelation among Ecology, Environment and Society, Environment Conservation and Sustainable Development, Environment Impact Analysis, Its Need, Scope and Methodology, Human Rights in Relation to Environment, Social movements regarding Environment and Ecology, Role of Non-Governmental and Voluntary Organization (NGOs & VOs) in Environment Protection.

FACULTY OF COMMERCE AND MANAGEMENT

- 1 Management**
- 2 Commerce**

1. MANAGEMENT

- 1. Managerial Economics:** Nature, Scope and Tools of Managerial Economics, Demand Analysis and Elasticity of Demand, Revenue concepts, Supply and Elasticity of Supply, Utility Analysis and Indifference of Return and Law of variable proportion, Cost, Revenue, Price determination in different market situations : Perfect competition, Monopolistic competition, Monopoly, Price discrimination and Oligopoly, Pricing strategies. Introduction to macro-economics: Structure, National Income Concepts, Government Budget and the Economy, Balance of Payment.
- 2. Organizational Behaviour:** Nature and Significance, Influence of Socio- Cultural factors on Organization, Classical, Neo-Classical and Modern theories of organizational structure, Line and Staff Relationship, Delegation and Decentralization, Formal and Informal Groups, Power and Authority, Organizational Roles and Status, Perception, Attitude, Motivation theories, Leadership: nature, style and approaches, Communication, Conflict and Controlling.
- 3. Human Resource Management:** Concepts, Role and Functions of HRM, HR Planning, Recruitment and Selection, Training and Development, Succession, Planning, Compensation: Wage and Salary, Administration, Incentive and Fringe Benefits, Morale and Productivity, Job analysis, Job description and Specification, Use of Job analysis, Information, Appraisal of Performance, Industrial Relations in India, Health, Safety, Welfare and Social Security, Workers participation in management, Trade Unions and Employers organization in the Industrial Disputes, Forms and trends of Industrial unrest in India, Status of Collective Bargaining in India, Employee Empowerment and Quality Management, Social Security Laws, Dispute resolution and Grievance Management, Future of Human Resource Management.
- 4. Financial Management:** Nature and Scope of Financial Management, Capital Structure, Financial and Operating Coverage, Cost of Capital, Capital Budgeting, Dividend Policy, Money and Capital Market, Working of Stock Exchanges in India: NSE, NASDAQ, Derivatives and Options, Venture Capital Funds, Merges and Acquisition, Mutual Funds, Lease, Financing, Factoring, Measurement of Risk and Returns, Securities Valuation and Portfolio Management, Corporate Risk Management. Working Capital Management: Determinants and Financing, Cash Management, Inventory Management, Receivables Management.

5. **Marketing Management:** Evolution and Concepts of Marketing, Marketing Mix, Marketing Segmentation, Product Life Cycle: New Product Development, Branding and Packaging, Pricing Methods, Distribution Decisions, Promotion Decisions, Market Planning, Organizing and Control, Marketing Tasks, Concepts and Tools, Marketing Environment: Marketing Research, On-line Marketing. Direct Marketing, Social, Ethical and Legal Aspects of Marketing in India. Consumer Behavior Theories and Models, Export Marketing Indian and Global Context, New Issues in Marketing.
6. **Business Environment:** Meaning and Elements of Business Environment, Changing Dimensions of Business Environment, Economic Policies, Policy Environment: Liberalization, Privatization and Globalization, First and Second Generation Reforms, Industrial Policy, FDI, MNC's, GATT, WTO, SAARC, NAFTA, IMF, World Bank, EXIM Policy, Regulations and Promotions of Foreign Trade, Monetary and Fiscal Policies and their Impact on Business. Global Environment Changes and Sustainable Development, Bio-diversity and its Impact on Business, Pollution and Waste Management.
7. **Quantitative Techniques:** Role and Scope of Operations Research, Linear Programming, Sensitivity Analysis, Duality, Transportation Model, Inventory Control, Queuing Theory, Decision Theory, Markov Analysis, PERT/CPM, Probability Theory, Probability Distribution, Binomial, Poisson, Normal and Exponential, Correlation and Regression Analysis, Sampling Theory, Tests of Hypothesis, Large and Small Samples Tests-t,Z,F and Chi-square Test.
8. **Business Management:** Nature and Significance of Management, Evolution and its Approaches, Principles of Management, Contribution of Taylor, Fayol and Bernard to Management Science, Social Responsibility of Managers. Planning: Objectives, Strategies, Planning Process and Techniques of Decision Making. Corporate Governance and Business Ethics.
9. **Use of Computer Applications in Management:** Computer Application to Functional Areas, Management of Data Processing System in Business Organization, Data Base Management System, Types of Information System, Development of Management Information System and Decision Making, Emerging Trends in e-commerce and its Application, Introduction to Programming Approaches and Languages JAVA, HTML etc.
10. **Teaching and Research Aptitude:** Teaching Aptitude, Research Aptitude, Reading Comprehension, Reasoning (Including Mathematical and Logical), Data Interpretation, Information and Communication Technology, Higher Education System: Governance, Policy and Administration.

2. COMMERCE

17. **Business Environment:** Meaning and Elements of Business Environment. Economic environment, Economic Policies, Economic Planning. Legal environment of Business in India, Competition Policy, Consumer protection, Environment Protection, Policy Environment: Liberalization, Privatization, Globalization, Industrial Growth and Structural changes.

- 18. Financial and Management Accounting:** Basic Accounting concepts, financial statement, partnership accounts: Admission, Retirement and dissolution of firms. Advanced Company Accounts: Issue, Forfeiture, and Purchase of Business, Liquidation, and Valuation of Shares, Amalgamation, Absorption and Reconstruction, Holding Company Accounts. Cost and management Accounting: Ratio analysis, Fund Flow Analysis, Cash Flow Analysis, Marginal Costing and Break Even Analysis, Standard Costing, Budgetary Control. Responsibility Accounting
- 19. Business Economics:** Nature and Uses of Business Economics, Concept of profit and Wealth maximization, Demand analysis and Elasticity of Demand, Indifference curve analysis. Utility analysis and Law, cost, Revenue, price determination in different market situations: Perfect Competition, Monopolistic Competition, Price Discrimination and Oligopoly, Pricing Strategies.
- 20. Business Statistics and data Processing:** Data type, data collection and analysis, Sampling, Need, errors and Methods of Sampling, Normal Distribution, Hypothesis Testing, Correlation and Regression and Chi-square test, Data processing- Elements, data Entry, data processing and Computer applications, Computers application to functional areas- Accounting, Inventory Control.
- 21. Business Management:** Principal of Management, Planning- Objectives, Strategies, Planning process, Decision making, Organizing, Organizational Structure, Formal and Informal Organizations, Staffing, Leading: Motivation, Leadership, Communication Controlling, Corporate governance and Business Ethics.
- 22. Marketing management:** The evolution of marketing, Concept of marketing, Marketing Mix, Marketing Environment. Consumer Behaviour, Market Segmentation, Product Decisions, Pricing decisions, Distribution decisions, Promotion decisions, Marketing Planning , organizing and Control.
- 23. Financial Management:** Capital Structure, Financial and Operating Leverage, Cost of Capital, Capital Budgeting, Working capital management, Dividend Policy.
- 24. Human Resources management:** Concepts, Role and Functions of Human Resource management, Human Resource planning, Recruitment and Selection, Training and Development. Compensation: Wages and Salary Administration, Incentives and Fringe benefits, Morale and Productivity, Performance Appraisal, Industrial Relation in India, Health, Safety, Welfare and Social Security.
- 25. Banking and Financial Institutions:** Importance of Banking to Business, Types of Banks and their functions, Reserve Bank of India, NABARD and Rural Banking. Banking Sector reforms in India, NPA, Capital adequacy norms. E- Banking, Development Banking: IDBI, IFCI, SFCs, UTI, SIDBI
- 26. International Business:** Theoretical foundation of International business, balance of Payments, International Economic Institutions- IMF, World Bank, IFC, IDA, ADB World Trade Organization- its functions and Policies. Structure of India's foreign trade: Composition and Direction, EXIM Bank, EXIM Policy of India, Regulation and promotion of Foreign Trades.

- 1 Botany
- 2 Biotechnology
- 3 Chemistry
- 4 Computer Science
- 5 Forestry
- 6 Geology
- 7 Information Technology
- 8 Mathematics
- 9 Physics
- 10 Statistics
- 11 Zoology

1. BOTANY

- 1 **Biology and Diversity-I:** Microbes, Lichens, Algae And Fungi, Characteristics and ultra structure of Viruses, General characteristic of lichen and its economic importance, General concept of Algae including economic importance , General characteristics of fungi, parasexuality; Mycorrhizae; Mycotoxins; fungi as biocontrol agents, economic importance of fungi. Fungal diseases in plants; types of pathogens; symptoms of different diseases; methods of disease control; biotechnological approaches for production of disease resistant plants.
- 2 **Biology and Diversity:** Bryophyta, Pteridophyta And Palaeobotany: General idea about the morphological, cytological and ecological characteristics of bryophytes. Morden system of classification up to order level and salient features of the various groups, Economic importance of bryophytes, , general idea about pteridophytes, Stelar evolution, telome theory, evolution of sorus, homospority, heterospority and seed habit, Kinds of fossils.
- 3 **Angiosperm and Gymnosperm:** The species concepts, Salient features of international code of botanical nomenclature (ICBN), Taxonomic tools, Bentham & Hooker and Hutchinson Systems of classification : taxonomical study of Some important families viz. Rannunculaceae, Rosaceae, Asteraceae, Lamiaceae, Orchidaceae, , Poaceae, Concepts of phytogeography: Endemism, plant migration., Botanical survey of India, General Introduction and distribution of Gymnosperms, structure and reproduction of Cycadales, Ginkgoales, Coniferales,
- 4 **Cell and Molecular Biology:** Structural organization of the plant cell, Structure and function of cell wall, and other cell organelles, nucleus, DNA structure, ribosomes, cytoskeleton, Structure and Genomic organization of chloroplast and mitochondria, Cell cycle check points and role of cyclin and cyclin dependent kinases, Antigen and antibody, Types of Immunity, immunodiffusion and Radial immunodiffusion, confocal microscopy.
- 5 **Biotechnology:** General concept of Biotechnology, Concepts of cellular differentiation, Totipotency, Organogenesis, Micro propagation, Somatic embryogenesis, tissue culture techniques, artificial seeds, secondary metabolites, somaclonal variation, application of plant tissue culture, Industrial biotechnology, Biofertilizers, Recombinant DNA Technology, Genomics
- 6 **Plant Ecology:** Major biomes of the world, Vegetation organization, Ecological succession and concept of climax, structure and function of Ecosystem, energy flow

pathways, biogeochemical cycles of C, N, and P, Biological diversity, Environmental pollution, Climate changes: Green house gases (CO₂, CH₄, N₂O, CFCs, sources, trends and role), Ozone layer and Ozone hole, consequences of climate change.

- 7 **Cytology, Genetics and Plant Breeding:** Chromosome structure, Structure and numerical alteration in chromosomes, Genetics of prokaryotes and eukaryotic organelles, Gene structure and expression, Genetic recombination and gene mapping, Mutation, Molecular Cytogenetics, Alien gene transfer of whole genome.
- 8 **Plant Physiology & Metabolism:** Fundamental of enzymology, Membrane transport and translocation of water and solutes, Signal transduction, Photosynthesis, Respiration and lipid metabolism, Phytochromes, Plant growth regulators, Photoperiodism, vernalization., Stress physiology
- 9 **Plant Development and Reproduction:** Development of plant, Shoot development, Leaf growth and development, Root development, Reproduction, Male and female gametophytes, Pollination and fertilization, Seed development and fruit growth, Senescence and programmed cell death (PCD)
- 10 **Plant Resource Utilization and Conservation:** Concept of plant biodiversity and sustainable development, World centers of primary diversity of domesticated plants, Green revolution, Strategies for conservation – In- situ and Ex- situ conservation, botanical gardens, seed banks, in-vitro repositories; cryobanks; general account and activities of Botanical Survey of India (BSI) and other important Institutions.

2. BIOTECHNOLOGY

1. **Cell Signaling:** Endocrine, Exocrine and synaptic signaling, surface and intracellular receptors, G proteins and generation of secondary messengers, mode of action of cAMP and Ca⁺⁺ calmodulin, Target cell adaptation, cellular responses to environmental signals in plants and animals.
2. **Water:** Weak interactions in aqueous systems, Ionization of Water, pH, pKa, Titration curves of weak acids, Buffers, Henderson- Hasselbalch equations, Water as a reactant.
3. **Enzymes:** Introduction, Classification and Mechanism of action, Concept of activation energy, Enzyme Kinetics-Michaelis-Menten and Lineweaver- Burk equation for single enzyme substrate catalyzed reactions, Units of enzyme activity, Turnover number.
4. **Methods in Microbiology:** Pure culture techniques, The theory and practice of sterilization, Principles of microbial nutrition, Construction of culture media, Enrichment of culture techniques for isolation of chemotrophs and photosynthetic microorganisms, Pure culture and its maintenance.
5. **Modes of plant regeneration:** Micropropagation of Plants, Clonal fidelity of micropropagated plants, Explant factors, Nutrient medium factors, Somatic embryogenesis, Organogenesis, Synthetic seeds, Production of virus free plants; Somaclonal variations.
6. Cells and organs of the immune system including B-cells, t-cells. Antigen presenting cells, Natural killer cells, Haemopoiesis. Innate, acquired, active and passive immunity. Cell mediated and humoral immunity, Antibody dependent cell mediate cytotoxicity.

7. DNA as a genetic material, DNA replication in prokaryotes and eukaryotes, Bidirectional replication and rolling circle process, DNA damage and repair, Mechanisms including recombinations.
8. Preparation of genomic and cDNA libraries, rDNA transfer methodologies. Cloning of genes in microbes, plants and animal systems
9. **Concepts of Genetics:** Mendel and experimental approach of genetics, Mendel rediscovered, Molecular explanation of Mendel's Laws, Extension of Mendel's work, Mitochondrial and Chloroplast DNA.
10. Molecular approach to environment arrangement, degradative plasmids, Xenobiotics, Biological detoxification

3. CHEMISTRY

1. **Spectroscopy:** Basic principles and application of IR, UV, ESR and Raman.
2. **Spectroscopy:** Basic principles and application of NMR and MS.
3. **Chemical Thermodynamics:** Laws of thermodynamics, Joule-Thomson effect, Partial molar quantities, Gibbs Duhem equation, Chemical potential, Fugacity, ΔG_{mix} and ΔS_{mix} , Thermodynamic probability, Boltzmann distribution law.
4. **Electrochemistry:** Nernst equation, Electrode kinetics, Electrical double layer, Debye-Hückel theory, Corrosion, Lead storage battery, Fuel cells, EMF and ΔG relationship, Polarography, Potentiometry.
5. **Transition metals, coordination compounds and supramolecular chemistry:** Magnetic, catalytic and color properties of transition metals. Bonding theories (VBT, CFT, MOT), Octahedral, Tetrahedral, Tetragonal complexes, Electronic spectra of coordination complexes, Term symbol, Reaction mechanisms, General aspects of supramolecular chemistry.
6. **Nuclear chemistry and radioactivity:** Radioactive disintegration, Half life time and average life time, Nuclear reactions, Fission and fusion, Nuclear forces and nuclear models, Radioactive isotopes and their application, Radio-analytical techniques and activation analysis.
7. **Reactions and reagents:** Reactive intermediates and organic reaction mechanism: Carbonium ion, Carbanion, Free radicals, Carbene, Nitrene and Benzyne. SN^1 , SN^2 , E^1 , E^2 , Addition on carbon-carbon and carbon-heteroatom multiple bond, Aromatic electrophilic and nucleophilic substitution reactions.
8. **Biomolecules:** Chemistry of Peptides, Carbohydrates, Nucleic acids and lipids.
9. **Chemistry of natural products:** Steroids, Alkaloids, Terpenes, Flavanoids
10. Pericyclic reactions, Environmental chemistry and nanotechnology. Computers in chemistry. Catalysis, Green chemistry and Medicinal chemistry

4. COMPUTER SCIENCE

1. Boolean algebra and minimization of Boolean functions, Combinational circuit Design, Sequential Circuit Design. Representation of integers: Octal, Hex, Decimal, and Binary. 2's Complement and 1's complement, arithmetic, Floating point representation. Microprocessor architecture, Instruction set and Microprocessor applications.
2. Database Concepts, ER diagrams, Data Models, Design of Relational database, Normalization
3. Programming language concepts, Paradigms and models.
4. Analog and Digital Transmission, Asynchronous and Synchronous Transmission, Transmission Media. Multiplexing, Switching techniques, Network topologies, Networking Devices, OSI Reference Model, TCP/IP protocols.
5. Definition, Simple and Composite structures, Arrays, Lists, Stacks queues, Priority Queues, Binary tree, Graphs.
6. Object, classes, encapsulation, inheritance, polymorphism, abstract classes, Object oriented design, multiple inheritance, metadata.
- 7.: Software development models, Requirement analysis and specifications, Software design, Programming techniques and tools, Software validation and quality assurance techniques, Software maintenance and advanced concepts, Software management.
8. Main functions of operating systems, multiprogramming, multiprocessing, and multitasking. Memory management: Virtual memory, paging, fragmentation. Concurrent Processing: Mutual exclusion. Critical regions, Lock and unlock. Scheduling: CPU scheduling, I/O scheduling, Resource scheduling Deadlock and Scheduling algorithm. Banker's algorithm for deadlock handling.
9. Neural Networks: Perception model, Linear separability and XOR problem, Two and three layered neural nets, Back propagation- Convergence, Hopfield nets, Neural net Learning, Applications. Fuzzy Systems: Definition of Fuzzy set, Fuzzy Relations, Fuzzy functions, Fuzzy measures, Fuzzy reasoning, and Applications of Fuzzy systems.
10. Software Engineering, Current Trends and Technologies-Parallel computing, Mobile computing. Data warehousing: Data Warehouse environment, architecture of a data warehouse methodology, analysis, design, construction and administration. Data Mining: Extracting models and patterns from large databases, data mining techniques, classification, regression, clustering, summarization, dependency modeling, link analysis, sequencing analysis, mining scientific and business data.

5. FORESTRY

1. **Forest ecology and environmental science:** Definition, basic concept and importance of ecology in forestry. Ecosystem and concept of energy flow. Biodiversity uses and its conservation, hotspots, threats to biodiversity and convention of biodiversity (CBD). Biomass, productivity and forest floor mass, litter decomposition, forest soil and nutrient cycling. Concept and classical models of succession and climax. Factors of locality, basis of classification, distribution and forest types of India. Salient features of major world forest types. Role of forest in national economy, tribal and rural livelihoods. Natural resources, their management and ecosystem services. Environmental pollutions, global warming, effects of global warming, green house gases, ozone layer depletion and acid rain. Role of trees and forest in environmental conservation, environmental monitoring, concepts of sustainable development and Environmental Impact Assessment. Environmental policy and legislation in India- The Water (Prevention and Control of pollution) Act 1974, Forest Conservation Act 1980, The Air (Prevention and Control of pollution) Act 1981 and Environmental protection act 1986 and biodiversity conservation bill.

- 2. Silviculture and silvics:** Scope and classification, form and growth of trees, natural regeneration and artificial regeneration. Tending operations-thinning, weeding, cleaning and lopping. Forest nurseries-selection and preparation of site, nursery bed, planting pattern, methods of planting and management of nursery, choice of species and afforestation of difficult sites- saline, alkaline, coastal sands, lateritic soils, sand dunes, dry and rocky areas, cold desert. Silviculture systems- Clear felling, shelterwood, uniform, group system, irregular shelterwood system, strip system, selection system, group selection system, accessories system, coppice system, coppice selection system, coppice with standard system. Silviculture of important tree species- Acacia, Sal, Shisham, Teak, Pinus, Deodar, Abies, Eucalyptus and Poplar, Quercus, Albizia and Bamboos.
- 3. Concept of agroforestry, social forestry, community forestry and farm forestry:** Benefits and constraints of agroforestry. Historical development of agroforestry and overview of global agroforestry systems. Classification of agroforestry systems- Structural, functional, socio-economic and ecological. Diagnosis and design of agroforestry system. Land capability classification and land use. Criteria of an ideal agroforestry design, productivity, sustainability and adaptability. Multipurpose tree species and their characteristics suitable for agroforestry. Plant management practices in agroforestry, tree-crop interactions, ecological and economic, water and nutrient competition in agroforestry, alleycropping and concept of allelopathy. Organic farming.
- 4. Forest mensuration:** Definition, object and scope. Methods of measuring diameter, girth, height, bark thickness, stem form and volume of tree, classification of volume table, volume estimation of stands. Growth and increment of tree. Forest inventory, sampling methods, sample plot, survey, inventory preparation and photo interpretation. GIS and remote sensing- concept and scope. Frequency distribution, Mean, median, mode and standard deviation. Normal, binomial and Poisson distribution. Correlation, Regression coefficient and multiple regressions. Tests of significance- F and Chi square tests. Experimental designs -basic principles, completely randomized, randomized block, latin square and split plot design.
- 5. Forest Management:** Definition and scope. Concept of sustained yield, normal forest, rotation, estimation of growing stock, density and site quality. Management of even aged and unevenaged forest. Regulation of yield in regular and irregular forest by area, volume increment, working plan and joint forest management. National forest policy 1894, 1952, 1988 and Indian Forest Act 1927. Forest economics- introduction, definition and scope, economic growth and development, demand function, demand and supply, market equilibrium, market principle and market structure, perfect competition, monopoly and price control, timber product economics. Forest valuation- internal rate of return, present net worth and cost benefit analysis.
- 6. Forest Protection:** Definition and factors effecting forest protection. Man as source of injury to forest, deforestation, shifting cultivation, encroachment, mining, forest fire, protection against injuries by animals and protection against injuries by diseases. Classification of forest tree diseases and their control, common diseases in forest trees- root rot, heart rot, wilt, stem cancer, stem rust, die-back, galls, leaf spots, leaf blight, powdery mildew and leaf rust. Protection against injuries by insects, defoliating, sap sucking and mites, shoot, twig and root insects, seed and cone insects, wood boring insects and gall makers.
- 7. Forest utilization:** Felling and felling tools, logging, timber depot, storage and transportation of timber. Wood structure- physical and mechanical properties of wood.

Defects and abnormalities of wood. Seasoning and preservation of wood. Non timber forest products such as gum, resin, tannin, essential oil, spices, bamboos and cane and medicinal plants. Important forest industries.

8. **Forest genetics:** Introduction, scope of genetics and it's application in the tree improvement. Heredity and variation, causes and kinds of variation in natural and artificial stands, forces that shapes variation, heritability and genetic gains Weinburg Law. Provenience testing-collection, processing, storage of seed, seed dormancy, viability, pretreatment, seed testing. Progeny test and design. Methods of tree breeding. Seed orchard-type, establishment and management, seed production areas, clonal forestry, Vegetative propagation, role of growth substance in vegetative propagation and tissue culture.
9. **Wildlife ecology:** Scope of wild life management in India, limitations of management, problems of wildlife manager, rare, threatened and endangered species of India. Food chain, quality and quantity, food web, carrying capacity, niches, food size, pinch period, predation and shelter, territory and home range of animal. population – biological surplus, environmental resistance, gregarious and flocking, density and saturation point and population dynamics and zoogeographical regions of the world. Management and conservation of wildlife Sanctuaries, National parks, zoological parks and biosphere reserves. Techniques of wild life studies- census and estimates track and trails, importance animals of India, their distribution and importance, wild life values, wildlife and tourist, wild life as a land use. Wild life protection act 1972 as amended 1991.
10. **Watershed Management:** Introduction and scope, natural hazards in watershed management, extent and causes of land denudation, aspects of hydrological cycle, deforestation and hydrologic change, impact of human activities on watershed, hill agriculture, erosion from mines and quarries, erosion hazards in road construction and scientific basis of watershed management. Role of forest in watershed management. Role of livestock in watershed management. Importance of the transfer of plant nutrients. Watershed management techniques. Wasteland their characteristics and reclamation.

6. GEOLOGY

1. **Igneous Petrology:** Forms, textures and structures of the igneous rocks. Silicate melt equilibria, binary and ternary phase diagrams. Behaviour of major, minor trace and Rare Earth elements during magmatic crystallization. Igneous rock suites and complexes and their tectonics settings. Mafic and ultramafic suites, including anorthosite, granite, syenite and alkaline suites, carbonitite, charnokite.
2. **Geochemistry:** Earth in relation to the solar system and universe, cosmic abundance of elements; Composition of the planets and meteorites. Structure and composition of earth and distribution of elements. Trace elements, Introduction to Isotopes geochemistry. Geochemical cycle and principals of geochemical prospecting.
3. **Geodynamics:** Earth and the solar system, planetary evolution of the earth and its internal structure Major tectonic features of the Oceanic and Continental crust. Continental breakup and drifting of continents. Sea-floor spreading and plate tectonics- concept and evidence Palaeomagnetism. Seismicity and plate movements. Island arc, Oceanic Island and volcanics arc. Isostasy Earthquake and volcanics. Tectonic subdivision, structure and evolution of Himalaya.. Active and passive marginal basins.
4. **Stratigraphy:** Standard Stratigraphic Scale, Code of Stratigraphic Nomenclature, Different Boundary Problems. Lithostratigraphic & Chronostratigraphic Classification.

Precambrian Formation of the World along with Archean Proterozoic, Paleozoic, Mesozoic and Cenozoic Formation of India, Different Tectonic Division and elements of Himalaya.

5. **Paleontology:** Origin of Life, Precambrian Life with special reference to microbiota, Ediacaran assemblage, Stromatolites and trace fossils International code of Zoological nomenclature. Biostratigraphic Classification. Critical evaluation of Indian Phanerozoic Fossil record with special emphasis on their evolution, Classification and significance of Brachiopoda, Mollusca, Trilobita, Graptolites and Echinoderms. Uses and application of different microfossil groups- Calcareous, Phosphatic and Siliceous. Evolution of Plants and Vertebrates – Man , Horse, Elephant and Dinosaurs.
6. **Crystallography and Mineralogy:** Elementary idea of space lattice and symmetry of internal structures. 14 Bravais Lattices. Systematic description of 32 classes of symmetry. Twinning in crystals. X- ray crystallography. Laue and oscillation methods. Rotation of crystals and Powder methods. Detailed study of silicate structures. Study of important groups of rock- forming minerals, with reference to their crystal structure, physical & optical properties, chemical composition and occurrences such as olivine, pyroxene, amphibole, mica, chlorite, talc feldspars, feldspathoids, zeolites and spinel. General principles of optical mineralogy, pleochroism, indicatrix, interference figures and determination of optical sign, 2V, 2E and dispersion. Universal Stage.
7. **Geomorphology and Remote Sensing:** Geomorphic processes and agents; development and evolution of landforms; slope and drainage; processes on deep oceanic and near-shore regions; quantitative and applied geomorphology. Types of remote sensing (aerial and space borne; aerial photography, multispectral scanning including thermal infra-red sensing, RADAR remote sensing). Elements of visual image interpretation. Fundamentals of Digital image processing. Application of remote sensing data in geological investigations, resource exploration, geohazard monitoring and environmental monitoring. India,s remote sensing programme.
8. **Sedimentology:** Granulometric properties and texture. Characters of various clastic and non-clastic rocks. Sedimentary structures. Palaeocurrent and sediment dispersal patterns. Provenance. Concept of sedimentary facies and facies analysis. Modern and ancient sedimentary environments. Sedimentary basins in different tectonic settings.
9. **Environmental Geology, Engineering Geology and Hydrogeology:** Landuse pattern and land capability mapping. Engineering properties of rocks and soils. Geological conditions for the suitability of dam foundation and reservoir. Problems of hill slope instability and remedial measures. Buildings, their types and foundation problems. Geological considerations for the safe alignment of tunnels. Buildings and their types. Bridges and causes of their failure. Distribution of ground water. Porosity, Permeability. Aquifers and their types. Impacts of excessive withdrawal of ground water. Pollution of ground waters, rivers and lakes.
10. **Structural Geology:** Concept of deformation, mechanical principles, Stress and strain status in rocks; folds, faults their definition, classification and mechanism, thrust geometry; Joints, fractures, rock cleavages, lineation and foliation, tectonites and microtectonics, shear zone, application of stereographic projection; crystallization and deformation; determination of structures in field.

7. INFORMATION TECHNOLOGY

1. **Computer Networks:** Network fundamentals; Local Area Networks (LAN), Metropolitan Area Networks (MAN), Wide Area Networks (WAN), Wireless Networks, Internetworks. Reference Models: The OSI model, TCP/IP model. Data Communication : Channel capacity. Transmission media- Twisted pair, Coaxial cables, Fibre-optic cables, Wireless Transmission-Radio, Microwave, Infrared and Millimeter waves. Lightwave Transmission. Telephones- Local loop, Trunks, Multiplexing, Switching, Narrowband ISDN, Broadband ISDN, ATM, High speed LANs, Cellular Radio Communication, Satellites-Geosynchronous and Low-Orbit. Internetworking: Switch/Hub, Bridge, Router, Gateways, Concatenated Virtual Circuits, Tunnelling, Fragmentation, Firewalls. Routing; Virtual Circuits and datagrams. Routing Algorithms. Congestion control. Network Security Cryptography-Public key, Secret key, Domain Name System (DNS)-Electronic Mail and Worldwide Web (WWW). The DNS, Resource Records, Name Servers, E-mail-Architecture and Services.
2. **Data and File Structures:** Data, Information, Definition of data structure, Arrays, Stacks, Queues, Linked Lists, Trees, Graphs, Priority Queues and Heaps. File Structures : Fields, Records and Files. Sequential, Direct, Index-Sequential and relative files. Hashing, Inverted Lists and Multi-lists. B trees and B⁺ trees.
3. **Discrete Structures:** Sets, Relation, Functions, Pigeonhole Principle, Inclusion-Exclusion Principle, Equivalence and Partial Orderings, Elementary Counting Techniques, Probability. Measure(s) for information and Mutual Information. Computability : Models of computation-Finite Automata, Pushdown Automata, Non-determinism and NFA, DPDA and PDAs and Languages accepted by these structures. Grammars, Language, Non-computability and Examples of Non-computable problems. Graph : Definition, walks, Paths, Trails, Connected Graphs, regular and bipartite graphs, cycles and circuits. Tree and rooted tree. Spanning trees. Eccentricity of a vertex radius and diameter of a graph . Central Graphs, Centre(s) of a tree. Hamiltonian and Eulerian Graphs, Planar Graphs. Groups : Finite Fields and Error Correcting/Detecting codes.
4. **Algorithms:** The Role of algorithms in computing, Probabilistic analysis and randomized algorithms, Sorting and order statistics, Heapsort, Quicksort., sorting in linear time, medians and order statistics, Elementary data structures, Hash tables, Binary search trees, Red-Black trees, Augmenting data structures, Dynamic programming, Greedy algorithms, Amortized analysis, B-Trees, Binomial Heaps, Fibonacci Heaps, Data structure for Disjoint sets, Elementary Graph algorithms, Minimum spanning trees, Single-source shortest paths, Maximum flow, Sorting networks, Matrix operations, Linear programming, Number-Theoretic algorithms, String Matching, Approximation algorithms.
5. **Software Engineering:** System Development Life Cycle (SDLC): Steps, Waterfall Model, Prototypes, Spiral Model. Software Metrics : Software Project Management. Software Design : System Design, Detailed Design, Function Oriented Design, Object Oriented Design, User Interface Design, Design Level Metrics. Coding and Testing: Testing Level Metrics. Software quality and reliability, Clean room approach, Software Reengineering.
6. **Artificial Intelligence:** Overview of artificial intelligence, LISP and other AI programming languages, Formalized symbolic logics, Probabilistic reasoning, Structured knowledge: Graphs, frames and related structures, Object oriented representations, Search and control

strategies, Matching techniques, Natural language processing, Pattern Recognition, Visual image understanding, General concepts in knowledge acquisition, Machine learning, Learning by induction, Analogical and explanation based learning.

7. **Computer Graphics:** A survey of computer Graphics, Overview of Graphics systems, Output Primitives, Attributes of output primitives, Two-dimensional geometric Transformations, Two-dimensional Geometric Transformations, Two –dimensional viewing, Structures and Hierarchical modeling, Graphical user interfaces and Interactive input methods, Three dimensional concepts, Three dimensional object representations, Three dimensional Geometric and Modeling Transformations, Three dimensional viewing.
8. **Web Design and Development:** Basic web designing: Introduction to web browser, architecture of web browser, web page, static & dynamic web pages, home page, web-site. Web-servers & clients. www. Introduction to HTML: History, structure of HTML document, creating & executing HTML. Tags of HTML: Headings and Title, Character level and paragraph level formatting tags. <Center>, Text-level elements , <U>, <I>, <PRE>, <BIG>, <STRIKE>, <SUB>, <SUP>, <BODY> Tag & its attributes. Changing Colors font, size using Tag, Text alignment & paragraph <P> tag. <MARQUEE> Tag, Event Handling & Form Validation: onClick, onChange, onLoad, onSelect, onSubmit, onMouseOver, onFocus, onBlur, Validation of text box entries, checkboxes, radio buttons, e-mail address validation, date validation. VBScript and Active Server Pages (ASP) VBScript : Introduction, keywords, empty, isempty, nothing, null, true, false. Variable, operators. VBScript Statements: if...then..else, if..then...elseif.., select, for...next, for..each, do...while loop. Arrays & Objects: declaring arrays, types of arrays, VBScript objects, VBScript layout statements, error handling, adding objects, Forms, Controls & managing transactions, VBScript event programming.
9. **Multimedia:** Multimedia in Use: Introduction to multimedia, Definition, Elements of multimedia, Need of multimedia, Applications, Goal & Objectives, Multimedia building blocks, Users of multimedia, Benefits of Multimedia, Training, Sales, Communication, Medicine. Multimedia & Internet. Multimedia Configuration: Converging technologies, Functions & subsystems (input, development & output). Multimedia PC workstation components. Multimedia platform, Multimedia H/w, System software, Multimedia OS File system (tiff, bmp, pcx, gif, jpeg etc.) Multimedia communication system. Development Tools: Developing applications, commercial tools, standards. Image and application image capture, Compression, text conversion, vaporization, image compression, Standards for encoding images, Standards for compression bitonal images, JPEG, Fractals for compression. Multimedia in Real World: Multimedia on network, Multimedia databases (in Oracle), Windows support for sound, animation, movies, music. Training & education: need for training, multimedia in training and education. Multimedia for information and sales, Multimedia in office & home.
10. **Network Security:** Introduction, Security Concepts, Threats and Risks, Attacks – Passive and Active, Security Services, Confidentiality, Authentication, Non-Repudiation, Integrity, Access Control, Availability, Model for Internetwork Security, Internet Standards and RFCs Access Control Mechanisms , Access Matrix, HRU, TAM, ACL and capabilities. Network Security Applications, Authentication Mechanisms: a) Passwords, b) Cryptographic authentication protocol, c) Smart Card, d) Biometrics,e) Digital Signatures and seals, f) Kerberos, g) X.509 LDAP Directory. Web Security: a) SSL Encryption b) TLS, SET. E-mail Security, PGP's / MIME, IP Security, Access and System Security, Intruders, Intrusion Detection and Prevention, Firewall a) Hardware Firewall b) Software Firewall c)

Application Firewall d) Packet Filtering. e). Packet Analysis , Proxy Servers, Firewall setting in Proxy, ACL in Proxy.

8. MATHEMATICS

1. **Real Analysis:** Riemann integrate functions; improper integrate, their convergence and uniform convergence. Euclidean space \mathbb{R}^n , Bolzano – Weierstrass theorem, compact. Subsets of \mathbb{R}^n , Heine – Borel theorem, Fourier series. Continuity of functions on \mathbb{R}^n , Differentiability of $f: \mathbb{R}^n \rightarrow \mathbb{R}^m$, Properties of differential, partial and directional derivatives, continuously differentiable functions. Taylor's series. Inverse function theorem, implicit function theorem. Integral functions, line and surface integrals, Green's theorem. Stokes's theorem.
2. **Complex Analysis:** Cauchy's theorem for convex regions, Power series representation of Analytic functions. Liouville's theorem, Fundamental theorem of algebra, Riemann's theorem on removable singularities, maximum modulus principle. Schwarz lemma, Open Mapping theorem, Casorati–Weierstrass–theorem, Weierstrass's theorem on uniform convergence on compact sets, Bilinear transformations, Multivalued Analytic Functions, Riemann Surfaces.
3. **Advanced Analysis:** Elements of Metric Spaces, Convergence, continuity, compactness, Connectedness, Weierstrass's approximation Theorem. Completeness, Baire category theorem, Lebesgue measure, Lebesgue integral, Differentiation and integration
4. **Algebra:** Symmetric groups, alternating groups, Simple groups, Rings, Maximal ideals, Prime ideals, integral domains, Euclidean domains, principal ideal domains, Unique Factorisation domains, quotient fields, Finite fields, Algebra of Linear Transformations, Reduction of matrices to Canonical Forms, Inner Product Spaces, Orthogonality, quadratic Forms, Reduction of quadratic forms.
5. **Numerical analysis:** Finite differences, interpolation ; Numerical solution of algebraic equation; Iteration; Newton–Raphson method; Solution on linear system; Direct method; Gauss elimination method; Matrix–Inversion, eigenvalue problems; Numerical differentiation and integration. Numerical solution of ordinary differential equation; iteration method, Picard's method, Euler's method and improved Euler's method.
6. **Linear Programming Basic Concepts:** Convex sets. Linear Programming Problem (LPP). Examples of LPP, Hyperplane, open and closed half – spaces. Feasible, basic feasible and optimal solutions. Extreme point and graphical method. Simplex method, Duality in linear programming. Transformation and assignment problems.
7. **Measure Theory:** Measurable and measure spaces; Extension of measures, signed measures, Jordan – Hahn decomposition theorems. Integration, monotone convergence theorem, Fatou's lemma, dominated convergence theorem. Absolute continuity. Radon Nikodym theorem, Product measures, Fubini's theorem.
8. **Functional Analysis:** Banach Spaces, Hahn – Banach Theorem, Open mapping and closed Graph Theorems. Principle of Uniform boundedness, Boundedness and continuity of Linear Transformations. Dual Space, Embedding in the second dual, Hilbert Spaces, Projections. Orthonormal Basis, Riesz – representation theorem. Bessel's inequality, Parseval's identity, self adjointed operators, Normal Operators.

- 9. Ordinary and partial differential equations:** Introduction to differential equations, Linear Equations with Variable Coefficients, Euler's Method, The Existence and Uniqueness Theorem, Homogeneous equations with constant coefficients, Fundamental solutions, linear independence, Wronskian, Non-homogeneous equations: method of undetermined coefficients, Non-homogeneous equations: method of variation of parameters, Partial differential equations, Monge's method, Canonical forms, Characterization of a partial differential equation, Heat equation, Wave equation, Laplace's equation
- 10. Topology:** Topological spaces, open sets, closed sets, neighbourhoods, Interior, exterior and boundary of sets. Metric spaces, Induced Topology, Complete metric spaces, compactness in metric spaces, Continuity and homeomorphism, Connectedness, Compactness, Countability and separability.

9. PHYSICS

- 1. Mathematical Methods of Physics:** Vector algebra and vector calculus; matrices, Cayley Hamilton theorem, eigenvalue problems; Linear differential equations; Hermite, Bessel, Laguerre and Legendre; Fourier series, Fourier and Laplace transforms; complex analysis: poles, residues and evaluation of integrals
- 2. Classical Mechanics:** Central-force motion; Two-body collisions, Rigid body dynamics, moment of inertia tensor, Variational principle, Lagrangian and Hamiltonian formalisms and equations of motion; Poisson brackets and canonical transformations, Special theory of relativity, Lorentz Transformations, relativistic kinematics and mass–energy equivalence.
- 3. Electromagnetic Theory:** Gauss' Law and its applications; Biot-Savart law, electromagnetic induction; Maxwell's equations in free and linear isotropic media; Gauge invariance; Electromagnetic waves in free space, dielectrics, and conductors; Lorentz invariance of Maxwell's equations
- 4. Quantum Mechanics:** Wave-particle duality; Heisenberg's uncertainty principle; Dirac's bra and Ket notations, time-dependent and time-independent Schroedinger equation ; Time independent perturbation theory and applications; Time dependent perturbation and Fermi's Golden Rule; Elementary theory of scattering, partial waves and Born Approximation; Identical particles, Pauli's exclusion principle, Klein Gordon and Dirac equations.
- 5. Thermodynamic and Statistical Physics:** Laws of thermodynamics and their consequences; Phase space, Micro canonical, canonical and grand-canonical ensembles; partition functions; Free Energy and connection with thermodynamic quantities; Classical and quantum statistics, ideal Fermi and Bose gases.
- 6. Electronics:** Semiconductor devices: diodes, junctions, transistors, field effect devices; Optoelectronic devices: including solar cells, photodetectors, and LEDs; Operational amplifiers and their applications; Digital techniques and applications (registers, counters, comparators and similar circuits); A/D and D/A converters.
- 7. Experimental Techniques and data analysis:** Data interpretation and analysis; Precision and accuracy, error analysis; chi-square test; Transducers (temperature, pressure/vacuum, magnetic field, vibration, optical, and particle detectors), , impedance matching, amplification (Op-amp based, instrumentation amp, feedback), filtering and noise reduction, shielding and grounding.

- 8. Atomic & Molecular Physics:** Quantum states of an electron in an atom; Electron spin; Stern-Gerlach experiment; Spectrum of Hydrogen, helium and alkali atoms; Relativistic corrections for energy levels of hydrogen; Hyperfine structure; LS & JJ coupling; Zeeman, Paschen Back & Stark effect; X-ray spectroscopy.
- 9. Condensed Matter Physics:** Bravais lattices; Elastic properties, phonons, lattice specific heat; Free electron theory; Drude model of electrical and thermal conductivity; Hall effect; Dia., Para, and Ferromagnetism; band theory of metals, insulators and Semiconductors; Superconductivity.
- 10. Nuclear and Particle Physics:** Basic nuclear properties: size, shape, charge distribution, spin and parity; Binding energy, Semi-empirical mass formula; Liquid drop model; Fission and fusion; Isospin; Elementary ideas of alpha, beta and gamma decays; Nuclear reactions, Classification of fundamental forces; Elementary particles (quarks, Baryons, mesons, leptons); isospin, strangeness; Gell-Mann-Nishijima formula; C, P, and T invariance; parity non-conservation in weak interaction.

10. STATISTICS

1. Statistical Methods: Measures of central tendency, dispersion, skewness, kurtosis, correlation, regression, interpolation, extrapolation, index numbers, time series and vital statistics.

2. Sampling Methods: simple random Sampling, stratified sampling, systematic sampling, ratio and regression methods, cluster sampling, two-stage sampling, double sampling, Non-sampling errors.

3. Design of Experiments: Block designs, CRD, RBD, LSD, BIBD, PBIPD, Factorial designs, confounding in block designs.

4. Probability: Compound probability, conditional probability, bayes theorem, expectation, MGF, characteristic function, Inversion and continuity theorems for C. F., Kolmogorov's inequality, The weak law of large numbers, The strong law of large numbers, Bernoulli's, Kintchine's theorems, Central limit theorem.

5. Testing of Hypothesis: Null hypothesis, alternative hypothesis, simple and compound hypothesis, errors in testing, Neyman Pearson Lemma and its generalization, UMP Tests, Unbiased Tests, UMPU Tests, Tests with Neyman structure and UMP similar tests, Likelihood Ratio tests and their large sample properties along with simple applications.

6. Estimation: Elements of Decision Theory, Admissibility, Properties of good estimators, Unbiasedness, Efficiency, Sufficiency and completeness, Cramer –Rao inequality and its generalization, Bhattacharya's Bounds, Characteristics of distribution admitting sufficient statistic, Rao-Blackwell Theorem and Lehmann - Scheffe theorem. Method of Estimation, Method of Maximum Likelihood, Method of Moments, Method of Chi-Square, Properties of M.L.E.

7. Multivariate Analysis: Singular and Non Singular Multivariate Normal distributions, Marginal and Conditional distributions, Characteristic Function and Moment Generating

Functions, Maximum Likelihood Estimation of Mean and Co-Variance matrix, independence and joint sufficiency for these estimates, Hotelling's T² statistic as a function of the Likelihood Ratio criterion, It's distribution and applications, Mahalanobis D² statistic and it's distribution, Discriminant function(for two variables), Principal Components and Canonical Correlations. Path Analysis, Factor Analysis , Discriminant Analysis, MANOVA.

8. Non-parametric Inference: Tests for randomness, tests for goodness of fit, one sample and two sample tests, Linear rank statistic and general two way sample problem, Linear Rank tests for location and scale problems, Rank test for one way and two way classified data, Multivariate non parametric test for one sample location problems, Asymptotic relative efficiency, examples of ARE tests.

9. Stochastic Process and Reliability Theory: Definition of Stochastic processes, Markov Chain, one step and n- step transition probabilities, Chapman-Kolmogorov Equation, first passage and first return probabilities, classification of states, Markov Chains with continuous state space, Poisson Processes, Birth and death processes, elements of Markov Process.

Definition of Reliability , Maintainability and Availability, Life distributions, failure rates and bath tub failure curve, exponential, Gamma, Weibull and Log Normal models, Linearly increasing Hazard model, mean time to system failure and mean time between failure components and system reliability, series and parallel configuration, Active and standby redundancy and preventive Maintenance.

10. Bayesian Inference and Econometrics: General structure of a Bayesian Decision problem, role of loss function, Risk function, Prior information, Application of Bayes theorem in computing posterior distributions, Bayes estimators of the posterior mean under squared error loss, Bayesian notion of sufficiency, construction of conjugate priors, improper and diffuse priors.

Construction of economic models, Endogenous and Exogenous Variables, concept of Multicollinearity, Identification Problems, rank and order condition of Identifiability, identification under bilinear restrictions, identifiability everywhere in the parametric space, WALA'S criterion of identification,

11. ZOOLOGY

- 1. Microbiology, Biotechnology and Instrumentation:** Kinds of Microorganisms: Viruses, Bacteriophages, Rickettsiae, Bacteria, Fungi, Slime moulds etc. Environmental Microbiology: Microbiology of air, water, soil and Bioremediation. Microbiology of food: Microbial contamination and spoilage of industrial and domestic food, sources of food poisoning and food preservation. Antibiotics: History of Penicillin, Classification of Antibiotics, Non-medical uses of antibiotics. Biotechnology: Scope and importance, Restriction enzymes in cloning, Techniques used in recombinant DNA technology (agarose and polyacrylamide gel electrophoresis, PEGE, Southern, Northern and Western Blotting, dot blots and slot blots); Cloning vectors for recombinant DNA (Plasmids, Phages, Cosmids, Viruses and Transposons), Transgenic plants and animals. Instrumentation:Elementary knowledge of the functioning and application of the following equipments: Microscopy: Light and phase contrast, Interference, Fluorescence and electron

microscopy. Microtomy: Routine paraffin microtomy, Spectrophotometry. Chromatography and Electrophoresis. Centrifugation

2. **Animal Diversity I:** General classification, characters, habits and habitats of non-chordate phyla. Protozoa: Locomotion and reproduction in protozoa. Porifera: Canal system. Coelenterata: Polymorphism in Coelenterata, coral reefs. Helminthes: Life cycle of *Wuchereria* and *Schistosoma*. Annelida: Segmental organs, Adaptive radiation in Polychaeta. Arthropoda: Crustacea (Larval forms); Onychophora (General characters and affinities); Insecta (social life in honey bee and termites). Echinodermata: Water vascular system.
3. **Animal Diversity II:** Classification upto orders, characters, habits and habitats of chordates. Origin and evolution of chordates, General organisation, classification and affinities of Protochordata and cyclostomata, Ratitae: Distribution and affinities, Dentition in mammals, General characters, distribution and affinities of Prototheria and Metatheria.
4. **Biological Chemistry and Physiology (With emphasis on Vertebrates):** Carbohydrates, Proteins and Lipids: Chemical structure, classification and sources of biochemically significant and metabolism. Enzymes: Nomenclature and classification, mechanism of enzyme action, factors influencing enzyme activity. Vitamins: Chemical structure, source and deficiency state of fat soluble and water soluble vitamins. Nutrition: Digestion, absorption and assimilation of various food stuffs. Respiration: Respiratory surfaces in different groups and gaseous exchange, Respiratory pigments, Transport of oxygen and Carbon dioxide. Circulation: Haemopoiesis, Heart beat and its regulation and cardiac output, Blood flow through arteries, veins and capillaries (pulse and blood pressure) including regulation, coronary circulation and coronary occlusion. Excretion and osmoregulation: Functions of kidney, Types of nitrogenous wastes in different animal groups and their excretion, Renal excretion in vertebrates (urine formation in a mammal in particular). Nervous Co-ordination: Structure of neuron, nature, origin and propagation of nerve impulse, Synaptic transmission, Chemistry and functions of neurotransmitters. Muscle physiology: Structure, kinds and characteristics of muscles.
5. **Cytogenetics:** Chemistry of gene: Structure of nucleic acids (A, B, C and Z-DNAs, RL-model of Sasisekhara; supercoiling; genetic and non-genetic RNAs), DNA replication (evidence for semi conservative replication); DNA repair (excision repair, mismatch repair and SOS repair), DNA repair and genetic disease in humans, Genetic Code: Properties of genetic code, Mutation and genetic code, Wobble hypothesis, New genetic codes in mitochondria and ciliate protozoa. Gene Function (Regulation of gene expression): Fine structure of gene; Benzer's analysis of r-II locus by deletion and complementation mapping; Operons in bacteria (lac and trp operons in *E. coli*); General introduction to complexities of gene regulation in eukaryotes, organisation of typical eukaryotic gene.
6. **Genetics; Chromosome mapping:** Chromosome mapping in *Drosophila* (single and double crossing over), human chromosomes (Somatic cell genetics). Sex determination: Chromosome theory of sex determination, Balance theory of sex determination (X/A ratio in *Drosophila*), Hormonal and environmental control of sex, Dose compensation in *Drosophila* and man. Sexuality and recombination in Bacteria and Viruses: Three modes of transfer of genetic material (Transformation, transduction and conjugation), Sexual conjugation in bacteria (F^+ , F^- and HFR strain), F^- and sex conjugation. Multiple Alleles: Multiple alleles and isoalleles (Skin colour in rodents, eye colour in *Drosophila*, blood group in humans).

7. **Ecology:** Basic concepts, Rationale and approach. Habitats: Freshwater (Lakes) and Marine (Estuary). Environmental factors: Laws of limiting factors, namely temperature. Eutrophication of freshwater ecosystems: Causes, consequences and control measures. Functioning of ecosystems: Energy flow, productivity, trophic structure and ecological efficiencies. Ecology of communities: Namely dominance, various types of diversity indices, Ecotone and niche concept.
8. **Evolutionary Biology, Taxonomy and Animal Behaviour:** Evolutionary Biology: Synthetic theory of evolution., Micro, macro and mega evolution., Isolation and Variation. Species and speciation. Genetic drift (Sewell –Wright effect). Hardy-Weinberg law. Taxonomy, Introduction to systematics and taxonomy and its significance in Zoology. Modern approaches in taxonomy. Concept of zoological classification. Species concept. Rules of zoological nomenclature. Collection, preservation and identification of insects and other specimens. Animal Behaviour Innate Behaviour and Learned Behaviour Communication: Chemical communication, Visual and Auditory communication. Migratory Behaviour: Mechanisms of navigation and homing in fish and birds. Social Behaviour: Types of social acts, Parental care. Biological Rhythms: Kinds of biological rhythms, Biological clock, Circadian rhythms and their control.
9. **Mammalian Endocrinology:** Classification and chemical nature of hormones, Complete knowledge of the generalized mechanisms of action (at molecular level) of protein and steroid hormones. Molecular structure, origin, release and transport of sex hormone. Microanatomical and histological structure of mammalian Pituitary, hypothalamo-hypophysial system, Pineal, Thyroid, Parathyroid, Endocrine Pancreas and Adrenal glands, and the molecular structure, synthesis, storage, control of release, transport, denaturation and physiological actions of their hormones.
10. **Developmental Biology:** Fertilization: Mechanism of fertilization, early and late changes in egg organisation caused by fertilization. Cleavage and Blastulation: Patterns of cleavage, determinate and indeterminate cleavage, influence of yolk on cleavage, metabolic changes during cleavage, morulation and blastulation in frog, chick and rabbit. Gastrulation: Fate maps, morphogenetic movements in frog, chick and rabbit. Development and functions of the foetal membranes in mammals. Organogenesis: Development of brain, eye and heart in chick. Metamorphosis: Kinds of metamorphosis, Physiological and biochemical changes during metamorphosis, hormonal control of metamorphosis.

FACULTY OF LAW

1. Definition, Scope and Development of Jurisprudence, Law and Morality
2. Sources of Law-Custom, Legislation and Precedent, Administration of Criminal Justice
3. Analytical School, Kelson's Pure Theory of Law, Natural Law, Sociological, Historical and Realistic Schools of Law
4. Rights and Duties, Legal Personality
5. Possession & Ownership, Liability and Obligation
6. Constitutional Developments, Salient Features and Nature of Indian Constitution, Preamble
7. Fundamental Rights, Directive Principles of State Policy and Fundamental Duties
8. Legislature- Union and State, Executive – Union and State, Judiciary

9. Centre-State Relationship, Governmental Liability in Torts and Contract, Civil Services, Freedom of Trade, Commerce and Intercourse
10. Emergency Provisions, Amendment of the Constitution

FACULTY OF EDUCATION

EDUCATION

1. Impact of Philosophical suppositions on education made by – Idealism Naturalism, Pragmatism and Existentialism.
2. Impact of Philosophical Suppositions on Education by – Indian Schools of Philosophy Namely – Upanishad, Geeta, Buddhism, Sankhaya, Yoga, and Vedant.
3. Educational Thoughts : Gandhi, Tagore and Sri Aurbindo.
4. Human Development : Factors influencing development and their relative role. Theories of Piaget and Bruner – major concepts and stages and implications for education.
5. Learning : Concept, Theories of Learning and their Educational Implications : Thorndike's Connectionism, Pavlov's classical conditioning, Skinner's operant conditioning, Gestalt Psychology, Gagne's conditions of Learning, Guthrie's contiguous conditioning.
6. Intelligence – Guilford's structure of intellect (SI) and Howard Gardener's Theory of Multiple Intelligences (MIT) Creativity – Definitions, factors, fostering and guiding creative children.
7. Methods of Educational Research Experimental, Normative Survey, Historical Case Study . Developmental, Ethnographic, Documentary –analysis.
8. Developing a Research Proposal Problem and its sources: Selection and Definition of problem. Objectives – primary, secondary and concomitant.
Hypothesis – nature, definition, types. Sources and characteristics of a good hypothesis : directional and non – directional hypothesis.
9. Sampling
Unit of sampling, population : techniques (a) probability sampling techniques & (b) non-probability sampling techniques.
Characteristics of a good sample.
Sampling errors and how to reduce them.
Tables of Random Numbers : types : how to use them.
10. Analysis of Data
Descriptive and Inferential Statistics
The null hypothesis, test of significance, type of errors.
One – tailed and two – tailed tests and F- test.
The F- Test (one- way ANOVA)
Normal probability curve and its characteristics.

KUMAUN UNIVERSITY

ORDINANCES - 2009

for

Ph.D., D.Litt. and D.Sc. degree Programmes

(for Faculties of Arts, Science, Education, Law, Technology & Commerce and Management)
effective from 2009-2010

(A) DOCTOR OF PHILOSOPHY (Ph.D.)

Eligibility Criteria

(a) A candidate for the Ph.D. degree must have a Master's degree of the Kumaun University (hereafter referred to as University) or of any other University incorporated by the law in force and recognized by the Executive Council; provided also that the candidate either,

(i) has secured at least fifty five percent (55%) marks or a grade point average equivalent of 55% marks at the Master's Degree examination. For S.C./S.T. Candidates, the minimum marks shall be 50%.

or

(ii) is a regularly appointed teacher in the University or a College affiliated to the University.

or

(iii) M. Phil in the subject concerned.

(b) A Candidate shall ordinarily be permitted to work for the Ph.D. Degree in the subject in which he/she has obtained Master's Degree, but also that research work leading to Ph.D. Degree may be allowed in allied subjects in the same or an other Faculty, if the Research Degree Committee (RDC) concerned is satisfied that the candidate possesses the requisite qualifications to take up the proposed work. Allied subjects for the above stated purpose must have been approved by the Academic Council of the University.

Procedure for Admission

(a) The University/Colleges/Centers shall notify the predetermined/ manageable number of seats for Ph.D. students annually depending upon facilities and expertise of eligible Faculty Supervisors. Only the predetermined number of students shall be admitted to Ph.D. programme.

(b) The admission to Ph.D. course shall be done through an Entrance Test to be conducted by the University for eligible candidates and shall be followed by an interview.

(c) The candidates shall be interviewed by the RDC about their research interest/area.

(d) The NET (or equivalent) qualified/ PG teachers (appointed on regular basis) and M.Phil. degree holders shall be exempted from the Entrance Test but are required to apply and shall be interviewed and considered together with other candidates at the time of interview for seat allotment.

(e) Reservation Policy of the Government shall be applicable for granting admissions.

Research Supervisor

(a) Every candidate shall have a supervisor. A supervisor/ guide (co-supervisor / co-guide) must be:

(i) A regular teacher of the Kumaun University or a college affiliated to it, who holds a research Degree (Ph.D.) and has at least five years teaching experience (including at least three years PG teaching). Such a teacher should have at least one year standing in the university college before being recognized as supervisor and must have expertise in related research area. or

(ii) A Scientist or Head of a section of a Research Institute/department / Laboratory recognized for the purpose by the University, who holds a Doctor's Degree and has at least 10 years teaching or research experience as a scientist or postgraduate teacher.

(iii) A scholar of exceptional merit, as proposed by the RDC/ Faculty Board and approved by the Academic Council.

(b) Relations of the candidate for the Ph.D. degree shall not act as supervisor. Relations will include father, mother, husband, wife, son, daughter, brother, sister, uncle, nephew, father-in-law, mother-in-law or such other relations, as may be determined by the Executive Council.

(c) No supervisor shall supervise the work of more than 4 candidates in case of an Assistant Professor, 6 candidates in case of an Associate Professor and 8 candidates in case of a Professor at a time.

(d) The allotment of the supervisor for a selected student shall be done depending on the number of students per faculty member, the available specialization among the faculty supervisors, and the research interest of the student as indicated during interview by the student. The allotment/allocation of supervisor shall not be left to the individual student or teacher though their choice may be considered. The Head of the concerned Department/Dean/ Principal shall ensure that in general the students are allotted to those supervisors who have expertise and facilities in the area of interest of the student. The supervisor/ co-supervisor may be present at the time of allotment of seats.

(e) A superannuated teacher may not enroll fresh candidates but may continue supervising for those candidates who had completed most of the work but for others he/ she may continue as co-guide. The superannuated Emeritus Scientists may, however, continue supervising those already registered before retirement.

Place of Work/ Research Centre

(a) Every research scholar shall work at one of the Campus/ College/ Research Centre recognized by the University.

(b) The Research Degree Committee (RDC) of the subject shall ensure, in the case of Assistant Professors and Associate professors, their ability to be approved as supervisors, which will be based on the quality of published/ project work carried out by them.

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(c) A Co-Guide/ co-supervisor can also be allowed by the RDC for interdisciplinary work. But, either guide or co-guide must be a teacher of this university.

(d) All new research centres and new supervisors (guide/co-guide) have to be approved by the Academic Council on the recommendations of concerned RDC/ Faculty Board as per provisions of the Statutes of Kumaun University.

Recognition of Institute/ Research Centre

(a) The Institute/Centre concerned shall apply for recognition as centre for conducting research leading to research degree for specified areas of research depending upon facility and experts available. The proposal shall be examined through the respective RDCs including visit by expert team.

(b) On recognition as research centre, the institute/ centre may enroll students for Ph.D. degree as per provisions specified for this purpose.

(c) The senior scientist of the Institute may be recognized as Guide/Co-Guide on the recommendations of RDC.

(d) Joint research programmes with the Institutes may be initiated after signing MoUs for this purpose.

Registration/ Course Work

(a) A pre-registration presentation of the synopsis shall be held in the subject R.D.C. of the University in which the candidate will have to present and defend his/her synopsis and related aspect of his/ her research.

(b) A Candidate shall be registered from the date of his/her application and submission of fees even though the RDC approves the subject at a later date, unless a different date has been specified by RDC.

(c) After his/ her admission, the candidate shall undertake the prescribed course work for one semester (six months). The course work shall be treated as Ph.D. preparation and shall include :

- (i) a course on research methodology which may include Quantitative Methods and Computer Applications.
- (ii) an Advanced Paper in the subject/ area in which the candidate has proposed to follow his/her research work for the Ph.D. degree.
- (iii) reviewing of Published Research in the relevant field. This shall be the minimum qualifying requirement for allowing a student to proceed with further work and the writing of the thesis.
- (iv) There shall be a total of three papers and the course work shall be supervised by the Dean of Faculty and concerned Head/ Convener.

(d) Upon satisfactory completion of the prescribed course work, the candidate shall undertake research work and produce a draft thesis. In case the candidate does not qualify the course, may be given one more opportunity to qualify the course.

(e) Admission/Registration of a candidate in research shall be cancelled by the University/competent authority (as the case may be), if any unsatisfactory report regarding the progress of the thesis and conduct of the candidate is given by the supervisor of the candidate.

(f) Supervisor shall maintain attendance of the research scholars regularly. The attendance, so maintained shall be sent to the Head of the Department and Dean/Principal of the concerned faculty at regular intervals.

(g) The application for registration shall be placed before RDC in each subject consisting of the Vice-Chancellor, The Director R&E, the Dean of the Faculty, Director R&E (or nominee) the Convener of the RDC concerned and three experts to be nominated by the Vice-Chancellor in consultation with the convener of the Board of studies. The Committee shall satisfy itself that the subject and the synopsis offered are such which can profitably be pursued under the guidance of the proposed supervisor, that the candidate possesses the requisite qualifications and that adequate facilities and equipment for work exist at the institution level.

(h) The candidate shall pursue his/her research at the institution assigned, under the supervisor and on the subject approved for not less than twenty-four months commencing from the date of registration and must put in at least 200 days attendance in the department or as permitted by the Academic Council, at the place approved by it (including the headquarters of the supervisor).

(i) A candidate must have at least three years standing as Master's Degree holder of the subject/ allied subject at the time of submission of the thesis.

Provided further that –

(i) The application for registration and the research synopsis of a candidate must be submitted to the university at least one month before the actual date of the meeting of the R.D.C. of a subject.

(ii) The maximum time of six months shall be allowed for submitting a revised synopsis. After this period the synopsis submitted shall be treated as withdrawn/cancelled.

(iii) That a candidate may be allowed to modify the synopsis of his thesis within four calendar years from the date of registration.

(iv) After the expiry of 4 years from the date of registration the candidate may be granted one-year extension by the Vice-Chancellor provided that the candidate has applied for extension within 3 months before the expiry of the four year period. Unless the extension is granted by the Vice-Chancellor, the name of the candidate shall be removed from the list of those registered for the Ph.D. Degree, after expiry of four year period. The candidate may apply for re-registration within a period of three months from the date on which the period of 4 years or the extended period has expired and, thereafter, he shall be re-enrolled after paying a fresh fee as prescribed and he shall be given a further maximum period of one year from the date of re-registration for the submission of his/ her thesis. The submission of thesis and the payment of fee, both must be done within 4 years or extended period. Thesis shall not be accepted after due date.

Pre-submission Seminar

(a) A pre-submission seminar shall be held in the university Department of the subject in which the candidate shall present and defend the thesis work. The pre-submission seminar shall be open to all the faculty members and research scholars of the concerned department and the faculty. The thesis to be submitted must be approved for submission by the majority of the teaching staff of the concerned department after the pre-submission seminar is over. Such an approval must include the university HoD/ convener of the RDC as chairman. The thesis must be forwarded to the University by the convener of the RDC.

(b) Ph.D. candidate shall publish at least one research paper in a refereed Journal before the submission of the thesis for adjudication, and produce evidence for the same in the form of acceptance letter or the reprint.

Evaluation of the Thesis

(a) The following documents shall be submitted by the candidate to the University at the time of submission of thesis:-

1. Thesis : 03 copies
2. Summary : 04 copies
3. Synopsis : 03 copies
4. No-dues Certificate (Fee. Receipt, Departmental and Campus Library)
5. CD of the Thesis (PDF File)
6. Pre-submission Certificate.
7. No-dues (Central Library of K.U. Nainital).
8. Fee deposition receipt

(b) The candidate shall supply three printed or type written (typed both sides of the paper) but not published copies of his/her thesis. Published matter may also be incorporated as a part of the thesis. The medium of expression for thesis shall be either English or Hindi (written in Devanagari script) except in the case of subjects connected with any of the oriental languages, where the thesis may, at the option of the candidate, be presented in that language. The thesis shall be accompanied by a certificate from the supervisor stating :

- (i) that the thesis embodies the work of the candidate himself/herself.
- (ii) that (unless he/she is a teacher in the University/an affiliated college) he/she has put in the required attendance in his/her research centre during that period.

(c) The thesis shall comply with the following conditions :-

- (i) It must be a piece of research work characterized either by the discovery of facts or by a fresh approach towards the interpretation of facts or theories. In either case, it should evince the candidate's capacity for critical examination and sound judgment. The candidate shall communicate how far the thesis embodies the result of his/her advance knowledge in the subject.

- (ii) It shall be satisfactory with respect to language and presentation of subject matter. The examiners will also indicate whether the thesis is suitable for publication in its present form with or without amendments.

(d)) Examiners for the thesis shall be appointed only after submission of thesis. The Convener of the Board of Studies and the concerned supervisor shall be requested to suggest panels consisting of six names of examiners each for consideration of the Vice-Chancellor (10 names, in case of Convener being the supervisor). The thesis shall be sent to two examiners selected for the purpose by the Vice-Chancellor out of a panel suggested by the convener and supervisor.

(e) The thesis produced by the Ph.D. student submitted to the University shall be evaluated by two out of which at least one shall be from outside the state.

(f) The Ph.D. examiner shall be required to submit his/her report normally in two months time. He/she may take some more time with permission of the Vice-Chancellor. Thereafter, a fresh examiner may be appointed.

(g) If the examiners recommend that the candidate be asked to improve his/her thesis the Executive Council may permit the candidate to resubmit his/her thesis, not earlier than six months and not later than one year, and under very special circumstances not later than a year and a half, the period being counted from the date of the communication of the decision of the Executive Council granting the permission. In case the candidate is allowed to re-submit his/her thesis, he/she shall have to pay a fresh fee of Rs. 2500/- or any other fee prescribed at the time of the re-submission of the thesis but it shall not be necessary for him/her to produce any certificate of further attendance at the institution at which he/she carried on his/her work.

(h) If both the examiners disapprove the thesis, it shall be rejected. In the event of divergence of opinion between the two examiners of the thesis, the thesis shall be sent for evaluation to the third examiner from the panel appointed under the ordinance and his/her opinion shall be final. The re-submitted thesis shall be examined by the old set of examiners.

(i) The University shall have the right to withdraw or cancel the already awarded Degree, if it is found at any date that there is no originality or genuineness in the thesis concerned or if there is any other severe matter according to which it is established that the degree should not have been awarded to the candidate. The supervisor of such a candidate shall also be held responsible for such a work.

Viva-Voce Examination

- (a) In case, both the original examiners approve the thesis (or in the event of divergence of opinion between the two, the third examiner approves the thesis), the candidate shall be called upon to appear for a *viva-voce* test before a board of two examiners comprising the supervisor and one of the two persons (selected by the Vice-Chancellor). If both *viva-voce* examiners are satisfied, the case shall be placed before the Executive Council. If the Executive council, after considering the reports of the examiners, considers the candidate worthy of the Ph.D. Degree, it shall approve the Degree.
- (b) The Head of the University Department/ convener of RDC of the University shall be the Chairman of the *viva-voce* examination of a candidate.
- (c) The *viva-voce* exam of a candidate shall be held at the University Headquarters (unless specially allowed by the Vice-Chancellor).
- (d) Not satisfied with the *viva-voce* examination, the candidate shall be asked to reappear (after paying a fee of Rs. 2000/-) at a second *viva-voce* examination within one year but not earlier than six months. If the candidate fails to satisfy the *viva-voce* examiners the second time, his/her thesis shall be finally rejected.
- (e) Following the successful completion of the evaluation process and announcements of the award Ph.D. the University shall submit a soft copy of the /Ph.D. thesis to the UGC within period of thirty days, for hosting the same in INFLIBNET, accessible to all Institutions/Universities.
- (f) Along with the Degree University shall issue a Provisional Certificate certifying the effect that the Degree has been awarded in accordance with the provisions of the ordinance.

(B) DOCTOR OF LETTERS/ LITERATURE (D.Litt.)/ DOCTOR OF SCIENCE (D.Sc.)

- (a) A Candidate for the D.Litt. / D.Sc. Degree must be either a Doctor of Philosophy of this University with at least two years' standing, or a Doctor of Philosophy of at least two years standing of another University recognized by the Kumaun University.
- (b) The candidate shall be required to join a recognized research centre of the university for at least 200 days, as provided in the Ph.D. Ordinances. During this period, he/she will have to engage himself/herself in academic work (including delivering lectures etc. to students). The candidate shall remain under the administrative and academic control of the Head of the Department and Dean/ Principal concerned.
- (c) A Candidate for the D.Litt. or D.Sc. Degree must apply to the University on a prescribed form along with 10 copies of the synopsis and copies of the documents concerning :-
- (i) his/her qualifications and experience,
 - (ii) the subject on which he/she proposes to work, and
 - (iii) the synopsis stating purpose of study indicating the original contribution to knowledge which the thesis proposes to make and which will bring to light material not yet known or used by scholars, or a fresh original interpretation of already known facts.
 - (iv) The application shall be supported by two senior members* of the concerned department of the University or two subject professors of any University, who shall testify that the candidate is a proper person to supplicate for the degree.
- (*) Senior means the concerned teacher must have at least 10 years of postgraduate teaching experience

The application shall be accompanied by the prescribed fee.

If the application is entertained, the balance fee prescribed shall be paid at the time of the submission of the thesis.

- (d) The application shall be placed before the Research Degree Committee of the subject concerned and the candidate shall attend the pre-registration interview.

If the application is approved by the Academic Council, the candidate may submit his/her thesis at any time not earlier than two years and not later than 5 years (including extended period) from the date on which he/ she was permitted to work for the degree (time will be counted from the date of registration). In case the candidate does

not submit his/her D.Litt. or D.Sc. thesis within 4 calendar years from the date of registration, the permission granted to him/her shall lapse, unless the time is extended by the Vice-Chancellor, (which will not exceed one year) and thereafter the name of the candidate shall be removed from the registered list.

- (e) A Pre-submission seminar shall be held in the University Department of the subject with Convenor as Chairperson. The candidate who is ready to submit his/her D.Litt./D.Sc. thesis shall present and defend his/her thesis work. This pre-submission seminar shall be open to all the faculty members and research scholars of the concerned department and the faculty. The thesis to be submitted must be approved, after the seminar, by at least a 2/3rd majority of the teaching staff of the concerned department. This approval must include the approval of the HoD/ Convenor of RDC concerned and thesis must be forwarded by the convenor of the R.D.C.
- (f). At least three research publications out of the work being carried for the degree, in refereed journals of the subject, which in the opinion of the HoD/Convenor are standard journals, are necessary before the pre-submission seminar (stated above) is held.
- (g). The Convenor of the Board of Studies/ RDC shall be requested to suggest a panel of 10 names for the consideration of the Vice-Chancellor. Three Examiners for thesis (two from out of state) shall be appointed from a panel of experts given by the Convenor.
- (h). A Candidate shall not be allowed to submit as a part of his/her thesis any paper or papers on the basis of which a degree has already been conferred on him/her by us or any other university, but he/she shall not be precluded, from incorporating a work which has already been submitted by him/her for a degree in the thesis covering a wider field, provided that he/she shall indicate the extent of the work so incorporated. The thesis submitted must be satisfactory as regards its literary form and, if not already published, must be in a form suitable for publication. The medium of expression for every thesis shall be English or Hindi (written in Devanagari script) except in the case of subject connected with any of the languages where the thesis may, at the option of the candidate, be presented in that language.
- (i) After the thesis is completed, the candidate shall submit four printed or typewritten copies of his/her thesis, together with the fee. The candidate shall indicate how far his/her thesis embodies the result of his/her research and in what respects his/her investigation appears to him/her to advance the bounds of knowledge. He/she shall also state what authorities/references or other sources he/she has utilized in preparing his/her thesis and shall submit in support of his/her candidature, any paper or papers which he/she may have published independently or jointly. The thesis must be a piece of original research work characterized either by the discovery of facts or by a fresh approach towards interpretation of facts or theories. In either case, it should evince the candidates capacity for critical examination and sound judgment.
- (j) On its receipt, the thesis shall be sent to three persons selected by the Vice- Chancellor out of the panel of 10 persons suggested by the Convenor of RDC.
If two of the three examiners do not approve the thesis, it shall be rejected, but if only two examiners approve it, the thesis shall be sent for evaluation to fourth examiner from the panel and his/her opinion shall be final.
- (k) In case all the three original examiners approve the thesis or, in the event of divergence of opinion between the original three, the fourth examiner approves it, the candidate shall be called upon to appear for a *viva-voce* test before a Board of two external examiners who approved his/her thesis. If both the *viva-voce* examiners are satisfied, the case shall be placed before the Executive Council. If the Council, after considering the report of the examiners, considers the candidate worthy of the D.Litt. or D.Sc. Degree (as the case may be) it shall approve the degree.
- (l) In case the recommendation of *viva-voce* examiners differ from those of the thesis examiners, or there is a difference of opinion between the *viva-voce* examiners, the candidate may be asked to re-appear after paying a fee at a second *viva-voce* examination within one year but not earlier than six months from the date of the first *viva-voce*. If the candidate fails to satisfy the *viva-voce* examiners the second time, his/her thesis shall be finally rejected.
- (m) If the examiners recommend that the candidate be asked to improve his/her thesis, the Executive Council may permit the candidate to re-submit his/her thesis not earlier than six months and not later than one year, after the date of the resolution of the Executive Council granting the permission. In case a candidate is allowed to re-submit his/her thesis, he/she shall have to pay a fresh fee of Rs. 5000/- or any prescribed fee at the time of submitting his/her thesis.
- (n) The Head of the Department / Convenor of RDC shall be the Chairperson of the *viva-voce* exam of a candidate. Both the *viva-voce* exam and the pre-submission seminar of a candidate both shall be held under

control of the Head of the Department, but the examiners' board of the *viva-voce* exam shall remain as prescribed in these ordinances.

(o) Regarding attendance, cancellation of admission or registration, cancellation of the already awarded degree and research centre, the relevant clauses of the Ph.D. Ordinances (with the supervisor replaced by the / Convener HoD) shall apply here too.

Special Instructions

- i. The contents of the thesis submitted in CD to the library shall be as single PDF file and shall not be different from what has been presented in the thesis.
- ii. The thesis may be written in Hindi or English unless it relates to any other language (typed/ printed **on both sides of paper**).
- iii. Additionally, the file should contain the following information:
 - (a) **Abstract / Summary of the thesis (200-300 words)**
 - (b) **Key words (up to 9)**
 - (c) **Author's name and address**
 - (d) **Supervisor's name**
 - (e) **Project's name under which work was carried out, if any**
 - (f) **Funding/ Fellowship granting agency's name**

Fee Structure

1. Entrance Test (form and Fee)/ Brochure/ Booklet Fee	Rs. 2000/-
3. Registration Fee (in two installments):	
(a) First Installment (at the time of submission of registration Form)	Rs. 5,000/-
(b) Second Installment (at the time of submission of Ph.D. thesis)	Rs. 5,000/-
Second Installment (at the time of submission of D.Sc./ D.Litt. thesis)	Rs. 15,000/-

Directorate of Research & Extension

The research directorate is visioned to improve the quality of research in the Campuses and Institutions affiliated to Kumaun University. It is also expected to help in bringing more funds for the University for supporting research activities and to introduce efficient governance of research programs in the university including the planning, processing and execution for research activities so as to be conducive to improve research quality and set the pace for motivated researches.

The research directorate shall deal with inception to execution of the projects in the Campuses and ultimately dissemination and exploitation of research findings. The university through research directorate shall ensure high standards of research activities.

Directorate of Research and Extension has the following mandate:

1. Reviewing and suggesting the research ordinances and provisions for research degrees.
2. Advise the faculties on the regulations of UGC and those of funding agencies, if any. Necessary amendments in the Act/ Statutes shall be made and regulations shall need to be made on different aspects for smooth conduct of the working involving the academic council.
3. Coordinate and monitor the research activities in various faculties of the university.

4. Provide facilities to the PI's and research staff working in the project.
5. Encourage faculty for grants from different funding agencies, donors, industries, non governmental organizations for thrust areas of research.
6. Plan for developing linkages with national and international funding agencies including collaborative research programs within university.
7. Work out consultancy and IPR matters of the university.
8. Help faculty members in smooth conduct of financial matters relating to the research projects such as timely distribution of salary to project staff, payment of project bills.
9. Directorate shall work for strengthening the infrastructure/ facilities.

Composition

The Research Directorate has the following composition:

1. **Research Advisory Committee** consisting of the Vice Chancellor as its Chairman, Campus Directors, all the Deans of Faculties, all the Joint Directors, Registrar and the Director as its Member Secretary.
2. It shall be headed by the Director who shall be assisted by senior positions (Joint Directors) drawn from the faculties.
3. For office matters, the directorate shall be run by the officials.
4. The Assistant Accounts Officers in the Campuses shall be entrusted with the job of coordinating between PIs and Research Directorate.

The Directorate of Research & Extension Advisory Committee

1. **Prof. V.P.S. Arora, Vice Chancellor, Chairperson**
2. **Prof. C.S. Mathela (Director, R&E)**
3. **Prof. N.S. Bisht (Director, DSB Campus)**
4. **Prof. D.S. Pokhariya, Dean, Faculty of Arts & Director SSJ Campus, Almora**
5. **Prof. P.S. Anand, Dean, Faculty of Commerce & Management**
6. **Prof. Lata Joshi, Dean, Faculty of Science**
7. **Prof. Amita Shukla, Dean, Faculty of Education**
8. **Dr. D.K. Bhatt, Dean, Faculty of Law**
9. **Prof. C.C. Pant (Joint Director)**
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13. **Prof V.R. Dhoundial (Joint Director)**
14. **Prof. H.S. Dhami (Director, ICT)**
15. **Mr. Sudhir Budhakoti (Registrar)**
16. **Mrs. Bhagirathi Bangyal**

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