ACHARYA NAGARJUNA UNIVERSITY

DIRECTORATE OF ADMISSIONS

ANUPGCET – 2015

INFORMATION BROCHURE

Dr. M. RAMI REDDY

DIRECTOR, DIRECTORATE OF ADMISSIONS

ACHARYA NAGARJUNA UNIVERSITY, NAGARJUNANAGAR – 522 510

CONTACT NUMBERS : 0863-2346138 / 171 & 9440258822 / 11

Note - 1 : SCHEDULE OF ANUPGCET – 2015

Cost of Application : **Rs.500/-**
(Application Fee Rs.100/- + Application Registration & Processing Fee Rs.400/-)

1. Commencement of Submission of Online Applications : 20.02.2015

2. Last date for submission of Online Applications : 20.03.2015

3. Last Date for submission of Online Applications with Late fee of Rs.1000/- : 30.03.2015

   (Application Fee Rs.500/- + Late Fee Rs.500/-)

4. Last Date for submission of Online Applications with Tatkal Fee of Rs.1500/- : 10.04.2015

   (Application Fee Rs.500/- + Tatkal Fee Rs.1000/-)

5. Schedule of Entrance Tests (Tentative) : 1st, 2nd & 3rd , May 2015

6. Downloading Hall-Tickets from website : April 25th Onwards

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Note – 2 : List of enclosures

The following **Original Certificates** along with one set of attested Photostat Copies are to be submitted at the **Time of Counseling**

1. Hall Ticket of the Entrance Test
2. Rank Card of the Entrance Test
3. Original Degree / Provisional Certificate of the Qualifying Examination
4. Marks memos
5. Transfer Certificate and Conduct Certificate from the College last studied
6. Study Certificates / Form-I or II or III or IV as given in Annexure - A pertaining to claim of Local Candidate
7. Date of Birth Certificate towards proof of Age
8. Certificate of the Reservation Category, if claiming
   (SC / ST / BC-A / BC-B / BC-C / BC-D / BC-E / PH / NCC / SPORTS / CAP)
9. Declaration form as given in Annexure-B
10. Three Pass Port size Photos

INFORMATION BROCHURE – ANUPGCET - 2015

The Candidates are required to read the following Instructions carefully for filling the Online Application Form.

Admission into PG Courses offered by Acharya Nagarjuna University Colleges, Constituent Post-Graduate Centre at Ongole and Colleges affiliated to Acharya Nagarjuna University for the Academic Year 2015-16 will be made for the courses mentioned in **Table – I.**

The admissions into various Courses mentioned in Table – I are based on Entrance Test.

TABLE – I : PARTICULARS OF THE COURSES OFFERED ALONG WITH ENTRANCE TEST CODES

Test Code	Test Name	Course Code	Course Name
101	LIFE SCIENCES	10101	M.Sc. Aquaculture
		10102	M.Sc. Biochemistry
		10103	M.Sc. Biotechnology
		10104	M.Sc. Botany
		10105	M.Sc. Environmental Science
		10106	M.Sc. Food & Nutritional Sciences
		10107	M.Sc. Microbiology
		10108	M.Sc. Nanobiotechnology
		10109	M.Sc. Zoology
102	PHYSICAL SCIENCES	10201	M.Sc. Electronics
		10202	M.Sc. Electronics & Instrument Technology
		10203	M.Sc. Physics
103	MATHEMATICAL SCIENCES	10301	M.Sc. Computer Science
		10302	M.Sc. Mathematics
104	STATISTICS	10401	M.Sc. Statistics
		10402	M.Sc. Statistics (QR & OR)
105	CHEMICAL SCIENCES	10501	M.Sc. Chemistry
		10502	M.Sc. Oils & Fats
106	GEOLOGY	10601	M.Sc. Geology
107	INTEGRATED COURSE	10701	M.Sc. Nanotechnology (5 Years)
108	SOCIAL SCIENCES	10801	M.A. Ancient History & Archaeology
		10802	M.A. Economics
		10803	M.A. History
		10804	M.A. Journalism and Mass Communication
		10805	M.A. Mahayana Buddhist Studies
		10806	M.A. Political Science
		10807	M.A. Public Administration
		10808	M.A. Rural Development
		10809	M.A. Sociology
		10810	Master of Social Work (M.S.W.)
		10811	M.H.R.M
		10812	P.G. Diploma in Ambedkar Studies
109	ENGLISH	10901	M.A. English
110	HINDI	11001	M.A. Hindi
111	SANSKRIT	11101	M.A. Sanskrit
112	TELUGU	11201	M.A. Telugu
113	COMMERCE	11301	M.Com.
114	EDUCATION	11401	M.Ed.
115	INTEGRATED COURSE	11501	M.B.A. International Business (5 Years)
116	PHYSICAL EDUCATION	11601	M.P.Ed.
150	P.G. DIPLOMA IN YOGA	15001	P.G. Diploma in Yoga for Human Excellence

No Entrance Test for P.G. Diploma in Yoga for Human Excellence

Admissions will be made on the basis of the Rank obtained by the Candidate in the Entrance Test subject to the fulfillment of eligibility criteria given in **Table – II**.

Table – II: PARTICULARS OF THE COURSES OFFERED ALONG WITH ELIGIBILITY CRITERIA

S. No	Test Name		Course Name	Eligibility
1	Life Sciences	1	M.Sc. Aquaculture	B.Sc., With Zoology / Fisheries / Fishery Science / Aquaculture / Industrial Fish and Fisheries / Any of the Life sciences as one of the subjects
		2	M.Sc. Biochemistry	B.Sc., with Chemistry or Biochemistry as one of the subjects
		3	M.Sc. Biotechnology	Bachelor's Degree in Physical / Biological Sciences / B.Sc. in Farm Science / B.Sc. Ag. / B.V.Sc., / Bachelor's Degree in Medicine or Pharmaceutical Sciences / B.E / B.Tech.,
		4	M.Sc. Nanobiotechnology	
		5	M.Sc. Botany	B.Sc., with Botany and Chemistry as the Two of the common Core subjects or B.Sc., with Botany as main and Chemistry as ancillary
		6	M.Sc. Environmental Science	Any B.Sc or B.E.M. Degree holder
		7	M.Sc. Food & Nutritional Sciences	Bachelor's Degree in Life Sciences, Natural Sciences, Biological Sciences and Paramedical Courses
		8	M.Sc. Microbiology	B.Sc. with Microbiology or Botany as one of the Three subjects and Chemistry or Biochemistry as another subject
		9	M.Sc. Zoology	B.Sc. with Zoology as one of the subjects
2	Physical Sciences	1	M.Sc. Physics	B.Sc. Mathematics, Physics and any other Third subject under common core scheme
		2	M.Sc. Electronics	B.Sc. with Mathematics, Electronics as the subjects of equal importance
		3	M.Sc. Electronics & Instrument Technology	B.Sc. with any one of the following subjects: Electronics / Physics / Instrumentation. **Note:** Except B.Sc. Mathematics, Statistics, Computer Science Combination
3	Mathematical Sciences	1	M.Sc. Computer Science	Any Graduate program with Computers as one of the subjects of study
		2	M.Sc. Mathematics	B.Sc. or B.A. with Mathematics as one of the Three equal subjects or as main subject
		3	M.Sc. Statistics	B.A. / B.Sc. with Mathematics and Statistics as Two of the Three Subjects
		4	M.Sc. Statistics (QR & OR)	B.A. / B.Sc. with Mathematics and Statistics as Two of the Three subjects (or) B. Tech. in any branch
4	Chemical Sciences	1	M.Sc. Chemistry	B.Sc., with Chemistry as one of the Three equal subjects in Common Core System. Organic, Inorganic and Analytical specializations are offered in A.N.U. College. The candidate has to choose one of the three specializations at the time of admission
		2	M.Sc. Oils & Fats	B.Sc., Oil Technology, B.Sc. Oils / Soaps / Detergents or B.Sc. with Chemistry as one of the Subject
5	Geology	1	M.Sc. Geology	B.Sc., (Any Science Graduate) **Note:** Preference for Admission is given to Geology students
6	Integrated Course (5 Years)	1	M.Sc. Nanotechnology	Intermediate (plus two) with M.P.C. / Bi.P.C as optional subjects

7	Social Sciences	1	M.A. Ancient History & Archaeology	Any Graduation
		2	M.A. Economics	B.A. with Economics as one of the Subjects, B.Com, B.Sc (Economics)
		3	M.A. History	Any Graduation
		4	M.A. Journalism and Mass Communication	Any Graduation
		5	M.A. Mahayana Buddhist Studies	Any Graduation
		6	M.A. Political Science	B.A. with Politics / Political Science / Public Administration as one of the subjects
		7	M.A. Public Administration	B.A. with Public Administration / Politics / Political Science / Economics / Psychology / Sociology / Social work as one of the subjects (or) B.Com / B.Sc, B.B.M. / B.C.A.
		8	M.A. Rural Development	B.A. / B.Sc. / B.Com.
		9	M.A. Sociology	Any Graduation
		10	Master of Social Work (M.S.W.)	Any Graduation
		11	M.H.R.M	Any Graduation
		12	P.G. Diploma in Ambedkar Studies	Any Graduation
8	Commerce	1	M.Com.	All B.Com Graduates
9	Education	1	M.Ed.	B. Ed.
10	English	1	M.A. English	B.A. / B.Sc. / B.Com./ B.B.M / B.C.A. / B.A. (O.L.) in Telugu / B.A. (O.L.) in Sanskrit with general English, Degree in Hotel Management, B.A. with Special English in the group subjects.
11	Hindi	1	M.A. Hindi	Any Graduation with Hindi as Second Language, B.A. with Hindi as Special subject, Rastra Bhasha Praveena from Dakshin Bharat Hindi Prachar Sabha, Madras, Visharad Diploma of Hindi of Dakshin Bharat Hindi Prachar Sabha or Sahitya Sammalan, Allahabad, Vidwan Degree and other equivalent Examinations.
12	Sanskrit	1	M.A. Sanskrit	B.A.O.L. Sanskrit main / B.A.O.L. Telugu Main / B.A. / B.Com. / B.Sc. / B.C.A. / B.B.M. with Sanskrit under Part I or Part II, B.A. with special Sanskrit, Vidya Praveena / Siromani / Vidwan (With POL / SSC), BOL Sanskrit / Bhasha Praveena With POL, any graduate with Sanskrit
13	Telugu	1	M.A. Telugu	B.A. Special Telugu, B.A.O.L. Telugu, B.A.O.L. Sanskrit, B.A. / B.Sc. / B.Com. / B.B.M / B.C.A. with Telugu under Part I or Part II, BOL Telugu / Bhasha Praveena with POL.
14	Integrated Course (5 Years)	1	M.B.A. (International Business)	Intermediate (plus two) with any combination of optional subjects or its equivalent (including Diploma in Polytechnic) or 2 Years I.T.I.
15	Physical Education	1	M.P.Ed.	B.P.Ed. degree (not less than 55% marks). There is a relaxation of 5% marks for those get 1, 2, 3 positions in State Level Sports / Games and those who have participated in the National Sports / Games. (The course is totally residential) **Note:** Admission will be made on the basis of the marks obtained in the Entrance Test and Weightage of Marks for Sports achievement.
16	P.G. Diploma in Yoga		P.G. Diploma in Yoga for Human Excellence	Any Graduation

Particulars of A.N.U. Colleges and A.N.U. PG Centre, Ongole offering Courses and Fee Structures are in Table – III and Table – IV given below

Table – III : A.N.U. COLLEGES, COURSES, SANCTIONED STRENGTH AND FEES PARTICULARS FOR THE ACADEMIC YEAR 2015-16

S. No		Course / Subject	GS	SF	Tuition Fee (Rs)	Special Fee (Rs)	Total Fee (Rs)	Medical Fund (Rs)
1	M.Sc.,	BOTANY	40	----	2640	3060	**5700**	240
2		CHEMISTRY	36	----	2640	3060	**5700**	240
3		GEOLOGY	18	----	2640	2160	**4800**	240
4		MATHEMATICS	55	----	2640	2160	**4800**	240
5		PHYSICS	40	----	2640	3060	**5700**	240
6		STATISTICS	25	----	2640	2160	**4800**	240
7		ZOOLOGY	42	----	2640	3060	**5700**	240
8		AQUACULTURE	----	30	16140	1760	**17900**	240
9		BIOCHEMISTRY	----	24	32240	1760	**34000**	240
10		BIOTECHNOLOGY	----	24	46608	3392	**50000**	240
11		ELECTRONICS AND INSTRUMENTATION TECHNOLOGY	----	16	32240	1760	**34000**	240
12		ENVIRONMENTAL SCIENCE	----	24	12940	1760	**14700**	240
13		FOOD AND NUTRITIONAL SCIENCES	----	28	32240	1760	**34000**	240
14		MICROBIOLOGY	----	28	32240	1760	**34000**	240
15		NANOBIOTECHNOLOGY	----	24	48720	1280	**50000**	240
16		NANOTECHNOLOGY (5 YEARS INTEGRATED)	----	40	24245	3355	**27600**	240
17		STATISTICS (QR & OR)	----	20	16185	1815	**18000**	240
18	M.A.,	ANCIENT HISTORY & ARCHAEOLOGY	25	----	1800	1200	**3000**	240
19		ECONOMICS	45	----	1800	1200	**3000**	240
20		ENGLISH	40	----	1800	1200	**3000**	240
21		HISTORY	25	----	1800	1200	**3000**	240
22		MAHAYANA BUDDHIST STUDIES	14	----	1800	1200	**3000**	240
23		POLITICAL SCIENCE	25	----	1800	1200	**3000**	240
24		PUBLIC ADMINISTRATION	25	----	1800	1200	**3000**	240
25		SANSKRIT	15	----	1800	1200	**3000**	240
26		TELUGU	40	----	1800	1200	**3000**	240
27		HINDI	----	40	3960	2040	**6000**	240
28		JOURNALISM & MASS COMMUNICATION	----	30	16140	1760	**17900**	240
29		RURAL DEVELOPMENT	----	25	9660	2040	**11700**	240
30		SOCIOLOGY	----	25	3960	2040	**6000**	240
31		M.COM.	50	----	1800	1800	**3600**	240
32		M.ED.	----	35	30540	1760	**32300**	240
33		M.H.R.M.	----	35	16140	1760	**17900**	240
34		MASTER OF SOCIAL WORK (M.S.W.)	----	40	9660	2040	**11700**	240
35		P.G. DIPLOMA IN AMBEDKAR STUDIES	----	30	2020	480	**2500**	240
36		M.B.A. INTERNATIONAL BUSSINESS (5 YEARS INTEGRATED)	----	50	24245	3355	**27600**	240
37		M.P.ED.	----	40	20270	2530	**22800**	240
38		P.G. DIPLOMA IN YOGA FOR HUMAN EXCELENCE	----	50	3313	687	**4000**	240

GS – General Seats; SF – Self Finance Seats

A.N.U. P.G. CENTRE ONGOLE, COURSES, SANCTIONED STRENGTH AND FEES PARTICULARS FOR THE ACADEMIC YEAR 2015-16

S. No		Course / Subject	SF	Tuition Fee (Rs)	Special Fee (Rs)	Total Fee (Rs)	Medical Fund (Rs)
1	M.Sc.,	MATHEMATICS	40	2640	2160	**4800**	240
2		STATISTICS	25	16185	1815	**18000**	240
3	M.A.,	ECONOMICS	40	1800	1200	**3000**	240
4		HISTORY	40	1800	1200	**3000**	240
5		MASTER OF SOCIAL WORK (M.S.W.)	40	9660	2040	**11700**	240
6		M.COM.	40	1800	1800	**3600**	240
7		M.ED.	35	30540	1760	**32300**	240

Table – IV : FEE PARTICULARS FOR ADMISSION INTO AFFILIATED COLLEGES FOR THE ACADEMIC YEAR 2015-16

S. No.		Course / Subject	Total Fee (Rs)	S. No.		Course / Subject	Total Fee (Rs)
1		BIOCHEMISTRY	35200	13		ECONOMICS	10500
2		BIOTECHNOLOGY	66600	14		ENGLISH	10500
3		BOTANY	26400	15		HISTORY	10500
4		CHEMISTRY	35200	16		SANSKRIT	4200
5		COMPUTER SCIENCE	35200	17	M.A.,	TELUGU	4200
6	M.Sc.,	ELECTRONICS	35200	18		MASTER OF SOCIAL WORK (M.S.W.)	8760
7		MATHEMATICS	17600	19		M.COM.	10500
8		MICROBIOLOGY	35200	20		M.ED.	29400
9		OILS & FATS	35200	21		M.H.R.M.	16200
10		PHYSICS	26400				
11		STATISTICS	18000				
12		ZOOLOGY	26400				

ANU AFFILIATED COLLEGES COURSES OFFERED THROUGH ANUPGCET – 2015

(THIS LIST IS TENTATIVE, THERE MAY BE SOME CHANGES)

S. No.	Name of the College		Course	No. of Seats
1	A.C. College, Guntur *	1	M.A. English	40
		2	M.A. History	40
		3	M.Sc. Chemistry	30
		4	M.Sc. Zoology	30
2	A.K.V.K Degree College, Ongole	1	M.Sc. Chemistry	30
		2	M.Com	40
3	A.S.N. College, Tenali	1	M.Sc. Chemistry	30
		2	M.Sc. Computer Science	40
		3	M.Sc. Mathematics	30
4	ANU PG Centre, Ongole	1	M.Sc. Mathematics	40
		2	M.Sc. Statistics	25
		3	M.A. History	40
		4	M.Com.	40
		5	M.Ed.	35
		6	Master of Social Work (M.S.W.)	40
		7	M.A. Economics	40
5	B.S.S.B. Degree College, Tadikonda	1	M.Sc. Chemistry	30
6	BA & KR Degree & P.G. College, Ongole	1	M.Sc. Chemistry	30
		2	M.Sc. Computer Science	30
		3	M.Sc. Mathematics	30
		4	M.Sc. Physics	24
7	Bapatla Engineering College, Bapatla	1	M.Sc. Analytical Chemistry	30
		2	M.Sc. Chemistry	30
		3	M.Sc. Computer Science	40
		4	M.Sc. Electronics	40
		5	M.Sc. Mathematics	40
		6	M.Sc. Physics	30
8	C.R. College, Chilakaluripet	1	M.Sc. Chemistry	30
9	Chaitanya College of Education, Markapur	1	M.Ed.	35
10	Chakradhar Degree College, Macherla	1	M.Sc. Chemistry	30
11	CSR Sarma College, Ongole	1	M.Sc. Chemistry	30
		2	M.Sc. Physics	30
		3	M.Sc. Mathematics	40

12	D.C.R.M Degree College & P.G. Courses, Inkollu	1	M.Sc. Chemistry	30
13	D.S. Govt. Degree & PG College for Women, Ongole	1	M.A. Telugu	40
14	G.C. & Y.P.N. Degree College, Kanigiri	1	M.A. English	30
		2	M.Sc. Botany	30
		3	M.Sc. Chemistry	30
		4	M.Sc. Microbiology	24
		5	M.Sc. Physics	30
15	Geetanjali Degree & PG College, Darsi	1	M.Sc. Chemistry	30
16	Govt. College for women, Guntur	1	M.A. Economics	20
		2	M.A. Telugu	30
		3	M.Sc. Chemistry	30
17	GVR & S Degree College for Women, Guntur	1	M.Sc. Chemistry	30
18	GVR & S Inst. for Professional Studies, Guntur	1	M.Sc. Chemistry	30
19	Hindu College, Guntur	1	M.A. Economics	40
		2	M.Com.	50
		3	M.Sc. Chemistry	30
		4	M.Sc. Physics	30
20	J.K.C. College, Guntur	1	M.A. English	40
		2	M.Sc. Biotechnology	30
		3	M.Sc. Chemistry	30
		4	M.Sc. Mathematics	40
		5	M.Sc. Microbiology	30
21	J.M.J. College for Women, Tenali *	1	M.A. English	40
		2	M.Com.	50
		3	M.Sc. Chemistry	30
		4	M.Sc. Mathematics	30
22	K.R.K. Govt. Degree College, Addanki	1	M.A. Telugu	25
		2	M.Com.	30
23	Krishnaveni Degree College, Narasaraopet	1	M.Sc. Chemistry	30
24	KVR, KVR & MKR College, Khajipalem	1	M.Sc. Chemistry	30
25	Mahathma Gandhi College, Guntur	1	M.Sc. Botany	24
		2	M.Sc. Chemistry	30
		3	M.Sc. Computer Science	40
26	NNR & CL Degree College, Ongole	1	M.Sc. Chemistry	30
		2	M.Sc. Computer Science	40
		3	M.Sc. Physics	30
27	NNS Vidya College of PG Studies, Chirala	1	M.Sc. Chemistry	30
		2	M.Sc. Computer Science	30
28	NRK & KSR Gupta PG College, Tenali	1	M.Com.	40
		2	M.Sc. Chemistry	30
29	P.N.C.A P.G. College, Singarayankonda	1	M.Sc. Chemistry	30
30	PNC & KR College of PG Courses, Narasaraopet	1	M.Sc. Biochemistry	30
		2	M.Sc. Chemistry	30
		3	M.Sc. Computer Science	40
31	Prabhala Lakshmi Narayana Memorial Degree College, Opp. ANU	1	M.Sc. Chemistry	30
		2	Master of Social Work (M.S.W.)	30
32	R.V.R.R. College of Education, Guntur	1	M.Ed.	40
33	Repalle Christian College, Repalle *	1	M.A. Economics	30
		2	M.A. English	40
		3	M.Sc. Botany	24
		4	M.Sc. Chemistry	30
		5	M.Sc. Zoology	24

34	S.G.H.R - M.C.M.R. Degree College, Guntur	1	M.A. English	30
		2	M.Sc. Biochemistry	30
		3	M.Sc. Botany	30
		4	M.Sc. Chemistry	30
		5	M.Sc. Mathematics	30
		6	M.Sc. Microbiology	30
		7	M.Sc. Physics	30
		8	M.Sc. Zoology	30
35	S.N.B.T. Degree College for Women, Repalle	1	M.Sc. Chemistry	30
36	S.S.N. Degree College, Ongole	1	M.Sc. Chemistry	30
		2	M.Sc. Physics	30
37	S.V. Arts & Science College, Giddalur	1	M.A. Economics	30
38	S.V.K.P. Degree & PG College, Cumbum	1	M.Sc. Botany	30
		2	M.Sc. Chemistry	30
		3	M.Sc. Physics	30
		4	M.Sc. Zoology	30
39	Sadineni Chowdaraiah College of Arts & Science, Maddirala	1	M.Sc. Chemistry	30
		2	M.Sc. Physics	24
40	Shams-Ul-Uloom College of Education, Markapur	1	M.Ed.	35
41	SIMS College of Life Sciences, Guntur	1	M.Sc. Chemistry	30
42	SPS Degree College, Darsi	1	M.Sc. Mathematics	40
43	Sri Baba Gurudev Degree College, Sattenapalli	1	M.Sc. Chemistry	30
		2	M.Com	40
44	Sri Gowthami Degree & P.G. College, Darsi	1	M.Sc. Chemistry	30
		2	M.Sc. Mathematics	30
		3	M.Sc. Physics	30
		4	M.Sc. Statistics	30
		5	M.Com	40
45	Sri Harshini Degree College, Martur	1	M.Sc. Chemistry	30
		2	M.Sc. Mathematics	40
46	Sri Harshini Degree College, Ongole	1	M.Sc. Chemistry	30
		2	M.Sc. Physics	30
47	Sri Pratibha PG College, Kandukuru	1	M.Sc. Chemistry	30
48	Sri Sarada Niketanam, Guntur	1	M.A. Sanskrit	20
49	Sri Siddhartha Degree & P.G. College, Bestavaripeta	1	M.Sc. Chemistry	30
		2	M.Sc. Zoology	30
50	Sri Srinivasa Arts & Science Degree College, Giddaluru	1	M.Sc. Chemistry	30
51	Sri Venkateswara Degree College, Guntur	1	M.Sc. Analytical Chemistry	30
		2	M.Sc. Chemistry	30
52	Sri Venkateswara Degree College, Kollipara	1	M.A. English	40
		2	M.Sc. Analytical Chemistry	30
		3	M.Sc. Chemistry	30
53	SS & N College, Narasaraopet	1	M.Sc. Chemistry	30
54	St. Ignatius Degree & P.G. College, Gurazala	1	M.Sc. Chemistry	30
55	St. Joseph's College of Education for Women, Guntur	1	M.Ed.	35
56	St. Paul's College of Education, Giddaluru *	1	M.Ed.	70
57	SVRM College, Nagaram	1	M.Sc. Analytical Chemistry	30
		2	M.Sc. Chemistry	30
		3	M.Sc. Mathematics	40
58	T.J.P.S. College, Guntur	1	M.A. English	30
		2	M.Com.	50
		3	M.Sc. Chemistry	30
		4	M.Sc. Computer Science	40
		5	M.Sc. Mathematics	40
		6	M.Sc. Physics	30

59	T.S. Reddy Degree & P.G. College, Piduguralla	1	M.Sc. Chemistry	30
60	V.S.R. & N.V.R College, Tenali	1	M.Sc. Chemistry	30
61	Vidyakendram Degree & PG College, Sattenapalli	1	M.Sc. Chemistry	30
		2	M.Sc. Microbiology	24
		3	M.Sc. Physics	30
62	Vignan Degree College, Guntur	1	M.Sc. Biochemistry	30
		2	M.Sc. Chemistry	30
		3	M.Sc. Mathematics	40
		4	M.Sc. Microbiology	30
63	VRS & YRN College, Chirala	1	M.Com	100
		2	M.Sc. Chemistry	30
		3	M.Sc. Oils & Fats	30

* Minority Colleges

GENERAL

♦ CANDIDATES WHO HAVE **COMPLETED THEIR QUALIFYING EXAMINAITON** OR **APPEARED FOR THE FINAL YEAR EXAMINATION IN MARCH / APRIL 2015 ARE ELIGIBLE** TO APPEAR FOR THE ENTRANCE TEST.

♦ Candidates who wish to take Admission into the P.G. Courses offered by Minority Colleges are also required to appear for the Entrance Test(s) conducted by the University.

♦ There is no provision for Revaluation, Retotaling or Personal verification of scripts of Entrance Tests.

♦ All candidates who apply for entrance test satisfying the eligibility criteria will only be allowed for the Entrance test.

♦ Any candidate allowed for entrance test, later found to be ineligible will not be issued Rank card. Even rank cards are issued in such cases, it will be cancelled later and such cases will not be entertained for Counseling.

♦ Mere allowing a candidate for the Entrance Test will not have any claim or right for admission into P.G. Courses. They have to satisfy the Eligibility Criteria given in Table-II. The decision of Admitting Authority is final in all such matters.

♦ Selected candidates (who were given Ranks) should bring all the **Original Certificates** along with one set of attested Photostat copies of certificates listed in **Note – 2** to the **Counseling**. He / She has to submit them and copies of certificates submitted will not be returned. If the original certificates are not produced for verification at the time of counseling, the candidate has to forfeit his / her seats.

♦ **Candidates admitted to Entrance test and subsequently getting admission by furnishing false / incorrect information / indulging into any other kinds of fraudulent methods are liable for prosecution and cancellation of their admission without notice.**

♦ Hall Ticket and Rank Cards are should be retained by the Candidate even after the Entrance Test as it is required at the time of Counseling.

♦ **There is no age restriction for Admission into any P.G. courses. However, those candidates who crossed the age of 30 years for OC, 34 years for BC, SC and ST are not eligible for claiming / applying any Fee Reimbursement (As per Memo No.10537/SW. Edn.2/2011, dated: 01-11-2011).**

♦ **P.G. Degree holders of a particular Course / Subject are not entitled for admission into the Same Course / subject in A.N.U. Colleges including A.N.U. P.G. Centre, Ongole. However, a P.G. Degree holder who wishes to pursue another P.G. Course in a different discipline may be given admission but is not eligible for Hostel Admission, any Scholarship / Exemption of any fees applying for reimbursement etc.**

♦ No Candidate is entitled to pursue more than one Full Time course at a time. If admitted, no candidate can undertake any other Full-Time Assignment / Employment / Study of any other Full-Time Course simultaneously.

ENTRANCE TEST

i. TEST CENTRES: 1. GUNTUR   2. ONGOLE   3. VIJAYAWADA

- Candidate should mention the Centre code and Name of his / her choice in Online Application Form.
- Candidates applying for more than one Test are advised to opt for the same Centre as there is a likelihood of clash of dates and timings. Requests for change of Test Centre and Subject opted by the Candidate in the Application Form will not be considered under any circumstances.
- The final allotment of the Examination Centre will be decided by the Directorate of Admissions.
- **The Exact Date, Time and Venue of Test Centre will be given in the Hall Ticket.**

ii. GENERAL INFORMATION

◊   Candidates can download their **Hall-tickets** from the website **www.anudoa.in** or **www.anu.ac.in/doa**

◊   No candidate will be admitted into Examination hall without Hall-Ticket.

◊   The Entrance Test will have **100 Multiple choice questions** carrying 100 marks to be answered in **90 minutes**.

◊   Candidates have to indicate their answers only on the **OMR Sheet** provided along with the Question Paper (Model OMR Answer sheet enclosed towards the end of this information brochure).

◊   Candidates have to bring **BLACK BALL POINT PEN** for marking on the OMR Sheet. (Candidates are required to go through instructions given on the OMR Sheet for answering questions in the Examination).

◊   Books / Tables / Mechanical / Electronic aids / Cell Phones / Mobile Phones / Pagers are not allowed in the Examination Hall. Possession of these items in the Examination hall is an offence and disciplinary action will be taken by the Chief Superintendent of the Examination centre.

◊   Candidate will not be admitted into the Examination Hall after a lapse of **15 minutes** after commencement of the Entrance test. The Candidate will be allowed to leave the Examination Hall after lapse of **60 minutes** of commencement of Entrance Test.

◊   The Chief Superintendent of the Centre may take any disciplinary action against candidates resorting to malpractices in the entrance examination will be dealt with in accordance with the University rules.

RESERVATIONS

(THE RULES OF RESERVATION THAT ARE IN FORCE AT THE TIME OF ADMISSION SHALL BE FOLLOWED)

Admission to various courses of study will be made on the basis of merit and subject to the following criteria of reservations.

a. **Local Candidates:** 85% of the available seats in each category in each course of study are reserved in favour of the local candidates belonging to the districts of **Srikakulam, Vizianagaram, Visakhapatnam, East Godavari, West Godavari, Krishna, Guntur and Prakasam**. Candidates claiming reservation under this category shall have to enclose appropriate **Form I or II or III or IV given Annexure-A** and it has to be attested by the appropriate official. The attested copy of local candidate certificate need to be submitted at the time of counseling. The allotment of seats under this category will be done as per G.O.Ms.No.42, Higher Education Dept., Dated: 18-5-2009.

b. **Statutory Reservations: (Candidates belonging to these categories should submit the permanent caste certificate in original issued by M.R.O.)**:

   i. Scheduled Caste (SC)   : 15%
   ii. Scheduled Tribes (ST)   : 6%
   iii. Backward Communities (BC)   : 29% (A-7%; B-10%; C-1%; D-7%; E-4 %)

c. **Other Category Reservations:**

   i. Physically Handicapped (PH)   : 3%
   ii. Sports   : 0.5%
   iii. NCC   : 1%
   iv. CAP (Children of Armed Personnel) : 2%
   v. Women   : 33.3% in each of reservation category.

Note 3: Candidates claiming Other Category Reservations to submit relevant certificates at the time of counseling

- ❖ Physically Handicapped candidates should submit the certificate of their disability issued by the concerned specialist government doctor (Professor's rank) / Medical Board.
- ❖ For implementation of reservations in each subject, A.N.U. College and A.N.U.P.G. Centre are taken as one unit and all the affiliated colleges as one unit.
- ❖ For claiming admission under N.C.C and Sports quota the candidates should submit relevant Certificates.
- ❖ The candidates claiming seats under the category of CAP need to produce
  - (i) Certificate from Zilla Sainik welfare Officer for whose parent(s) are Ex-Service Men
  - (ii) Service certificate for whose parent(s) are still in service

COUNSELING

- ▶ The Order of merit will be decided on the basis of marks obtained in the Entrance Test. In case of tie, the tie will be resolved on the basis of Percentage of obtained in the Qualifying Examination, further tie will be resolved based on marks obtained in the Group subjects of the qualifying examination. Still, tie persists it will be resolved on the basis of date of birth in favour of older candidates.
- ▶ Selection for Admission shall be based on the Rank obtained in the Entrance Test for courses mentioned in Table-I except M.P.Ed. In case of M.P.Ed. Admission will be made on the basis of the marks obtained in the entrance test and weightage of marks for sports achievements.
- ▶ Candidates can download their Rank Cards and Schedule of Counseling from the website **www.anudoa.in or www.anu.ac.in/doa.** The movement the above material is uploaded to the website, it will be informed to the candidates through SMS / E-mail.
- ▶ If any candidate fails to report to the allotting authority (Director, Directorate of Admissions) when his / her Rank / Name is announced, he / she will be considered for allotment at the end of that Session subject to availability of seats and no explanation for the delay in reporting to the allotting authority will be entertained.
- ▶ Candidate needs to pay Processing Fee and Prescribed Admissions Fee at the time of counseling in single installment failing which he / she has to forfeit his / her Seat.
- ▶ Duly filled in declaration form given in **Annexure - B** and should submit at the time of counseling.
- ▶ A Candidate once allotted to a college can avail transfer of college by paying Rs.300/- for the first time and only one more transfer is allowed by paying Rs.500/- subject to availability of seats and no more transfers are allowed.
- ▶ A candidate once opted for a course and is allotted will be allowed to change the course already opted subject to availability of seats on payment of Rs.300/- for the first time and on payment of Rs.500/- for the second time and no more change of course is allowed.
- ▶ For the purpose of reimbursement of fee, the Income certificate is invariably to be issued by M.R.O. If the Original Certificates are not submitted at the time of counseling he / she has to pay total prescribed fee on par with the candidates of other categories and no concession will be allowed by the allotting authority.
- ▶ The income certificate of the parent / guardian issued by M.R.O. is valid if it is issued within six months from the date of counseling.
- ▶ The Fee Reimbursement is limited to the extent of **Rs.20,000/-** only (wide G.O. M.S. 56, S.W. Edn.-2. Dept dated 6.10.2003) and if the fee is over and above Rs.20,000/- the remaining amount has to be paid at the time of counseling failing which he / she has to forfeit the seat.
- ▶ Candidates who belong to other Universities shall pay Rs. 100/- as recognition fee in addition to tuition fee.

CANCELLATION OF SEAT

- ➢ Once seat is allotted in a particular course, he / she will have to join in that course and the college to which he / she is allotted on or before the stipulated date failing which the seat allotted will automatically be cancelled and it will be allotted to the next candidate in order of merit.

- A seat allotted to a candidate can be cancelled on request if he / she gets a seat in another University or gets a job.
- If the seat allotted to a candidate is cancelled for the two reasons mentioned above, the Total fee paid by the candidate will be refunded after deducting 10% of it. The Processing fee will not be refunded under any circumstances.
- However, Cancellation of seat is allowed only before the closure of the Admissions for the Academic Year 2015-16.
- If a candidate wants to cancel the seat after the closure of the Admissions, the penalties he / she is required to pay will be decided by the Registrar, A.N.U. based on the merits of the case.

ADMISSIONS

- P.G. admissions are made under **Choice Based Credits System in Semester Pattern** with an internal component of 30%, without any supplementary examinations.
- a. Hostel accommodation is available for all Girl students admitted into the University College.
  b. Limited Hostel accommodation is available for male students of A.N.U. Colleges, subject to A.N.U. Hostel Rules.
  c. University does not provide any transport facilities for any purpose. However, students can make use of the concessional APSRTC student bus pass facility.
- 75% attendance of classes is compulsory. Condonation may be granted to only those who have put in at least 60% of attendance on production of evidence with sufficient ground.
- If a student discontinues a course after admission, he/she will not be readmitted into the course later.
- The student name will be removed from the rolls without any notice if he/she is absent continuously for a period of one month.
- Students of this University are prohibited from simultaneously pursuing another full time course of study here or elsewhere or employment or profession.
- Transfer Certificate (T.C.) and Conduct Certificate (C.C.) once submitted will not be returned.
- Hostel inmates who don't pay their dues regularly are liable for eviction from Hostel/ineligible for readmission into Hostel.
- If any student is found responsible for defacing the walls or damaging any permanent structures within the campus or destruction of University property he/she is liable for expulsion from the University / need to compensate the financial loses / liable for punishment under Law and Order.
- ANU Campus is **Ragging Free Zone** and if any student is indulging is the act of Ragging, he / she is liable for prosecution as per **ANDHRA PRADESH ANTI RAGGING ACT XXXVI OF 1997**

* * * * *

LOCAL CANDIDATE CERTIFICATE FORM - I

(To be issued by the Principal of College)

I certify that Sri / Kum ………………………………………………………………………… Son / Daughter / Wife of

……………………………………………………..… a candidate for admission to the ……………………………………………

studying in the following educational institutions during the four or more consecutive academic years ending with

the academic year in which he / she appeared in the above qualifying examination.

S. No	College Name	Educational Qualification	Place	Year
1.				
2.				
3.				
4.				

and thus is a Local candidates in the Acharya Nagarjuna University area within the meaning of G.O.Ms. No.453 General Administration (SLF-B) dt. 3rd July, 1974.

_____

S I G N A T U R E

Place   :   Designation:
Date   :   (with Office Seal)

………..........

FORM – II

Admissions for ……………………………………………………………………………………… Course.

1.   It is hereby certified **a)** that …………………………………………….. S/o, D/o ………………………………………….

a) Candidate for admission to the ……………………………………………… course, appeared for the first time for the …………………………………… examination (belong the minimum qualifying examination for admission to the course mentioned above) in ……………………………………. (Month) ………………………………… (Year)

b) that he /she has not studied in any educational institution during the whole period or a part of the four consecutive academic years ending with the academic year in which he / she first appeared for the aforesaid examination.

c) that in the four years immediately preceding the commencement of the aforesaid examination he / she resided in the following place / places falling within the Local area in respect of University, namely.

1.

2.

3.

4.

2.   The above candidate is, therefore, a Local candidate in relation to the Local area specified in paragraph 3(1) / 3(2) / 3(8) of the Andhra Pradesh Educational Institutions (Regulation of Admission) order 1974.

Place   :

Date   :   **Officer of Revenue Department**

Office Seal   :   (Not below the rank Mandal Revenue Officer)

FORM – III

(STUDY CERTIFICATE)

(Applicable only to candidates who have studied in Andhra Pradesh for atleast seven consecutive years and to whom Form-I does not apply)

It is hereby certified **(a)** that …… S/o / D/o ……………………………………………………………………………….. a candidate for admission to the ……………………………………………………. Course appeared, or, as the case may be, first appeared for the ……………………………………………………… examination (being the relevant qualifying examination for admission to the course mentioned above) in ……………………………… (Month) ………………………………………… (Year) **(b)** that he / she has studied in educational institutions in the State of Andhra Pradesh for a period of not less than seven consecutive academic years ending with the qualifying examination mentioned in para (a) as indicated below.

S. No	No. of Years	College or Educational Institution in which studied	Place	Academic Years
1.				
2.				
3.				
4.				
5.				
6.				
7.				

(c) and that therefore he / she having studied for the maximum period or equal period, as the case may be, within the Acharya Nagarjuna University area the meaning of the Andhra Pradesh Educational Institutions, (Regulations of Admission) Order 1974 as amended by the second Amendment Order (vide G.O.Ms.816 Gen. Admn. A.P.E.-B) date 22-11-86) is a Local candidate.

Place:
Date:

Principal of the College / Institution
(in which candidate last studied)

Designation
(with Office Seal)

FORM – IV
(CERTIFICATE OF RESIDENCE)

Applicable only to candidates who resided in the State of Andhra Pradesh for seven consecutive years preceding the qualifying examination whether or not he / she studied in any educational institution in the state of Andhra Pradesh

It is hereby certified **(a)** that …… S/o / D/o …………………………………………………………………………………….. a candidate for admission to the ……………………………………….. Course appeared for the ……………………………………… examination (being the relevant qualifying examination for admission to the course mentioned above) in ………………………. (Month) ………………………… (Year) **(b)** that he / she has not studied in any educational institutions in Andhra Pradesh during the whole part of period of seven years ending with the qualifying examination, but resided within the state of Andhra Pradesh during the whole of the said period within the Acharya Nagarjuna University area as detailed below.

S. No	No. of Years	College or Educational Institution in which studied	Place	Academic Years
1.				
2.				
3.				
4.				
5.				
6.				
7.				

(c) and that therefore he / she having resided for the longest period during the last part or the equal period, as the case may be, within the Acharya Nagarjuna University area he / she is a Local candidate of the Acharya Nagarjuna University area within the meaning of the Andhra Pradesh Educational Institutions, (Regulations of Admission) Order 1974 as amended by the second Amendment Order 1976 (vide G.O.Ms.No.816 Admn.(SPF-B) date 26-11-75).

Place   :

Date   :   **Officer in Revenue Department**

Office Seal   :   (Not below the rank of Mandal Revenue Officer)

ANNEXURE-B

DECLARATION FORM

(To be given by the Applicant and the Parent)

I …….. abide by the rules

and regulations of admissions for the academic year 2015-16.

Signature of the Parent / Guardian   **Signature of the Applicant**

Date:

SYLLABUS FOR ANUPGCET – 2015

LIFE SCIENCES

Max. Marks: 100

1. Cell Biology: Ultra structure of prokaryotic and eukaryotic cell, Structure and function of cell organelles. Cell division - Mitosis and Meiosis. Chromosomes structure, Karyotype.

2. Genetics: Mendelian principles, Gene Interaction, Linkage and Crossing over, Sex determination, Sex linkage, Mutations - Genic and chromosomal (Structural and numerical); Chromosomal aberrations in humans. Recombination in prokaryotes transformation, conjugation, transduction, sexduction. Extra genomic inheritance.

3. Molecular Biology and Genetic Engineering: Structure of eukaryotic gene, DNA and RNA structure, DNA replication in pro and eukaryotes, Transcription and translation in pro and eukaryotes, genetic code. Regulation of gene expression in prokaryotes, Principles of recombinant DNA technology. DNA vectors, Transgenesis. Applications of genetic engineering.

4. Biotechnology: Plant and animal cell culture, cloning, Fermentors types and process, Biopesticides, Biofertilizers, Bioremediation, Renewable and non - renewable energy resources, Non-conventional fuels.

5. Biomolecules: Carbohydrates, proteins, amino acids, lipids, vitamins and porphyrins. Enzymes - classification and mode of action, enzyme assay, enzyme units, enzyme inhibition, enzyme kinetics, Factors regulating enzyme action.

6. Immunology: Types of immunity, cells and organelles of immune system, Antigen – antibody reaction. Immunotechniques, Hypersensitivity, Vaccines.

7. Techniques: Microscopy - Light and Electron, Centrifugation, Chromatography, Eletrophoresis, Calorimetric and Spectrophotometric techniques, Blotting techniques, PCR, DNA finger printing.

8. Ecology, Environment and Evolution: Theories and evidences of organic evolution, Hardy – Weinberg law. Components of an ecosystem, Ecological pyramids, Biogeochemical cycles, Ecological adaptations. Climatic and edaphic and biotic factors. Ecological sucession - Hydrosere and xerosere, Natural resources, Biodiversity, current environmental issues, Environmental pollution, Global warming and climate change.

9. Physiology: Structure and function of liver, kidney and heart, composition of blood, blood types, blood coagulation, Digestion and absorption, Endocrinology, Muscle and Nervous system.

10. Metabolism: Metabolism of carbohydrates, lipids, proteins, aminoacids and nucleic acids. Biological oxidation and bioenergetics.

11. Animal Science: Biology of invertebrates and chordates, Embryology of chordates, Classification of marine environment - Physical and chemical parameters, Marine, estuarine, reservoir and riverine fisheries, Cultivation of fin and shell fish. Culture practices.

12. Plant Science: Classification of cryptogams and phanerogams. General characteristics of taxonomic groups at class and family level Water relations and mineral nutrition of plants, Plant growth regulators, Ethnobotany and medicinal plants, Biology of plant seed, Photosynthesis.

13. Microbiology: Microbes - Types, distribution and biology. Isolation and cultivation of bacteria and virus. Staining techniques. Bacterial growth curve, Microbial diseases - food and water borne, insect borne, contact diseases in humans. Microbial diseases in plants - by bacteria, fungi and virus, Plant microbe - interactions.

14. Nutrition: Biological value of proteins, protein malnutrition, disorders, Chemistry and physiological role of vitamins and minerals in living systems.

PHYSICAL SCIENCES

Electricity, Magnetism and Electronics:

1. Electrostatics: Gauss law and its applications-Uniformly charged sphere, charged cylindrical conductor and an infinite conducting sheet of charge. Deduction of Coulmb's law from Gauss law Mechanical force on a charged conductor Electric potential - Potential due to a charged spherical conductor, electric field strength from the electric dipole and an infinite line of charge. Potential of a uniformly charged circular disc.

2. Dielectrics: An atomic view of dielectrics, potential energy of a dipole in an electric field. Polarization and charge density, Gauss's law for dielectric medium- Relation between D,E, and P. Dielectric constant, susceptibility and relation between them. Boundary conditions at the dielectric surface. Electric fields in cavities of a dielectric-needle shaped cavity and disc shaped cavity.

3. Capacitance: Capacitance of concentric spheres and cylindrical condenser, capacitance of parallel plate condenser with and without dielectric. Electric energy stored in a charged condenser – force between plates of condenser, construction and working of attracted disc electrometer, measurement of dielectric constant and   potential difference.

4. Magnetostatics: Magnetic shell - potential due to magnetic shell - field due to magnetic shell - equivalent of electric circuit and magnetic shell - Magnetic induction (B) and field (H) -permeability and susceptibility -Hysteresis loop.

5. Moving charge in electric and magnetic field: Hall effect, cyclotron, synchrocyclotron and synchrotron - force on a current carrying conductor placed in a magnetic field, force and torque on a current loop, Biot -Savart's law and calculation of B due to long straight wire, a circular current loop and solenoid.

6. Electromagnetic induction: Faraday's law -Lenz's law - expression for induced emf - time varying magnetic fields -Betatron -Ballistic galvanometer - theory - damping correction - self and mutual inductance, coefficient of coupling, calculation of self inductance of a long solenoid -toroid – energy stored in magnetic field - transformer - Construction, working, energy losses and efficiency.

7. Varying and alternating currents: Growth and decay of currents in LR, CR and LCR circuits – Critical damping. Alternating current relation between current and voltage in pure R,C and L-vector diagrams -Power in ac circuits. LCR series and parallel resonant circuit - Q-factor. AC & DC motors-single phase, three phase (basics only).

8. Maxwell's equations and electromagnetic waves: A review of basic laws of electricity and magnetism -displacement current - Maxwell's equations in differential form - Maxwell's wave equation, plane electromagnetic waves -Transverse nature of electromagnetic waves, Poynting theorem, production of electromagnetic waves (Hertz experiment).

9. Basic Electronics: Formation of electron energy bands in solids, classification of solids in terms of forbidden energy gap. Intrinsic and extrinsic semiconductors, Fermi level, continuity equation - p-n junction diode, Zener diode characteristics and its application as voltage regulator. Half wave and full wave, rectifiers and filters, ripple factor (quantitative) – p n p and n p n transistors, current components in transistors, CB.CE and CC configurations - transistor hybrid parameters - determination of hybrid parameters from transistor characteristics -transistor as an amplifier — concept of negative feed back and positive feed back - Barkhausen criterion, RC coupled amplifier and phase shift oscillator (qualitative).

10. Digital Principles: Binary number system, converting Binary to Decimal and vice versa. Binary addition and subtraction (1's and 2's complement methods). Hexadecimal number system. Conversion from Binary to Hexadecimal - vice versa and Decimal to Hexadecimal vice versa.

11. Logic gates: OR, AND, NOT gates, truth tables, realization of these gates using discrete components. NAND, NOR as universal gates, Exclusive - OR gate, De Morgan's Laws - statement and proof, Half and Full adders. Parallel adder circuits.

Thermodynamics and Optics:

1. Kinetic theory of gases: Introduction - Deduction of Maxwell's law of distribution of molecular speeds, Experimental verification Toothed Wheel Experiment, Transport Phenomena - Viscosity of gases - thermal conductivity - diffusion of gases.

2. Thermodynamics: Introduction - Reversible and irreversible processes - Carnot's engine and its efficiency - Carnot's theorem - Second law of thermodynamics, Kelvin's and Claussius statements - Thermodynamic scale of temperature - Entropy, physical significance - Change in entropy in reversible and irreversible processes - Entropy and disorder - Entropy of universe - Temperature- Entropy (T-S) diagram - Change of entropy of a perfect gas-change of entropy when ice changes into steam.

3. Thermodynamic potentials and Maxwell's equations: Thermodynamic potentials – Derivation of Maxwell's thermodynamic relations – Clausius - Clayperon's equation - Derivation for ratio of specific heats - Derivation for difference of two specific heats for perfect gas. Joule Kelvin effect – expression for Joule Kelvin coefficient for perfect and Vanderwaal's gas.

4. Low temperature Physics: Introduction - Joule Kelvin effect - liquefaction of gas using porous plug experiment. Joule expansion - Distinction between adiabatic and Joule Thomson expansion – Expression for Joule Thomson cooling - Liquefaction of helium, Kapitza's method - Adiabatic demagnetization - Production of low temperatures-Principle of refrigeration, vapour compression type. Working of refrigerator and Air conditioning machines. Effects of Chloro and Fluro Carbons on Ozone layer; applications of substances at low-temperature.

5. Quantum theory of radiation: Black body-Ferry's black body - distribution of energy in the spectrum of Black body - Wein's displacement law, Wein's law, Rayleigh-Jean's law - Quantum theory of radiation - Planck's law - deduction of Wein's law, Rayleigh-Jeans law, from Planck's law - Measurement of radiation - Types of pyrometers - Disappearing filament optical pyrometer - experimental determination- Angstrom pyroheliometer - determination of solar constant, effective temperature of sun.

6. Statistical Mechanics: Introduction to statistical mechanics, concept of ensembles, Phase space, Maxwell-Boltzmann's distribution law, Molecular energies in an ideal gas, Bose-Einstein Distribution law, Fermi-Dirac Distribution law, comparison of three distribution laws, Black Body Radiation, Rayleigh-Jean's formula, Planck's radiation law, Weins Displacement, Stefan's Boltzmann's law from Plancks formula. Application of Fermi-Dirac statistics to white dwarfs and Neutron stars.

7. The Matrix methods in paraxial optics: Introduction, the matrix method, effect of translation, effect of refraction, imaging by a spherical refracting surface. Imaging by a co-axial optical system. Unit planes. Nodal planes. A system of two thin lenses.

8. Aberrations: Introduction - Monochromatic aberrations, spherical aberration, methods of minimizing spherical aberration, coma, astigmatism and curvature of field, distortion. Chromatic aberration – the achromatic doublet - Removal of chromatic aberration of a separated doublet.

9. Interference: Principle of superposition - coherence - temporal coherence and spatial coherence - conditions for Interference of light **Interference by division of wave front:** Fresnel's biprism - determination of wave length of light. Determination of thickness of a transparent material using

Biprism -change of phase on reflection - Lloyd's mirror experiment. **Interference by division of amplitude:** Oblique incidence of a plane wave on a thin film due to reflected and transmitted light (Cosine law) - Colours of thin films - Non reflecting films - interference by a plane parallel film illuminated by a point source - Interference by a film with two non-parallel reflecting surfaces (Wedge shaped film) - Determination of diameter of wire-Newton's rings in reflected light with and without contact between lens and glass plate, Newton's rings in transmitted light (Haidinger Fringes) - Determination of wave length of monochromatic light - Michelson Interferometer - types of fringes - Determination of wavelength of monochromatic light, Difference in wavelength of sodium 0^2 lines and thickness of a thin transparent plate.

10. Diffraction: Introduction - Distinction between Fresnel and Fraunhoffer diffraction Fraunhoffer diffraction:- Diffraction due to single slit and circular aperture - Limit of resolution - Fraunhoffer diffraction due to double slit - Fraunhoffer diffraction pattern with N slits (diffraction grating) Resolving Power of grating – Determination of wave length of light in normal and oblique incidence methods using diffraction grating. Fresnel diffraction:- Fresnel's half period zones - area of the half period zones - zone plate - Comparison of zone plate with convex lens - Phase reversal zone plate - diffraction at a straight edge - difference between interference and diffraction.

11. Polarization: Polarized light: Methods of Polarization, Polarizatioin by reflection, refraction, Doublerefraction, selective absorption , scattering of light - Brewsters law - Malus law – Nicol prism polarizer and analyzer - Refraction of plane wave incident on negative and positive crystals (Huygen's explanation) - Quarter wave plate, Half wave plate - Babinet's compensator - Optical activity, analysis of light by Laurent's half shade polarimeter.

12. Laser, Fiber Optics and Holography: Lasers: Introduction - Spontaneous emission – Stimulated emission - Population inversion. Laser principle - Einstein coefficients - Types of Lasers - He-Ne laser - Ruby laser -Applications of lasers. Fiber Optics: Introduction - Optical fibers - Types of optical fibers - Step and graded index fibers - Rays and modes in an optical fiber - Fiber material - Principles of fiber communication (qualitative treatment only) and advantages of fiber communication. Holography: Basic Principle of Holography - Gabor hologram and its limitations, Holography applications.

Mechanics and Waves and Oscillations:

1. Vector Analysis: Scalar and vector fields, gradient of a scalar field and its physical significance. Divergence and curl of a vector field and related problems. Vector integration, line, surface and volume integrals. Stokes, Gauss and Greens theorems- simple applications.

2. Mechanics of Particles: Laws of motion, motion of variable mass system, motion of a rocket, multistage rocket, conservation of energy and momentum. Collisions in two and three dimensions, concept of impact parameter, scattering cross-section, Rutherford scattering

3. Mechanics of rigid bodies: Definition of Rigid body, rotational kinematic relations, equation of motion for a rotating body, angular momentum and inertial tensor. Eulers equation, precession of a top, Gyroscope, precession of the equinoxes

4. Mechanics of continuous media: Elastic constants of isotropic solids and their relation, Poisson's ratio and expression for Poisson's ratio in terms of y, n, k. Classification of beams, types of bending, point load, distributed load, shearing force and bending moment, sign conventions, simple supported beam carrying a concentrated load at mid span, cantilever with an end load

5. Central forces: Central forces - definition and examples, conservative nature of central forces, conservative force as a negative gradient of potential energy, equation of motion under a central force, gravitational potential and gravitational field, motion under inverse square law, derivation of Kepler's laws, Coriolis force and its expressions.

6. Special theory of relativity: Galilean relativity, absolute frames, Michelson-Morley experiment, Postulates of special theory of relativity. Lorentz transformation, time dilation, length contraction, addition of velocities, mass-energy relation. Concept of four vector formalism.

7. Fundamentals of vibrations: Simple harmonic oscillator, and solution of the differential equation- Physical characteristics of SHM, torsion pendulum, - measurements of rigidity modulus , compound pendulum, measurement of 'g', combination of two mutually perpendicular simple harmonic vibrations of same frequency and different frequencies, Lissajous figures

8. Damped and forced oscillations: Damped harmonic oscillator, solution of the differential equation of damped oscillator. Energy considerations, comparison with undamped harmonic oscillator, logarithmic decrement, relaxation time, quality factor, differential equation of forced oscillator and its solution, amplitude resonance, velocity resonance

9. Complex vibrations: Fourier theorem and evaluation of the Fourier coefficients, analysis of periodic wave functions-square wave, triangular wave, saw-tooth wave

10. Vibrations of bars: Longitudinal vibrations in bars- wave equation and its general solution. Special cases (i) bar fixed at both ends ii) bar fixed at the mid point iii) bar free at both ends iv) bar fixed at one end. Transverse vibrations in a bar- wave equation and its general solution. Boundary conditions, clamped free bar, free-free bar, bar supported at both ends, Tuning fork.

11. Vibrating Strings: Transverse wave propagation along a stretched string, general solution of wave equation and its significance, modes of vibration of stretched string clamped at both ends, overtones, energy transport, transverse impedance

12. Ultrasonics: Ultrasonics, properties of ultrasonic waves, production of ultrasonics by piezoelectric and magnetostriction methods, detection of ultrasonics, determination of wavelength of ultrasonic waves. Velocity of ultrasonics in liquids by Sear's method. Applications of ultrasonic waves.

MATHEMATICAL SCIENCES

Max. Marks: 100

LINEAR ALGEBRA AND VECTOR CALCULUS

Linear Algebra: Vector spaces, General properties of vector spaces, Vector subspaces, Algebra of subspaces, linear combination of vectors. Linear span, linear sum of two subspaces, Linear independence and dependence of vectors, Basis of vector space, Finite dimensional vector spaces, Dimension of a vector space, Dimension of a subspace. Linear transformations, linear operators, Range and null space of linear transformation, Rank and nullity of linear transformations, Linear transformations as vectors, Product of linear transformations, Invertible linear transformation.

The adjoint or transpose of a linear transformation, Sylvester's law of nullity, characteristic values and characteristic vectors , Cayley- Hamilton theorem, Diagonalizable operators. Inner product spaces, Euclidean and unitary spaces, Norm or length of a vector, Schwartz inequality, Orthogonality, Orthonormal set, complete orthonormal set, Gram - Schmidt orthogonalisation process.

Multiple integrals and Vector Calculus: Multiple integrals: Introduction, the concept of a plane, Curve, line integral- Sufficient condition for the existence of the integral. The area of a subset of R2 , Calculation of double integrals, Jordan curve , Area, Change of the order of integration, Double integral as a limit, Change of variable in a double integration.

Vector differentiation. Ordinary derivatives of vectors, Space curves, Continuity, Differentiability, Gradient, Divergence, Curl operators, Formulae involving these operators. Vector integration, Theorems of Gauss and Stokes, Green's theorem in plane and applications of these theorems.

REAL NUMBERS: The Completeness Properties of R, Applications of the Supremum Property. Sequences and Series - Sequences and their limits, limit theorems, Monotonic Sequences, Sub-sequences and the Bolzano - Weirstras**s** theorem, The Cauchy's Criterion**,** Properly divergent sequences, Introduction to series, Absolute convergence, test for absolute convergence, test for non-absolute convergence. Continuous Functions-continuous functions, combinations of continuous functions, continuous functions on intervals, Uniform continuity.

DIFFERENTIATION AND INTEGRATION: The derivative, The mean value theorems, L'Hospital Rule, Taylor's Theorem. Riemann integration - Riemann integral, Riemann integrable functions, Fundamental theorem.

DIFFERENTIAL EQUATIONS & SOLID GEOMETRY

Differential equations of first order and first degree: Linear differential equations; Differential equations reducible to linear form; Exact differential equations; Integrating factors; Change of variables; Simultaneous differential equations; Orthogonal trajectories.

Differential equations of the first order but not of the first degree: Equations solvable for p; Equations solvable for y; Equations solvable for x; Equations that do not contain x (or y); Equations of the first degree in x and y - Clairaut's equation.

Higher order linear differential equations: Solution of homogeneous linear differential equations of order n with constant coefficients. Solution of the non-homogeneous linear differential equations with constant coefficients by means of polynomial operators. Method of undetermined coefficients; Method of variation of parameters; Linear differential equations with non-constant coefficients; The Cauchy-Euler equation

System of linear differential equations: Solution of a system of linear equations with constant coefficients; An equivalent triangular system. Degenerate Case: $p_1(D) p_4(D)-p_2(D) p_3(D) = 0$.

SOLID GEOMETRY

The Plane: Equation of plane in terms of its intercepts on the axis, Equations of the plane through the given points, Length of the perpendicular from a given point to a given plane, Bisectors of angles between two planes, Combined equation of two planes, Orthogonal projection on a plane.

The Line: Equations of a line, Angle between a line and a plane, The condition that a given line may lie in a given plane, The condition that two given lines are coplanar, Number of arbitrary constants in the equations of a straight line. Sets of conditions which determine a line, The shortest distance between two lines. The length and equations of the line of shortest distance between two straight lines, Length of the perpendicular from a given point to a given line, Intersection of three planes, Triangular Prism.

The Sphere: Definition and equation of the sphere, Equation of the sphere through four given points, Plane sections of a sphere. Intersection of two spheres; Equation of a circle. Sphere through a given circle; Intersection of a sphere and a line. Power of a point; Tangent plane. Plane of contact. Polar plane, Pole of a plane, Conjugate points, Conjugate planes; Angle of intersection of two spheres. Conditions for two spheres to be orthogonal; Radical plane. Coaxial system of spheres; Simplified from of the equation of two spheres.

STATISTICS

Max. Marks: 100

Descriptive Statistics and Probability Distributions:

1. Descriptive Statistics**:** Concept of primary and secondary data. Methods of collection of primary data and secondary data. Classification and tabulation of data. Measures of central tendency (mean, median, mode, geometric mean and harmonic mean) topics are constrained to definitions merits and demerits

only (but proofs are not necessary). Concepts of absolute & relative measure of dispersion (range, quartile deviation, mean deviation, and standard deviation)

2. Importance of moments, central and non-central moments, and their interrelationships, Sheppard's corrections for moments for grouped data. Measures of skewness based on quartiles and moments and kurtosis based on moments with suitable examples.

3. Basic concepts in Probability—deterministic and random experiments, trail, outcome, sample space, event, and operations of events, mutually exclusive and exhaustive events, and equally likely and favorable outcomes with examples. Mathematical, statistical and axiomatic definitions of probability with merits and demerits. Properties of probability based on axiomatic definition. Conditional probability and independence of events. Addition and multiplication theorems for n events. Boole's inequality and Bayes' theorem. Problems on probability.

4. Definition of random variable, discrete and continuous random variables, functions of random variables, probability mass function and probability density function with illustrations. Distribution function and its properties. Transformation of one-dimensional random variable (simple 1-1 functions only). Notion of bivariate random variable, bivariate distribution and statement of its properties. Joint, marginal and conditional distributions. Independence of random variable**s.**

5. Mathematical Expectation**:** Mathematical expectation of a function of a random variable. Raw and central moments and covariance using mathematical expectation with examples. Addition and multiplication theorems of expectation. Definition of moment generating function (m.g.f), cumulant generating function (c.g.f), probability generating function (p.g.f) and characteristic function (c.f) and statements of their properties with applications. Chebyshev's , and Cauchy-Schwartz's inequalities. Statement of weak law of large numbers and central limit theorem for identically and independently distributed (i.i.d) random variables with finite variance.

6. Discrete distributions**:** Uniform, Bernoulli, Binomial, Poisson, Negative binomial, Geometric and Hyper-geometric (mean and variance only) distributions. Properties of these distributions such as m.g.f., c.g.f., p.g.f., c.f., & derive moments up to second order from them. Reproductive property wherever exists. Binomial approximation to Hyper-geometric, Poisson approximation to Binomial and Negative BD.

7. Continuous distributions: Rectangular and Normal distributions. Normal distribution as a limiting case of Binomial and Poisson distributions. Exponential, Gamma, Beta of two kinds (mean and variance only) and Cauchy (definition and c.f. only) distributions. Properties of these distributions such as m.g.f., c.g.f., c.f., and moments up to fourth order, their real life applications and reproductive productive property wherever exists.

Statistical Methods and Inference:

1. Bivariate data, scattered diagram Correlation coefficient and it's properties. Computation of correlation coefficient for grouped data. Correlation ratio, Spearman's rank correlation coefficient and it's properties. Simple linear regression properties of regression coefficients, correlation verses regression. Principles of least squares, fitting of quadratic and power curves. Concepts of partial and multiple correlation coefficients (only for three variables).

2. Analysis of categorical data, independence and association and partial association of attributes, various measures of association (Yule's)& coefficient of colligation for two way data and coefficient of contingency (pearsonss's & Tcheprow's)

3. Concept of population, parameter, random sample, statistic, sampling distribution and standard error. Standard error of sample mean (s) and sample proporations (s). Exact sampling distributions:- Statements and properties of X^2, t, &F distributions and their inter relationships.

4. Point estimation of a parameter. Concept of bias and mean square error of an estimate. Criteria of good estimator-consistency, unbiasedness, efficiency and sufficiency with examples. Statement of Neyman's Factorisation theorem, derivations of sufficient statistics in case of Binomial, Poisson, Normal and Exponential (one parameter only) distributions. Estimation by the method of moments, Maximum likelihood (ML), statements of asymptotic properties of MLE. Concept of interval estimation. Confidence Intervals of parameters of normal population.

5. Concepts of statistical hypothesis, null and alternative, hypothesis, critical region, two Types of errors, level of significance and power of a test. One and two tailed tests, Neyman pearson"s fundamental lemma for Randomised tests. Examples in case of Binomial, poisson, Exponential and Normal distributions and their powers. Use of central limit theorem in testing large sample tests and confidence intervals for mean(s), proportion(s), standard deviation(s) and correlation coefficient(s).

6. Test of significance based on X^2, t, F. X^2-test for goodness of fit and test for independence of attributes. Definition of order statistics.

7. Non-Parametric tests their advantages and disadvantages, comparison with parametric tests. Measurement scale: nominal, ordinal, interval and ratio. One sample runs test, sign test and Wilcoxon-signed rank tests (single and paired samples). Two independent sample tests: Median test, Wilcoxon –Mann-Whitney U test, Wald Wolfowitz's runs test.

APPLIED STATISTICS:

Design of Sample Surveys: Concept of population, sample, sampling unit, parameter, statistic, sampling errors, sampling distribution, sample freme and standard error.

Principle steps in sampling surveys-need for sampling, census verses samples surveys

Sampling and non-sampling errors, sources and treatment of non-sampling errors, advantages and limitations of sampling. Types of sampling: subjective, probability and mixed sampling methods. Methods of drawing random samples with and without replacement. Estimates of population mean, total and proportion, their variances and estimates of variances in the following methods

i) SRSWRAND SRSWOR

ii) Stratified random sampling with proportional and Neyman allocation.

Comparison of relative efficiencies.

Concept of Systematic sampling N=nk

Analysis of Variance and Design of Experiments: ANOVA-one-way, two way classifications with one observation percell-concept of Gauss - Markoff linear model, Statement of Cochran's theorem, Mathematical Analysis, importance and applications of design of experiments. Principles of Experimentation, Analysis of Completely randomized Design (CRD), Randomized Block Design (RBD) and Latin Square Design (LSD)

Time Series: Time series and it's components with illustrations, additive, multiplicative and mixed models, Determination of trend by least squares, moving average methods Determination of Seasonal indices by Ratio to moving average, Ratio to trend and link relative methods.

Index Numbers: Concept, Construction, uses and limitations of simple and weighted index numbers, lasperyer's, Paasche's and Fisher's Index numbers. Fisher's index as ideal index number. Fixed and chain base index numbers. Cost of living index numbers and wholesale price index numbers. Base shifting, Splicing and deflation of index numbers.

Official Statistics: Functions and organization of CSO and NSSO. Agricultural Statistics, area and yield statistics. National Income and it's coputation, utility and difficulties in estimation of National income.

Vital Statistics: Introduction, definition and uses of vital statistics. Sources of vital statistics, registration method and census method. Rates and ratios, Crude Death rate, age specific death rate, standardized death rates, crude birth rate, age specific fertility rate, general fertility rate, total fertility rate. Measurement of population Growth, crude rate in natural increase – Pearl's vital index. Gross reproductive rate and net reproductive rate, Life tables, contruction and uses of life tables and abridged life tables.

Demand Analysis: Introduction, Demand and supply, price elastics of supply and demand. Methods of determining demand and supply curves, Leontief's, Pigous's methods of determining demand curve from time series data, limitations of these methods.

CHEMICAL SCIENCES

Max. Marks: 100

INORGANIC CHEMISTRY

1. s-block elements: General characteristics of groups I & II elements, diagonal relationship between Li & Mg, Be & Al.

2. p-block elements:

General characteristics of elements of groups 13, 14, 15, 16 and 17

Group – 13: Synthesis and structure of diborane and higher boranes (B_4H_{10} and B_5H_9),

boron-nitrogen compounds ($B_3N_3H_6$ and BN)

Group – 14: Preparation and applications of silanes and silicones, graphitic compounds.

Group – 15: Preparation and reactions of hydrazine, hydroxylamine, phosphazenes.

Group – 16: Classifications of oxides based on (i) Chemical behaviour and (ii) Oxygen content.

Group – 17: Inter halogen compounds and pseudo halogens

3. Organometallic Chemistry: Definition and classification of organometallic compounds, nomenclature, preparation, properties and applications of alkyls of 1, 2 and 13 group elements.

4. Chemistry of d-block elements: Characteristics of d-block elements with special reference to electronic configuration, variable valence, magnetic properties, catalytic properties and ability to form complexes. Stability of various oxidation states and e.m.f. Comparative treatment of second and third transition series with their 3d analogues. Study of Ti, Cr and Cu traids in respect of electronic configuration and reactivity of different oxidation states.

5. Chemistry of f-lock elements: Chemistry of lanthanides – electronic structure, oxidation states, lanthanide contraction, consequences of lanthanide contraction, magnetic properties, spectral properties and separation of lanthanides by ion exchange and solvent extraction methods. Chemistry of actinides – electronic configuration, oxidation states, actinide contraction, position of actinides in the periodic table, comparison with lanthanides in terms of magnetic properties, spectral properties and complex formation.

6. Theories of bonding in metals: Valence bond theory, Explanation of metallic properties and its limitations, Free electron theory, thermal and electrical conductivity of metals, limitations, Band theory, formation of bands, explanation of conductors, semiconductors and insulators.

7. Metal carbonyls and related compounds – EAN rule, classification of metal carbonyls, structures and shapes of metal carbonyls of V, Cr, Mn, Fe, Co and Ni. Metal nitrosyls and metallocenes (only ferrocene).

8. Coordination Chemistry: IUPAC nomenclature, bonding theories – review of Werner's theory and Sidgwick's concept of coordination, Valence bond theory, geometries of coordination numbers 4-tetrahedral and square planar and 6-octahedral and its limitations, crystal filed theory, splitting of d-orbitals in octahedral, tetrahedral and square-planar complexes – low spin and high spin complexes – factors affecting crystal-field splitting energy, merits and demerits of crystal-field theory. Isomerism in coordination compounds – structural isomerism and stereo isomerism, stereochemistry of complexes with 4 and 6 coordination numbers.

9. Spectral and Magnetic Properties of Metal Complexes: Electronic absorption spectrum of $[Ti(H_2O)_6]^{3+}$ ion. Types of magnetic behavior, spin-only formula, calculation of magnetic moments, experimental determination of magnetic susceptibility – Gouy method.

10. Reactivity of metal complexes: Labile and inert complexes, ligand substitution reactions – S_N^1 and S_N^2, substitution reactions of square planar complexes – Trans effect and applications of trans effect.

11. Stability of Metal Complexes: Thermodynamic stability and kinetic stability, factors affecting the stability of metal complexes, chelate effect, determination of composition of complex by Job's method and mole ratio method.

12. Hard and soft acids bases (HSAB): Classification, Pearson's concept of hardness and softness, application of HSAB principles – Stability of compounds / complexes, predicting the feasibility of a reaction.

13. Bioinorganic Chemistry: Essential elements, biological significance of Na, K, Mg, Ca, Fe, Co, Ni, Cu, Zn and chloride (Cl^-). Metalloporphyrins – hemoglobin, structure and function, Chlorophyll, structure and role in photosynthesis.

ORGANIC CHEMISTRY

1. Structural theory in Organic Chemistry: Types of bond fission and organic reagents (Electrophilic, Nucleophilic, and free radical reagents including neutral molecules like H_2O, NH_3 & $AlCl_3$). Bond polarization: Factors influencing the polarization of covalent bonds, electro negativity – inductive effect. Application of inductive effect (a) Basicity of amines (b) Acidity of carboxylic acides (c) Stability of carbonium ions. Resonance or Mesomeric effect, application to (a) acidity of phenol, and (b) acidity of carboxylic acids. Hyper conjugation and its application to stability of carbonium ions, Free radicals and alkenes, carbanions, carbenes and nitrenes. Types of Organic reactions: Addition – electrophilic, nucleophilic and free radical. Substitution – electrophilic, nucleophilic and free radical. Elimination-Examples (mechanism not required).

2. Acyclic Hydrocarbons:

Alkanes– IUPAC Nomenclature of Hydrocarbons. Methods of preparation: Hydrogenation of alkynes and alkenes, Wurtz reaction, Kolbe's electrolysis, Corey- House reaction. Chemical reactivity – inert nature, free radical substitution mechanism. Halogenation example- reactivity, selectivity and orientation.

Alkenes **–** Preparation of alkenes (a) by dehydration of alcohols (b) by dehydrohalogenation of alkyl halides (c) by dehalogenation of 1,2 dihalides (brief mechanism), Saytzev's rule. Properties: Addition of hydrogen – heat of hydrogenation and stability of alkenes. Addition of halogen and its mechanism. Addition of HX, Markonikov's rule, addition of H_2O, HOX, H_2SO_4 with mechanism and addition of HBr in the presence of peroxide (anti – Markonikov's addition). Oxidation – hydroxylation by $KMnO_4$, OsO_4,

peracids (via epoxidation) hydroboration, Dienes – Types of dienes, reactions of conjugated dines – 1,2 and 1,4 addition of HBr to 1,3 – butadiene and Diel's – Alder reaction.

Alkynes **–** Preparation by dehydrohalogenation of dihalides, dehalogenation of tetrahalides, Properties; Acidity of acetylenic hydrogen (formation of Metal acedtylides). Preperation of higher acetylenes, Metal ammonia reductions Physical properties. Chemical reactivity – electrophilic addition of X_2, HX, H_2O (Tautomerism), Oxidation with $KMnO_4$, OsO_4, reduction and Polymerisation reaction of acetylene.

3. Alicyclic hydrocarbons (Cycloalkanes): Nomenclature, Preparation by Freunds methods, heating dicarboxylic metal salts. Properties – reactivity of cyclopropane and cyclobutane by comparing with alkanes, Stability of cycloalkanes – Baeyer's strain theory, Sachse and Mohr predictions and Pitzer's strain theory. Conformational structures of cyclobutane, cyclopentane, cyclohexane.

4. Benzene and its reactivity: Concept of resonance, resonance energy. Heat of hydrogenation, heat of combustion of Benezene, mention of C-C bond lengths and orbital picture of Benzene. Concept of aromaticity – aromaticity (definition), Huckel's rule – application to Benzenoid (Benzene, Napthalene) and Non – Benzenoid compounds (cyclopropenyl cation, cyclopentadienyl anion and tropylium cation) Reactions – General mechanism of electrophilic substitution, mechanism of nitration. Friedel Craft's alkylation and acylation. Orientation of aromatic substitution – Definition of ortho, para and meta directing groups. Ring activating and deactivating groups with examples (Electronic interpretation of various groups like NO_2 and Phenolic). Orientation of (i). Amino, methoxy and methyl groups (ii). Carboxy, nitro, nitrile, carbonyl and Sulfonic acid groups. (iii). Halogens (Explanation by taking minimum of one example from each type).

5. Polynuclear Hydrocarbons - Structure of naphthalene and anthracene (Molecular Orbital diagram and resonance energy) any two methods of preparation of naphthalene and reactivity. Reactivity towards electrophilic substitution. Nitration and sulfonation as examples.

6. Halogen compounds: Nomenclature and classification of alkyl (into primary, secondary, tertiary), aryl, aralkyl, allyl, vinyl, benzyl halides. Chemical Reactivity, formation of RMgX Nucleophilic aliphatic substitution reaction- classification into S_N^1 and S_N^2. Energy profile diagram of S_N^1 and S_N^2 reactions. Stereochemistry of S_N^2 (Walden Inversion) S_N^1 (Racemisation). Explanation of both by taking the example of optically active alkyl halide – 2bromobutane. Ease of hydrolysis – comparision of alkyl, benzyl, alkyl, vinyl and aryl halides.

7. Hydroxy compounds: Nomenclature and classification of hydroxy compounds. Alcohols: Preparation with hydroboration reaction, Grignard synthesis of alcohols. Phenols: Preparation i) from diazonium salt, ii) from aryl sulphonates, iii) from cumene. Physical properties- Hydrogen bonding (intermolecular and intramolecular). Effect of hydrogen bonding on boiling point and solubilitiy in water. Chemical properties:

   a. acidic nature of phenols.

   b. formation of alkoxides/phenoxides and their reaction with RX.

   c. replacement of OH by X using PCl_5, PCl_3, PBr_3, $SOCl_2$ and wit $HX/ZnCl_2$.

   d. esterification by acids (mechanism).

   e. dehydration of alcohols.

   f. oxidation of alcohols by CrO_3, $KMnO_4$.

   g. special reaction of phenols: Bromination, Kolb-Schmidt reaction, Riemer-Tiemann reaction, Fries rearrangement, azocoupling. Identification of alcohols by oxidation with $KMnO_4$, ceric ammonium nitrate, lucas reagent and phenols by reaction with $FeCl_3$. Polyhydroxy compounds: Pinacol-Pinacolone rearrangement.

8. Carbonyl compounds: Nomenclature of aliphatic and aromatic carbonyl compounds, structure of the carbonyl group. Synthesis of aldehydes from acid chlorides, synthesis of aldehydes and ketones using 1,3-dithianes, synthesis of ketones from nitriles and from carboxylic acids. Physical properties: absence of hydrogen bonding, keto-enol tautomerism, reactivity of carbonyl group in aldehydes and ketones. Nucleophilic addition reaction with a) $NaHSO_3$, b) HCN, c) RMgX, d) NH_2OH, e)$PhNHNH_2$, f) 2,4 DNPH. g) Alcohols-formation of hemiacetal and acetal. Halogenation using PCl_5 with mechanism. Base catalysed reactions: a) Aldol, b) Cannizzaro reaction, c) Perkin reaction, d) Benzoin condensation, e) Haloform reaction, f) Knoevenagel reaction. Oxidation of aldehydes- Baeyer-Villiger oxidation of ketones. Reduction: Clemmensen reduction, Wolf-Kishner reduction, MPV reduction, reduction with $LiAlH_4$ and $NaBH_4$. Analysis of aldehydes and ketones with a) 2,4-DNT test, b) Tollen's test, c) Fehling text, d) Schiff test, e) Haloform test (with equation).

9. Carboxylic acids and derivatives: Nomenclature, classification and structure of carboxylic acids. Methods of preparation by a) hydrolysis of nitriles, amides and esters. b) carbonation of Grignard reagents. Special methods of preparation of aromatic acids by a) oxidation of side chain. b) hydrolysis by benzotrichlorides. c) Kolbe reaction. Physical properties: Hydrogen bonding, dimeric association, acidity-strength of acids with examples of trimethyl acetic acid and trichloroacetic acid. Relative differences in the acidities of aromatic and aliphatic acids. Chemical properties: Reactions involving H, OH and COOH groups- salt formation, anhydride formation, acid chloride formation, amide formation and esterification (mechanism). Degradation of carboxylic acids by Huns-Diecker reaction, decarboxylation by Schimdt reaction, Arndt-Eistert synthesis, halogenation by Hell-Volhard- Zelinsky reaction. Derivatives of carboxylic acids: Reaction of acid chlorides, acid anhydrides, acid amides,

esters (mechanism of the hydrolysis of esters by acids and bases).

10. Active methylene compounds: Acetoacetic esters: preparation by Claisen condensation, keto-enol tautomerism. Acid hydrolysis and ketonic hydrolysis. Preparation of a) monocarboxylic acids. b) dicarboxylic acids. Reaction with urea Malonic ester: preparation from acetic acid. Synthetic applications:

Preparation of

a) monocarboxylic acids (propionic acid and n-butyric acid).

b) dicarboxylic acids (succinic acid and adipic acid).

c) α, ß-unsaturated carboxylic acids (crotonic acid). Reaction with urea.

11. Exercises in interconversion

12. Nitrogen compounds

13. Nitro hydrocarbons: Nomenclature and classification – nitro hydrocarbons – structure. Tautomerism of nitroalkanes leading to aci and keto form. Preparation of Nitroalkanes. Reactivity – halogenation, reaction with HONO (Nitrous acid), Nef reaction and Mannich reaction leading to Michael addition and reduction. Amines (Aliphatic and Aromatic): Nomenclature, Classification into 1^0, 2^0, 3^0 Amines and Quarternary ammonium compounds. Preparative methods - 1. Ammonolysis of alkyl halides 2. Gabriel synthesis 3. Hoffman's bromamide reaction (mechanism). 4. Reduction of Amides and Schmidt reaction. Physical properties and basic character – Comparative basic strength of Ammonia, methyl amine, dimethyl amine, trimethyl amine and aniline – comparative basic strength of aniline, methylaniline and N,N-dimethyl aniline (in aqueous and non-aqueous medium), steric effects and substituent effects. Use of amine salts as phase transfer catalysts. Chemical properties: a) Alkylation b) Acylation c) Carbylamine reaction d) Hinsberg separation e) Reaction with Nitrous acid of 1^0, 2^0, 3^0 (Aliphatic and aromatic amines). Electrophilic substitutions of Aromatic amines – Bromination and Nitration. oxidation of aryl and 3^0 Amines. Diazotization Cyanides and isocyanides: Nomenclature (aliphatic and aromatic)

structure. Preparation of cyanides from a) Alkyl halides b) from amides c) from aldoximes. Preparation of isocyanides from Alkyl halides and Amines. Properties of cyanides and isocyanides, a) hydrolysis b) addition of Grignard reagent iii) reduction iv) oxidation.

14. Heterocyclic Compounds

15. Introduction and definition: Simple 5 membered ring compounds with one hetero atom Ex. Furan. Thiophene and pyrrole. Importance of ring system – presence in important natural products like hemoglobin and chlorophyll. Numbering the ring systems as per Greek letter and Numbers. Aromatic character – 6- electron system (four- electrons from two double bonds and a pair of non-bonded electrons from the hetero atom). Tendency to undergo substitution reactions. Resonance structures: Indicating electron surplus carbons and electron deficient hetero atom. Explanation of feebly acidic character of pyrrole, electrophillic substitution at 2 or 5 position, Halogenation, Nitration and Sulphonation under mild conditions. Reactivity of furan as 1,3 -diene, Diels Alder reactions (one example). Sulphonation of thiophene purification of Benzene obtained from coal tar). Preparation of furan, Pyrrole and thiophene from 1,4,- dicarbonyl compounds only, Paul-Knorr synthesis, structure of pyridine, Basicity – Aromaticity – Comparison with pyrrole – one method of preparation and properties – Reactivity towards Nucleophilic substitution reaction – chichibabin reaction.

16. Carbohydrates: Monosaccharides: All discussion to be confined to (+) glucose as an example of aldo hexoses and (-) fructose as example of ketohexoses. Chemical properties and structureal elucidation: Evidences for straight chain pentahydroxy aldehyde structure (Acetylation, reduction to n-hexane, cyanohydrin formation, reduction of Tollen's and Fehling's reagents and oxidation to gluconic and saccharic acid). Number of optically active isomers possible for the structure, configuration of glucose based on D-glyceraldehyde as primary standard (no proof for configuration is required). Evidence for cyclic structure of glucose (some negative aldehydes tests and mutarotation). Cyclic structure of glucose. Decomposition of cyclic structure (Pyranose structure, anomeric Carbon and anomers). Proof for the ring size (methylation, hydrolysis and oxidation reactions). Different ways of writing pyranose structure (Haworth formula and chair conformationa formula). Structure of fructose: Evidence of 2 – ketohexose structure (formation of penta acetate, formation of cyanohydrin its hydrolysis and reduction by HI to give 2-Carboxy-n-hexane). Same osazone formation from glucose and fructose, Hydrogen bonding in osazones, cyclic structure for fructose (Furanose structure and Haworth formula). Interconversion of Monosaccharides: Aldopentose to aldo hexose – eg: Arabinose to D-Glucose, DMannose (Kiliani - Fischer method). Epimers, Epimerisation – Lobry de bruyn van Ekenstein rearrangement. Aldohexose to Aldopentose eg: D-glucose to D-arabinose by Ruff'f degradation. Aldohexose (+) (glucose) to ketohexose (-) (Fructose) and Ketohexose (fructose) to aldohexose (Glucose)

17. Amino acids and proteins: Introduction: Definition of Amino acids, classification of Amino acids into alpha, beta, and gama amino acids. Natural and essential amino acids – definition and examples, classification of alpha amino acids into acidic, basic and neutral amino acids with examples. Methods of synthesis: General methods of synthesis of alpha amino acids (specific examples – Glycine, Alanine, valine and leucene) by following methods: a) from halogenated carboxylic acid b) Malonic ester synthesis c) strecker's synthesis. Physical properties: Optical activity of naturally occurring amino acids: L-configuration, irrespective of sign rotation, Zwitterion structure – salt like character - solubility, melting points, amphoteric character , definition of isoelectric point. Chemical properties: General reactions due to amino and carboxyl groups – lactams from gamma and delta amino acids by heating peptide bond (amide linkage). Structure and nomenclature of peptides and proteins.

18. Mass Spectrometry: Basic principles – Molecular ion / parent ion, fragment ions / daughter ions. Theory – formation of parent ions. Representation of mass spectrum. Identification of parent ion, (M+1), (M+2), base peaks (relative abundance 100%) Determination of molecular formula – Mass spectra of ethylbenzene, acetophenone, n-butyl amine and 1- proponal.

PHYSICAL CHEMISTRY

1. Gaseous state: Compression factors, deviation of real gases from ideal behavior. Van der Waal's equation of state. P-V Isotherms of real gases, Andrew's isotherms of carbon dioxide, continuity of state. Critical phenomena. The van der Waal's equation and the critical state. Relationship between critical constants and van der Waal's constants. The law of corresponding states and reduced equation of states. Joule Thomson effect. Liquefaction of gases: i) Linde's method and ii) Claude's method.

2. Liquid state: Intermolecular forces, structure of liquids (qualitative description). Structural differences between solids, liquids and gases. Liquid crystals, the mesomorphic state. Classification of liquid crystals into Smectic and Nematic. Differences between liquid crystal and solid/liquid. Application of liquid crystals as LCD devices.

3. Solid state: Symmetry in crystals. Law of constancy of interfacial angles. The law of rationality of indices. The law of symmetry. Definition of lattice point, space lattice, unit cell. Bravis lattices and crystal systems. X-ray diffraction and crystal structure. Bragg's law. Determination of crystal structure by Bragg's method and the powder method. Indexing of planes and structure of NaCl and KCl crystals. Defects in crystals. Stoichiometric and non-stoichiometric defects. Band theory of semoconductors. Extrinsic and intrinsic semiconductors, n- and p-type semiconductors and their applications in photo electrochemical cells.

4. Solutions: Liquid-liquid - ideal solutions, Raoult's law. Ideally dilute solutions, Henry's law. Non-ideal solutions. Vapour pressure – composition and vapour pressure-temperature curves. Azeotropes-HCl-H_2O, ethanol-water systems and fractional distillation. Partially miscible liquids-phenol-water, trimethylamine-water, nicotine-water systems. Effect of impurity on consulate temperature. Immiscible liquids and steam distillation. Nernst distribution law. Calculation of the partition coefficient. Applications of distribution law.

5. Colloids and surface chemistry: Definition of colloids. Solids in liquids(sols), preparation, purification, properties -kinetic,optical,electrical. Stability of colloids, Hardy-Schulze law, protective colloid. Liquids in liquids (emulsions) preparation, properties, uses. Liquids in solids (gels) preparation, uses. Adsorption: Physical adsoption, chemisorption. Freundlich, Langmuir adsorption isotherms. Applications of adsorption.

6. Phase rule: Concept of phase, components, degree of freedom. Derivation of Gibbs phase rule. Phase equilibrium of one component – water system. Phase equilibrium of two-component system, solid-liquid equilibrium. Simple eutectic diagram of Pb-Ag system, desilverisation of lead. Solid solutionscompound with congruent melting point- (Mg-Zn) system, compound with incongruent melting point – NaCl- water system. Freezing mixtures.

7. Dilute solutions: Colligative properties. Raoult's law, relative lowering of vapour pressure, its relation to molecular weight of non-volatile solute. Elevation of boiling point and depression of freezing point. Derivation of relation between molecular weight and elevation in boiling point and depression in freezing point. Experimental methods of determination. Osmosis, osmotic pressure, experimental determination. Theory of dilute solutions. Determination of molecular weight of non-volatile solute from osmotic pressure. Abnormal Colligative properties. Van't Hoff factor, degree of dissociation and association.

8. Electrochemistry: Specific conductance, equivalent conductance, measurement of equivalent conductance. Variation of equivalent conductance with dilution. Migration of ions, Kohlrausch's law. Arrhenius theory of electrolyte dissociation and its limitations. Ostwald's dilution law. Debye-Huckel-Onsagar's equation for strong electrolytes (elementary treatment only). Definition of transport number, determination by Hittorf's method. Application of conductivity measurements-determination of dissociation constant (Ka) of an acid, determination of solubility product of sparingly soluble salt, conductometric titrations. Types of reversible electrodes- the gas electrode, metal-metal ion,

metalinsoluble salt and redox electrodes. Electrode reactions, Nernst equation, single electrode potential, standard Hydrogen electrode, reference electrodes, standard electrode potential, sign convention, electrochemical series and its significance. Reversible and irreversible cells, conventional representation of electrochemical cells. EMF of a cell and its measurements. Computation of cell EMF. Applications of EMF measurements, Calculation of thermodynamic quantities of cell reactions (DG, DH and K). Determination of pH using quinhydrone electrode, Solubility product of AgCl. Potentiometric titrations.

9. Chemical kinetics: Rate of reaction, factors influencing the rate of a reaction-concentration, temperature, pressure, solvent, light, catalyst. Experimental methods to determine the rate of reaction. Definition of order and molecularity. Derivation of rate constants for first, second, third and zero order reactions and examples. Derivation for time half change. Methods to determine the order of reactions. Kinetics of complex reactions (first order only): opposing reactions, parallel reactions, consecutive reactions and chain reactions. Effect of temperature on rate of reaction, Arrhenius equation, concept of activation energy. Theories of reaction rates- collision theory-derivation of rate constant for bimolecular reaction. The transition state theory (elementary treatment).

10. Photochemistry: Difference between thermal and photochemical processes. Laws of photochemistry - Grothus-Draper's law and Stark-Einstein's law of photochemical equivalence. Quantum yield. Errioxalate actinometry. Photochemical hydrogen- chlorine, hydrogen-bromine reaction. Jablonski diagram depicting various processes occurring in the excited state, qualitative description of fluorescence,phosphorescence, non-radiative processes (internal conversion, intersystem crossing). Photosensitized reactions- energy transfer processes (simple example)

11. Thermodynamics: The first law of thermodynamics-statement, definition of internal energy and enthalpy. Heat capacities and their relationship. Joule's law-Joule-Thomson coefficient. Calculation of w, q, dU and dH for the expansion of perfect gas under isothermal and adiabatic conditions for reversible processes. State function. Temperature dependence of enthalpy of formation-Kirchoff's equation. Second law of thermodynamics. Different Statements of the law. Carnot cycle and its efficiency. Carnot theorem. Thermodynamic scale of temperature. Concept of entropy, entropy as a state function, entropy changes in cyclic, reversible, and irreversible processes and reversible phase change. Calculation of entropy changes with changes in V & T and P&T. Entropy of mixing inert perfect gases. Entropy changes in spontaneous and equilibrium processes. The Gibbs (G) and Hlmholtz (A) energies. A & G as criteria for thermodynamic equilibrium and spontaneity-advantage over entropy change. Gibbs equations and the Maxwell relations. Variation of G with P, V and T.

Chemistry and Industry

Physico Chemical methods of analysis

1. Separation techniques

1. Solvent extraction: Principle and process, Batch extraction, continuous extraction and counter current extraction. Application – Determination of Iron (III)

2. Chromatography: Classification of chromatography methods, principles of differential migration adsorption phenomenon, Nature of adsorbents, solvent systems, Rf values, factors effecting Rf values.

a. Paper Chromatography: Principles, Rf values, experimental procedures, choice of paper and solvent systems, developments of chromatogram – ascending, descending and radial. Two dimensional chromatography, applications.

b. Thin layer Chromatography (TLC): Advantages. Principles, factors effecting Rf values. Experimental procedures. Adsorbents and solvents. Preparation of plates. Development of the chromatogram. Detection of the spots. Applications.

c. Column Chromatography: Principles, experimental procedures, Stationary and mobile Phases, Separation technique. Applications

d. High Performance Liquid Chromatography (HPLC): Principles and Applications.

e. Gas Liquid Chromatography (GLC): Principles and Applications

2. Spectrophotometry: General features of absorption – spectroscopy, Beer-Lambert's law and its limitations, transmittance, Absorbance, and molar absorptivity. Single and double beam spectrophotometers. Application of Beer-Lambert law for quantitative analysis of

1. Chromium in $K_2Cr_2O_7$

2. Manganese in manganous sulphate Iron (III) with thiocyanate.

3. Molecular Spectorscopy

(i) Electronic Spectroscopy: Interaction of electromagnetic radiation with molecules and types of molecular spectra. Potential energy curves for bonding and antibonding molecular orbitals. Energy levels of molecules (ó,ð, n). Selection rules for electronic spectra. Types of electronic transitions in molecules effect of conjugation. Concept of chromophore.

(ii) Infra red spectroscopy: Energy levels of simple harmonic oscillator, molecular vibration spectrum, selection rules. Determination of force constant. Qualitative relation of force constant to bond energies. Anharmonic motion of real molecules and energy levels. Modes of vibrations in polyatomic molecules. Characteristic absorption bands of various functional groups. Finger print nature of infrared spectrum.

(iii) Raman spectroscopy: Concept of polarizavility, selection rules, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules.

(iv) Proton magnetic resonance spectroscopy (^{1}H-NMR) Principles of nuclear magnetic resonance, equivalent and non-equivalent protons, position of signals. Chemical shift, NMR splitting of signals – spin-spin coupling, coupling constants. Applications of NMR with suitable examples – ethyl bromide, ethanol, acetaldehyde, 1,1,2-tribromo ethane, ethyl acetate, toluene and acetophenone.

(v) Spectral interpretation: Interpretation of IR, UV-Visible, ^{1}H-NMR and mass spectral data of the following compounds 1. Phenyl acetylene 2. Acetophenone 3.Cinnamic Acid 4. Paranitro aniline.

Drugs, formulations, pesticides and green chemistry

1. Drugs

1. Introduction: Drug, disease (definition), Historical evolution, Sources – Plant, Animal synthetic, Biotechnology and human gene therapy
2. Terminology: Pharmacy, Pharmacology, Pharmacophore, Pharmacodynamics, Pharmacokinetics (ADME, Receptors – brief teartment) Metabolites and Anti metabolites.
3. Nomenclature: Chemical name, Generic name and trade names with examples
4. Classification: Classification based on structures and therapeutic activity with one example each.
5. Synthesis: Synthesis and therapeutic activity of the following drugs., L-Dopa, Chloroquin, Omeprazole, Albuterol and ciprofloxacin.
6. Drug Development: Pencillin, Separation and isolation, structures of different pencillins
7. HIV-AIDS: Immunity – CD-4 cells, CD-8 cells Retrovirus, replication in human body. Investigation available, prevention of AIDS. Drugs available – examples with structures: PIS: Indinavir (Crixivan), Nelfinavir (Viracept), NNRTIS: Efavirenz (Susrtiva), Nevirapine (Viramune) NRTIs: Abacavir (Ziagen), Lamivudine (Epivir, 3TC) Zidovudine (Retravir, AZT, ZDV)
8. Monographs of drugs: Eg Paracetamol, Sulpha methoxazole (Tablets)

2. Formulations

1. Need of conversion of drugs into medicine. Additives and their role (brief account only)
2. Different types of formulations

3. Pesticides

1. Introduction to pesticides – types – Insecticides, Fungicides, Herbicides, Weedicides, Rodenticides plant growth regulators, Pheremones and Hormones. Brief discussion with examples, Structure and uses.
2. Synthesis and presnt status of the following.
   DDT, BHC, Malathion, Parathion, Endrin, Baygon, 2,4-D and Endo-sulphon

4. Green Chemistry

Introduction: Definition of green Chemistry, need of green chemistry, basic principles of green chemistry

Green Synthesis: Evalution of the type of the reaction i) Rearrangements (100% atom economic), ii) Addition reaction (100% atom economic), Pericyclic reactions (no by-product). Selection of solvent:

i) Aqueous phase reactions ii) Reactions in ionic liquids iii) Solid supported synthesis iv) Solvent free reactions (solid phase reactions)

ii) Green catalysts: i) Phase transfer catalysts (PTC) ii) Biocatalysts

Microwave and Ultrasound assisted green synthesis:

1. Aldol condensation

2. Cannizzaro reaction

3. Diels-Alder reactions

4. Strecker synthesis

5. Willaimson synthesis

6. Dieckmann condensation

Macromolecules, materials Science and catalysis

1. Macromolecules: Classification of polymers, chemistry of polymerization, chain polymerization, step polymerization, coordination polymerization – tacticity. Molecular weight of polymers-number average and weight average molecular weight, degree of polymerization, determination of molecular weight of polymers by viscometry, Osmometry and light scattering methods. Kinetics of free radical polymerization, derivation of rate law. Preparation and industrial application of polyethylene, PVC, Teflon, polyacrylonitrile, terelene and Nylon66. Introduction to biodegradability.

2. Materials science: Superconductivity, characteristics of superconductors, Meissner effect, types of superconductors and applications. Nanomaterials- synthetic techniques, bottom-up-sol-gel method, top-down- electro deposition method. Properties and applications of nano-materials. Composites definition, general characteristics, particle reinforce and fiber reinforce composites and their applications.

3. Catalysis Homogeneous and heterogeneous catalysis, comparision with examples. Kinetics of specific acid catalyzed reactions, inversion of cane sugar. Kinetics of specific base catalyzed reactions, base catalyzed conversion of acetone to diacetone alcohol. Acid and base catalyzed reactions- hydrolysis of esters, mutarotation of glucose. Catalytic activity at surfaces. Mechanisms of heterogeneous catalysis. Langmuir-Hinshelwood mechanism. Enzyme catalysis: Classification, characteristics of enzyme catalysis. Kinetics of enzyme catalyzed reactions-Michaelis Menton law, significance of Michaelis constant (K_m) and maximum velocity (V_{max}). Factors affecting enzyme catalysis- effect of temperature, pH, concentration and inhibitor. Catalytic efficiency. Mechanism of oxidation of ethanol by alcohol dehydrogenase.

GENERAL CHEMISTRY

1. Atomic Structure and elementary quantum mechanics: Blackbody radiation, Planck's radiation law, photoelectric effect, Compton effect, de Broglie's hypothesis, Heisenberg's uncertainty principle. Postulates of quantum mechanics. Schrodinger wave equation and a particle in a box, energy levels, wave functions and probability densities. Schrodinger wave equation for H-atom. Separation of

variables, Radial and angular functions, hydrogen like wave functions, quantum numbers and their importance.

2. Chemical Bonding: Valence bond theory, hybridization, VB theory as applied to ClF_3, BrF_4, $Ni(CO)_4$, XeF_2. Dipole moment – orientation of dipoles in an electric field, dipole moment, induced dipole moment, dipole moment and structure of molecules. Molecular orbital theory – LCAO method, construction of M.O. diagrams for homo-nuclear and hetero-nuclear diatomic molecules (N_2, O_2, HCl, CO and NO). Comparision of VB and MO theories.

3. Stereochemistry of carbon compounds: Molecular representations- Wedge, Fischer, Newman and Saw-Horse formulae. Stereoisomerism, Stereoisomers: enantiomers, diastereomers- definition and examples.Conformational and configurational isomerism- definition. Conformational isomerism of ethane and n-butane. Enantiomers: Optical activity- wave nature of light, plane polarised light, interaction with molecules, optical rotation and specific rotation. Chiral molecules- definition and criteria- absence of plane, center, and Sn axis of symmetry- asymmetric and disymmetric molecules. Examples of asymmetric molecules (Glyceraldehyde, Lactic acid, Alanine) and isymmetric molecules (trans -1,2-dichloro cyclopropane). Chiral centers: definition- molecules with similar chiral carbon (Tartaric acid), definition of mesomers- molecules with dissimilar chiral carbons (2,3-dibromopentane). Number of enantiomers and mesomers- calculation. D,L and R,S configuration for asymmetric and disymmetric molecules. Cahn-Ingold-Prelog rules. Racemic mixture- racemisation and resolution techniques. Diastereomers: definition- geometrical isomerism with reference to alkenes- cis, trans and E,Z- configuration.

4. General Principles of Inorganic qualitative analysis: Solubility product, common ion effect, characteristic reactions of anions, elimination of interfering anions, separation of cations into groups, group reagents, testing of cations.

5. Molecular symmetry: Concept of symmetry in chemistry-symmetry operations, symmetry elements. Rotational axis of symmetry and types of rotational axes. Planes of symmetry and types of planes. Improper rotational axis of symmetry. Inversion centre. Identity element. The symmetry operations of a molecule form a group. Flow chart for the identification of molecular point group.

6. Theory of quantitative analysis

a) Principles of volumetric analysis. Theories of acid-base, redox, complexometric, iodometric and precipitation titrations, choice of indicators for these titrations.

b) Principles of gravimetric analysis: precipitation, coagulation, peptization, coprecipitation, post precipitation, digestion, filtration and washing of precipitate, drying and ignition, precipitation from homogenous solutions, requirements of gravimetric analysis.

7. Evaluation of analytical data.: Theory of errors, idea of significant figures and its importance, accuracy – methods of expressing accuracy, error analysis and minimization of errors, precision – methods of expressing precision, standard deviation and confidence limit.

8. Introductory treatment to:

a. Pericyclic Reactions Concerted reactions, Molecular orbitals, Symmetry properties HOMO, LUMO, Thermal and photochemical pericyclic reactions. Types of pericyclic reactions – electrocyclic, cycloaddition and sigmatropic reactions – one example each.

b. Synthetic strategies Terminology – Disconnection (dix), Symbol ( ), synthon, synthetic equivalent (SE), Functional group interconversion (FGI), Linear, Convergent and Combinatorial syntheses, Target molecule (TM). Retrosynthesis of the following molecules

   1. acetophenone 2. cyclohexene 3. phenylethylbromide

c. Asymmetric (Chiral) synthesis Definitions-Asymmetric synthesis, enantiomeric excess, diastereomeric excess. stereospecific reaction, definition, example, dehalogenation of 1,2-

dibromides by I⁻. stereoselective reaction, definition, example, acid catalysed dehydration of 1-phenylproponol.

GEOLOGY

<div align="right">Max. Marks: 100</div>

Paleontology, Indian Geology and Economic Geology

Petrology and Structural Geology

Physical Geology, Crystallography and Mineralogy

INTEGRATED COURSE - M.SC. NANOTECHNOLOGY (5 YEARS)

<div align="right">Max. Marks: 100</div>

Physics:

1. Measurements, Units and Dimensions	2. Elements of Vectors	3. Kinematics
4. Dynamics	5. Collisions	6. Centre of Mass (CM)
7. Friction	8. Rotatory Motion	9. Gravitation
10. Simple Harmonic Motion (Shm)	11. Elasticity	12. Surface Tension
13. Fluid Mechanics	14. Temperature And Thermal Expansion of Materials	
15. Thermodynamics	16. Transmission of Heat	17. Wave Motion
18. Optics	19. Physical Optics	20. Magnetism
21. Electrostatics	22. Current Electricity	23. Thermoelectricity
24. Electromagnetics	25. Atomic physics	26. Nuclear Physics
27. Semi Conductor Devices	28. Communication Systems	

Chemistry:

1. Atomic Structure
2. Classification of Elements And Periodicity In Properties
3. Chemical Bonding and Molecular Structure
4. Stoichiometry
5. States of Matter: Gases and Liquids
6. Solutions
7. Electro Chemistry
8. Solid State
9. Chemical Kinetics
10. Thermodynamics
11. Surface Chemistry
12. Hydrogen and Its Compounds
13. Alkali and Alkaline Earth Metals
14. p-Block Elements: Group 13 Elements: (IIIA Group Elements)
15. p-Block Elements: Group 14 Elements: (IVA Group Elements)
16. p- Block Elements: Group 15 Elements (VA Group Elements)
17. p- Block Elements: Group 16 Elements (Via Group Elements)
18. P- Block Elements: Group 17 Elements (VIIA Group Elements)
19. Group 18 Elements: (Zero Group Elements)
20. Transition Elements
21. General Principles of Metallurgy
22. Environmental Chemistry
23. Basic Principles and Techniques in Organic Chemistry
24. Hydrocarbons
25. Alkynes & Aromatic Hydrocarbons
26. Stereo Chemistry
27. Haloalkanes & Haloarenes: Haloalkanes
28. Alcohols , Phenols and Ethers
29. Aldehydes and Ketones
30. Carboxylic Acids
31. Organic Compounds Containing Nitrogen
32. Polymers & Biomolecules
33. Chemistry in everyday life

Mathematics:

1. Algebra   2. Trigonometry   3. Vector Algebra   4. Probability   5. Coordinate Geometry   6. Calculus

SOCIAL SCIENCES

Max. Marks: 100

Reasoning: Analogy Test – Alphabet Series – Test of Direction Sense – Coding – Decoding test – Number series – Puzzle – Problem on Age Calculation – Blood Relations – Calendar – Decision Making – Number Series – Matrix – Mathematical Reasoning – Statement and Assumption – Statement and Arguments – Dice – Clock – Inserting the Mission Character – Clerical Aptitude – Word formation – Venn Diagram.

Numerical Ability: General aptitude with emphasis on logical reasoning, graphical analysis, analytical ability, quantitative comparisons, series formation, puzzles, etc. Time and distance - Time and work General arithmetic aptitude - Ratios, Percentage Increase/Decrease - - Numerical Logic - Arithmetic Test - Numerical Reasoning - Data Interpretation - Numerical Estimation.

General English: Active/Passive Voice; Parts of Speech; Time, Tense and Aspect; Phrasal Verbs; Auxiliary verbs; Use of Shall, will, For, Since; Idioms and Phrases; Common Errors; Preposition; Synonyms and Antonyms; Precis Writing and Comprehension

Current Affairs: Current events of national and international importance. - History of India and Indian National Movement. - Indian and World Geography - Physical, Social, Economic Geography of India and the World. - Indian Polity and Governance - Constitution, Political System, Panchayati Raj, Public Policy. - Economic and Social Development, Sustainable Development, Poverty, Inclusive growth, Demography, Social Sector initiatives, etc. General issues on Environmental Ecology, Bio-diversity and Climate Change – that do not require subject specialization.

MASTER OF COMMERCE

Max. Marks: 100

FINANCIAL ACCOUNTING:

Introduction to Accounting

Need for Accounting – definition, features, objectives, functions, systems and bases and scope of accounting - Book keeping and Accounting - Branches of Accounting - Advantages and limitations-basic terminology used- – Accounting concepts and conventions.

Accounting Process-Accounting cycle-Accounting equation-classification of accounts-rules of double entry book keeping – identification of financial transactions-Journalizing –Posting to Ledgers, Balancing of Ledger Accounts – Computerized Accounting: Meaning and Features - Advantages and disadvantages of computerized Accounting Creating of an Organization - Grouping of accounts – Creation of Accounts – creation of inventory-creation of stock groups-,stock categories, units of measurement-stock items-entering of financial transactions-types of vouchers-voucher entry-editing and deleting of vouchers-voucher numbering-customization of vouchers

Subsidiary Books and Bank Reconciliation Statement

Sub Division of Journal-Preparation of Subsidiary Books including different types of cashbooks- simple cashbook, cashbook with cash and discount columns, cashbook with cash, discount and bank columns, cashbook with cash and bank columns and petty cash book. Preparation of sales register, purchase register, journal proper, debit note register, credit note register, and different cash books including interest and discount transactions using computers.

Bank Reconciliation Statement- Need - Reasons for difference between cash book and pass book balances - problems on favorable and over draft balances - Ascertainment of correct cash book balance. Preparation of bank reconciliation statement using computers

Trial Balance, Final Accounts; Errors and Rectification.

Trial Balance: meaning, objectives, methods of preparation - Final Accounts: Meaning, features, uses and preparation of Manufacturing, Trading Account, Profit & Loss Account and Balance Sheet-Adjusting and Closing entries. Preparation of trial balance, trading, profit and loss account, processing of year ending and closing the books, adjusting and closing entries and balance sheet using computers

Errors and their Rectification - Types of Errors - Rectification before and after preparations of final Accounts - Suspense Account- Effect of Errors on Profit. Rectification of errors using computers.

Consignment and Joint Ventures:

Consignment - Features, Terms used Proforma invoice - Account sale Delcredere commission -Accounting treatment in the books of the consignor and the consignee - Valuation of consignment stock - Normal and abnormal Loss - Invoice of goods at a price higher than the cost price.

Joint ventures -features-difference between joint venture and consignment, Accounting Procedure – Methods of keeping records for Joint venture accounts-method of recording in co ventures books-separate set of books method.

Depreciation - Provisions and Reserves:

Meaning of Depreciation - Causes- objects of providing for depreciation -Factors affecting depreciation - Accounting Treatment- Methods of providing depreciation - Straight line method - Diminishing Balance Method.

Provisions and Reserves - Reserve Fund – Different Types of Provisions and Reserves.

BUSINESS ECONOMICS:

Introduction

Economic and Non-Economic Activities—Business-Meaning—Economics-Definitions–micro and macro economics-method of economics-positive and normative—inductive and deductive approaches—reading of graphs-concept of slope—Utility-cardinal and ordinal utility-Law of diminishing marginal utility-Law of Equi-marginal Utility.

Demand, Supply and Market Equilibrium

Demand-meaning-individual demand—law of demand-properties of demand curve-income effect and substitution effect-exceptions to the law of demand—individual demand and Market Demand—demand function—determinants of demand and market demand—shift of demand vs. movement along a demand curve—Elasticity of demand-price elasticity-meaning and measurement-price elasticity and total revenue of a firm-income elasticity-classification of goods based on income elasticity-cross elasticity-classification of goods into substitutes and complements—Supply-law of supply-determinants of supply—market equilibrium—concept of consumer surplus.

Production and Costs

Production function—Distinction between short-run and long-run - Production with one variable input-relationship between total, marginal and average production functions-law of variable proportion - production with two variable inputs - isoquants – isocosts - techniques of maximization of output, minimization of cost and maximization of profit-scale of production-economies and diseconomies of scale - Cost of production - cost function - short-run total and average costs - long-run total and average cost.

Market Structure and Factors of Production

Market structure—characteristics—perfect competition-characteristics-equilibrium price—profit maximizing output in the short and long-run—Monopoly-characteristics-profit maximizing output in the short and long run-defects of monopoly—monopolistic competition-characteristics—product differentiation-profit maximizing price and output in the short and long-run—Oligopoly-characteristics-price rigidity-the kinked demand curve—Factors of Production

National Income, Trade Cycles and International Trade

National Income—definition-measurement—GDP-meaning—fiscal deficit—economic systems-socialism-mixed economy system - free market economies- Concepts of Economic Liberalisation, privatization, Globalisation—WTO—objectives—agreements—functions—Trade cycles-meaning-phases-consequences-remedies—International Trade-Balance of payments.

FINANCIAL SERVICES - BANKING & INSURANCE:

Introduction to Financial Services

Meaning of Financial Services, Structure of Indian Financial System Importance of Financial system for the economic development. (Financial and Banking system charts)

a. Definition of Bank, Functions of Commercial Banks and Reserve Bank of India. (Forms of various accounts and deposits)

b. Definition / Meaning of Insurance and reinsurance, Principles of Insurance, kinds of Insurance, advantages of insurance, globalization of insurance and insurance sector reforms in India.

Banking Systems and its Regulation

a. Banking Systems – Branch banking, Unit Banking, Correspondent banking, Group banking, Deposit banking, Mixed banking and Investment banking. An overview of banking; Banking Sector Reforms with special reference to Prudential Norms: capital adequacy norms, income recognition norms, classification of assets and NPAs; Innovations in Banking-ATMs, E-Banking, Credit cards, Online & Offshore Banking, etc (working and operations)

Regional Rural banks, Cooperative banks, Micro Finance, Priority Sector Lending, Indigenous banking, Role of NABARD, Development Financial institutions – SFC, SIDBI.

Banker and customer, loans and advances:

a. Banker and customer definition and their relationship, types of customers and modes of operations, procedure and precaution for opening an account, pass book & its features, Rights, duties and obligations of the banker. (Application forms for opening accounts, Cheque Books, pass books, requisition slips for withdrawals and deposits, bank statements, etc)

b. Promissory Note and Bills of Exchange and Cheque, differences between them, types of crossing the cheque, payment of cheque and consequences of wrongful dishonor, collection of local and upcountry cheques, responsibilities and liabilities of collecting banker and statutory protection to the collecting banker. (Promissory notes, B/E, Crossed cheques - various modes)

c. Types of loans and advances, principles of sound lending policies, credit appraisals of various forms of loans and advances- modes of creating charges- lien, pledge, mortgage and hypothecation (Documents required for sanction of loans and advances)

Financial Markets & Services:

a. Indian Money Market- Characteristics, Structure, composition (call and notice money, market, treasury bills market, CDs, CPs, short term bill market, MMMFs and DFHI) problems and reforms in Indian money markets (CDs, CPs, Treasury Bills)

b. Indian capital market-composition and growth of primary and secondary markets, differences between primary and secondary markets, capital market reforms and NBFCs in capital markets; Stock Exchanges, NSE, OTCEI, Online Trading and role of SEBI.

c. Financial intermediaries and services: Merchant bankers, Mutual funds, Leasing companies, Venture Capital Funds, Forfaiting, Loan Syndication, Factoring, Custodial Services, Depository Services, and Depository Participants.(Documentation)

Types of Insurance and its regulation

a. Life Insurance – Practical aspects of Life Insurance, procedure for issuing a life insurance policy, issue of duplicate policies, nomination, surrender value, policy loans, assignment, revivals and claim settlement. (Formats of types of Insurance)

b. Non Life Insurance- Types of products and scope of Fire Insurance, Marine Insurance, Health Insurance, Social Insurance and Rural Insurance. Regulation of Insurance in India- Insurance Act, 1938 and IRDA 1999. (Formats of types of Non Life Insurance)

COST AND MANAGEMENT ACCOUNTING:

Introduction

Cost Accounting: definitions, features, objectives, functions, scope, advantages and limitations. Management Accounting: definitions, features, objectives, functions, scope, advantages and limitations. Relationship between cost, management and financial accounting.

Cost concepts-Cost classification -preparation of cost sheet. Relationship of costing department with other departments.

Elements of Costs

Material Cost: direct and indirect material cost, Inventory control techniques-stock levels, EOQ, ABC analysis. Issue of materials to production- pricing methods-FIFO, LIFO with base stock, average methods.

Labor cost: direct and indirect labor cost- methods of payment of wages including incentive plans – Halsey and Rowan plans, Tailors Piece Rate method.

Overheads: features, classification, methods of allocation and apportionment of overheads.

Methods of Costing

Single or Output Costing, job and contract costing: Features, costing process- computation of cost

Process Costing: features, treatment of normal and abnormal losses, preparation of process cost accounts (excluding equivalent products and inter process profits)

Costing Techniques for Decision making

Budgetary Control-Fixed, Flexible Budget

Marginal Costing-Break Even Analysis

Standard Costing-Material and labour Variances

Financial Statement analysis

Financial statements - features, limitations. Need for, Meaning, objectives, and process of financial statement analysis-Methods and techniques of analysis (Theory Only)

Fundsflow Analysis and Cashflow Analysis (as per AS-3)

Ratio Analysis, Calculation of liquidity, solvency, profitability and turnover ratios- Interpretation of ratios

BUSINESS LAWS:

Contract Act

1. Agreement and Contract: Definition and meaning - Essentials of a valid contract – types of contracts.

2. Offer and Acceptance: Definition – Essentials of a valid offer and acceptance **–** communication and revocation of offer and acceptance**.**

3. Consideration: Definition and importance – Essentials of valid consideration – the Doctrines of 'Stranger to Contract' and 'No Consideration – No Contract' – Capacity to contract – special rules regarding minor's agreements.

4. Consent: Free Consent – Flaw in Consent: Coercion – Undue influence – Fraud – Misrepresentation and Mistake.

Discharge of a Contract

1. Legality of object and consideration: illegal and immoral agreements – agreements opposed to public policy.

2. Agreements expressly declared to be void – wagering agreements and contingent contracts.

3. Discharge of a contract – various modes of discharge of a contract – performance of contracts.

4. Breach of a contract – types – remedies for breach of a contract

Sale of Goods Act

1. Contract of sale: Definition - features – definition of the term goods – types of goods – rules of transfer of property in goods – differences between sale and agreement to sell.

2. Rights of an unpaid seller.

3. Conditions and warranties – meaning and distinction – express and implied conditions and warranties – sale by non-owners – auction sale.

Consumer Protection Act and Intellectual Property Rights

1. Definitions of the terms consumer, unfair trade practices, restrictive trade practices and complainant – rights of consumers – consumer protection councils – consumer redressal agencies – penalties for violation.

2. Intellectual Property Rights: Meaning - Need and objectives-Meaning of the terms industrial property, literary property, copy right, patents, trade marks, trade names, trade secrets, industrial designs, geographical indications. Information Technology Act, 2000: aims and   objectives – a brief overview of the Act.

Company Law

1. Doctrine of ultra vires and its effects – doctrine of constructive notice – doctrine of indoor management – exceptions.

2. Management of companies – directors – qualifications – disqualifications – appointment – removal – rights and duties – company meetings and resolutions - appointment of a company secretary.

3. Winding up of companies – various modes – compulsory winding up- powers and duties of official liquidator – members and creditors voluntary winding up – winding up subject to the supervision of the court – dissolution.

MASTER OF EDUCATION

Max. Marks: 100

Teacher and Education in Emerging Indian Society; School Management

Educational Psychology and Statistics

Education Technology & Computer Education

ENGLISH

Max. Marks: 100

POETRY

Title of the Poem	Name of the Poet
1. Ode to Autumn	John Keats
2. Dover Beach	Mathew Arnold
3. The Unknown Citizen	W. H. Auden
4. Poem – 36	Rabindranath Tagore
5. Myriad-Winged Bird	A. Satyavathi Devi
6. Telephone Conversation	Wole Soyinka

PROSE

Title of the Prose Lesson	Name of the Author
1. Is Progress Real?	Will Durant
2. Stephen Leacock	Conjuror's Revenge
3. The Best Investment I Ever Made	A. J. Cronin
4. Prospects of Democracy	Dr. B. R. Ambedkar
5. I Have a Dream	Martin Luther King
6. Letter to a Teacher	Nora Rossi and Tom Cole

GRAMMAR AND VOCABULARY

1. Reading Comprehension
2. Verb Forms
3. Right Words (Synonyms, Antonyms, Homonyms and One-Word Substitutes)
4. Idioms Detection of Errors

POETRY

Title of the Poem	Name of the Poet
1. The Sunne Rising	John Donne
2. The Solitary Reaper	William Wordsworth
3. Road Not Taken	Robert Frost
4. Refugee Mother and Child	Chinua Achebe
5. Good Bye Party for Mrs. Pushpa T. S.	Nissim Ezekiel
6. I will embrace only the sun	Tripuraneni Srinivas (**Down to Earth**, Post-Modern Telugu Poetry, OUP)

PROSE

Title of the Prose Lesson	Name of the Author
1. Mr. Know-All	Somerset Maugham
2. Film-Making	Satyajit Ray
3. Not Just Oranges	Premchand
4. Talk on Advertising	Herman Wouk
5. On Shaking Hands	A. G. Gardiner
6. Decolonizing the Mind	Ngugi wa Thiong'o

COMMUNICATION AND COMPOSITION

1. Resume Writing   2. e-Correspondence   3. Note-Making
4. Report Writing   5. Expansion of Proverbs and Ideas   6. Description of Pictures

Macmillan

Communication – Verbal and Non-Verbal

1. Spoken English with Group Discussion and Debates
2. Business Writing (types of CVs with Covering Letters)
3. e-Mail Writing (with principles)
4. News-Reading (compeering/anchoring)

Orient Longman

1. Presentation Skills
2. Facing an Interview (with Mock Role-Plays)
3. Listening Skills (for mood, tone, attitude)
4. Telephone Skills (listening/responding/initiating**)**

HINDI

Max. Marks: 100

Prose: 'Gadya Sandesh',   Editor: Dr.V.L Narasimham Shiva Koti

Published by: LORVEN Publications, Hyderabad

Sl. No	Lesson No	Title of the Lesson	Name of the Writer
01	01	Sahithya Ki Mahattha	Mahaveer Prasad Dwivedi
02	03	Mithratha	Acharya Ramachandra Shukla
03	05	Poos Ki Raath	Premchand
04	08	Samakruthi aur Sahithya Ka Paraspar sambandh	Dr. G. Sunder Reddy
05	10	Bharath Ek Hai	Ramdhari Singh Dinakar
06	12	HIV / AIDS	Prakash Bhatal Bandey

Non – Detailed Study: 'Kathalok',   Editor: Dr.Ghanashyam

Published by: SUDHA Publications, Hyderabad.

Sl. No	Lesson No	Title of the Lesson	Name of the Writer
01	01	Mukthidhan	Munshi Premchand
02	02	Goodad Sayi	Jayashankar Prasad
03	03	Usne Kaha tha	Chandradhar Sharma Gulari
04	06	Bhook Hadthal	Bala Shouri Reddy
05	07	Mai Haar Gayi	Mannu Bhandari
06	09	Paramaathma Ka Kutha	Mohan Rakesh

1. Kabir   -   Sakhi 1 to 10
2. Surdas   -   Bal – Vaman 1 to 2 only
3. Tulasidas   -   Dohe 1 to 10
4. Raheem   -   Dohe 1 to 10
5. Bihari   -   Dohe 1 to 10
6. Matili Saran Guptha   -   Mathrubhoomi
7. Jaya Sankar Prasad   -   Ashok ki chinta
8. Sumitranadan Pant   -   Bharat Mata
9. Surya Kanth Tripati Nirala -   Thodthi Pattar
10. Ramdhari Singh Dinkar   -   Parichay

Grammar:

I. Rewriting of Sentences as directed based on: Case, Gender, Number, and Voice.

II. Correction of Sentences

III. Usage of words into Sentences

IV. Karyalaya Hindi: Administrative terminology (Prashashanik Shabdabali) Official Designations (Padnaam 200 words)

        (A) Changing English term to Hindi   (B) Changing Hindi term to English

V. Sandhi Vichched

VI. Antonyms (Virodhi Shabd)

VII. Letter – Writing: Personal letters, Official letters, Letters of Complaints, Application for appointment.

VI. History of Hindi Literature

SANSKRIT

<div align="right">Max. Marks: 100</div>

Poetry and Drama

Lesson No.1	Saranagathi - From Valmiki Ramayanam Yuddhakanda 17th Canto Slokas 11–68
Lesson No.2	Ahimsa Paramodharmah - From Srimadbharatam, Adiparva 8th chapter Sloka 10 to the end of 11 Chapter
Lesson No.3	Raghoh Audaryam - From Raghuvamsa 5th Canto 1 – 35 Slokas

Lesson No.4   Modern poetry Mathrudesasya Aujvalyam By Dr. G.S.R. Krishna Murthy

     1.   Pratima Gruham - Pratima of Bhasa III act only

     2.   Modern Drama - Bharata Samskruteh mulam P. Sreeramachandrudu from (Susamhata Bharatam VI act)

     3.   Upanisadadadesah - Bruhadaranayaka - Dakara katha - Sikshanusasanam -Sikshavalli of Taittiriya

Prose

Lesson No. 5   Mitrasampraptih - From Pancatantra – Ist Story (Abridged)

Lesson No. 6   Modern prose Chikroda katha - Andhra Kavya Kathah - By Sannidhanam Suryanarayana Sastry

Lesson No. 7   Computer Yanthram - By Prof. K.V. Ramakrishnamacharyulu

     4.   Sukanasopadesah - From Kadambari Sangraha

     5.   Bhojasya Saraswati Sushama - From Bhojaprabandha Page No. 74 (Abridged form)

     6.   Poets and Books from History of literature

         1. Panini, 2. Kautilya, 3. Bharatamuni, 4. Bharavi, 5. Magha, 6. Sri Harsha,

         7. Bhavabhuti, 8. Sankaracharya, 9. Dandin, 10. Jagannadha

Grammar and Alankaras

Declensions   Nouns ending in Vowels:- Deva, Kavi, Bhanu Dhatr, Pitr, Go, Rama, Mati, Nadee, Tanu, Vadhoo, Matr, Phala, Vari & Madhu

Sandhi   Swara Sandhi: Savarnadeergha, Ayavayava, Guna, Vrddhi, Yanadesa

              Vyanjana Sandhi: Schutva, Stutva, Anunasikadvitva, Anunasika, Latva, Jastva

              Visarga Sandhi: Visarga Utva Sandhi, Visargalopa Sandhi, Visarga, Repha Sandhi, Ooshma Sandhi

Samasa   1. Dwandwa, 2. Tatpurusha (Common), 2a. Karmadharaya, 2b. Dwigu, 2c. Pradi Tatpurusha, 2d. Gatitatpurusha, 2e. Upapada Tatpurusha, 3. Bahuvrihi, 4. Avyayibhava Conjugations

I Conjugations - Bhoo, Gam, Shtha, Drhs Labh, Mud;   II Conjugation – As;

III Conjugation – Yudh;   IV th Conjugation – Ish;

VIII Conjugation – Likh, Kri;   IXth Conjugation – Kreen;

Xth Conjugation – Kath, Bhash, Ram, Vand

Alankaras from Kuvalayananda:

        1. Upama, 2. Ananvayaa, 3. Utpreksha, 4. Deepakam, 5. Aprastutaprasamsa, 6. Drstantam, 7. Arthantaranyasa, 8. Virodha Bhasa, 9. Ullekha, 10. Vyajasthuti

Grammar: Declensions: -

            Halanta Nouns - 1. Jalamuc, 2. Vac, 3. Marut, 4. Bhagavat, 5. Pachat, 6. Rajan, 7. Gunin,
            8. Naman, 9. Vidwas, 10. Manas

Pronouns   Asmad, Yushmad, Idam, Tat, Etat, Yat, Kim

Participles   Ktva, Lyap, tumun, Kta. Ktavat, Shatr, Shanac, Tavya

MODEL QUESTIONS

1.

    (a)   (b)   (c)   (d)

2.

    (a)   (b)   (c)   (d)

3.

    (a)   (b)   (c)   (d)

4.

    (a)   (b)   (c)   (d)

5.

    (a)   (b)   (c)

      (d)

TELUGU

Max. Marks: 100

INTEGRATED COURSE - M.B.A. (INTERNATIONAL BUSINES - 5 YEARS)

Max. Marks: 100

Analogy, Reasoning & Problem Solving:

a. Sequences and Series

b. Analogy

c. Data Analysis

d. Coding and Decoding Problems

e. Date, Time & Arrangement Problems

Communication Ability

PHYSICAL EDUCATION

Max. Marks: 100

Admission shall be made on the basis of Two Criteria:

a	Marks obtained in the Entrance Examination conducted by the University	100 marks
b	Achievement in Sports during their study of Degree/P.G./B.P.Ed., Courses	100 Marks
	Total	200 Marks

a. The entrance test consists of 100 multiple choice questions from the following six papers not less than 15 questions in one each paper.

> **HISTORY, PRINCIPLES AND PHILOSOPHY OF PHYSICAL EDUCATION AND SPORTS PSYCHOLOGY:**
> History of Physical Education, Ancient and Modern Olympics, national Sports Policy, Principles of Physical Education, Biological and Sociological Principles, Sports Psychology, Learning and Motivation

SPORTS MANAGEMENT AND METHODS OF PHYSICAL EDUCATION:

Sports Management, Organisation of Physical Education & Sports, Classification and Class Management, Tournaments, Budget, Material management, Methods of Teaching and Presentation Techniques

ANATOMY, PHYSIOLOGY AND HEALTH EDUCATION:

Cell, Musculoskeletal System, Circulatory System, Respiratory System, Digestive System, Nervous System, Health Education, Food and Nutrition, Hygiene and Communicable Diseases and Their Prevention

KINESIOLOGY AND BIO-MECHANICS:

Kinesiology, Mechanical Concepts of Movements, Application of Basic Mechanical Principles to Fundamental Physical Skills, Bio-mechanics-Motion, Force, levers and Projectiles

PRINCIPLES OF OFFICIATING, YOGA, RECREATION AND CAMPING:

Principles of Officiating, Mechanics of Officiating, Track and Field Events –

Measurement and Officiating, History, Measurement and Officiating of following games i.e.,

a. Basketball, b. Cricket, c. Hockey and d. Kabaddi, History, Measurement and Officiating of following games

i.e., a. Football, b. Handball, c. Volleyball and d. Kho-Kho

Yoga, Recreation, Camping and Adventure Sports

METHODS OF SPORTS TRAINING, MEASUREMENT AND EVELUATION:

Sports Training, Physical Fitness Components, methods of Sports Training, Skill, Technique and Tactics, Test, Measurements and Evaluation, Criteria of Good Test, posture and Physical Fitness Tests and Games skill Test

MODEL QUESTIONS:

1. Father of Modern Olympics
a. Cari Luis   b. Jawaharlal Nehru   c. Perry D.Kubertin   d. Cozen
2. How many times Indian Hockey team secured Gold Medals in Olympics
a. 16   b.10   c.6   d.8