

परिशिष्ट - 1

अकादमिक कैलेंडर सत्र 2021-22
(सेमेस्टर कक्षाओं के लिए प्रभावशील)

अकादमिक कार्य	स्नातकोत्तर प्रथम/तृतीय	स्नातकोत्तर द्वितीय/चतुर्थ
आरंभिक कक्षाएँ	01 सितम्बर 2021	21 जनवरी 2022
शैक्षणिक कार्य	01 सितम्बर 2021 से 15 दिसम्बर 2021	21 जनवरी 2022 से 30 अप्रैल 2022
सी.सी. ई. कार्य	नवम्बर द्वितीय सप्ताह	मार्च द्वितीय सप्ताह
प्रायोगिक परीक्षाएँ	15 नवम्बर 2021 से 30 नवम्बर 2021 के मध्य	01 अप्रैल से 15 अप्रैल 2022 के मध्य
परीक्षा पूर्व तैयारी अवकाश	06 दिसम्बर 2021 से 15 दिसम्बर 2021	21 अप्रैल से 30 अप्रैल 2022
सेमेस्टर एवं ए.टी.के.टी. परीक्षा	16 दिसम्बर 2021 से 11 जनवरी 2022	01 मई 2022 से 21 मई 2022
सेमेस्टर अंतराल (ब्रेक) विद्यार्थियों के लिए	12 जनवरी 2022 से 20 जनवरी 2022	22 मई से 30 जून 2022 (कुल 40 दिवस)
परीक्षा परिणामों की घोषणा	31 जनवरी 2022 तक	30 जून 2022 तक

- उत्सव कार्यक्रम : अक्टूबर (प्रथम सप्ताह) 2021
- छात्रसंघ गठन : अक्टूबर - 2021
- खेलकूद/एन.सी.सी./एन.एस.एस./युवा उत्सव/दीक्षांत : माह नवम्बर तक पूर्ण कर ली जाएँ।
समारोह एवं अन्य गतिविधियाँ।
- दीपावली अवकाश : दिनांक 01 नवम्बर से 06 नवम्बर 2021 तक (05 कार्य दिवस)
- स्नेह सम्मेलन/वार्षिकोत्सव/पुरस्कार वितरण : मार्च 2022 द्वितीय सप्ताह
वार्षिक पत्रिका का प्रकाशन एवं विमोचन (अधिकतम 03 कार्य दिवस)

टीप :-

- (1) अपरिहार्य कारणवश शैक्षणिक कार्य निर्धारित मानक दिवसों से कम होने की दशा में, महाविद्यालय/विधि स्तर पर शैक्षणिक कालखण्डों की अवधि में आवश्यकतानुसार वृद्धि कर शैक्षणिक दिवसों की पूर्ति की जाये ताकि अकादमिक कैलेंडर का पालन समयानुसार सुनिश्चित किया जा सके।
- (2) स्नातकोत्तर तृतीय सेमेस्टर में प्रवेश हेतु नवीनीकरण प्रक्रिया को अपनाते हुए शैक्षणिक कार्य प्रारंभकरना सुनिश्चित किया जाये।
- (3) शैक्षणिक कार्य दिवस कम होने पर अतिरिक्त कक्षाएं संचालित कर पाठ्यक्रम पूर्ण किया जावे।

स्नातकोत्तर प्रथम/तृतीय
कार्य दिवसों की गणना सत्र 2021-22

क्र.	माह	दिवस	अवकाश	कार्य दिवस
1	सितम्बर 2021	30	4 रविवार + 0 अवकाश	26
2	अक्टूबर 2021	31	5 रविवार + 4 अवकाश	22
3	नवम्बर 2021	30	4 रविवार + 2 अवकाश	24
4	दिसम्बर 2021	31	4 रविवार + 01 अवकाश	26
5	11 जनवरी 2022 तक	11	2 रविवार + 0 अवकाश	09
	कुल दिवस	133	26	107

स्नातकोत्तर सेमेस्टर पद्धति प्रथम/तृतीय हेतु शैक्षणिक कार्य दिवसों की गणना
सत्र 2021-22

क्रमांक	विवरण	कार्य दिवस
1.	01 सितम्बर 2021 से 11 जनवरी 2022 तक कुल कार्य दिवस	107
2.	अवकाश एवं शैक्षणिक गतिविधि/परीक्षा हेतु अशैक्षणिक दिवस 1. स्थानीय अवकाश - 02 2. दीपावली अवकाश - कुल 5 कार्यदिवस 3. महाविद्यालय स्तर गतिविधियां - 06 कार्य दिवस 4. परीक्षा-21 कार्य दिवस	34
3.	कुल शैक्षणिक दिवस (1-2) (107-34)	73

स्नातकोत्तर द्वितीय/चतुर्थ
कार्य दिवसों की गणना सत्र 2021-22

क्रमांक	माह	दिवस	अवकाश	कार्य दिवस
1	21 जनवरी 2022	11	2 रविवार + 1 अवकाश	08
2.	फरवरी 2022	28	4 रविवार + 1 अवकाश	23
3.	मार्च 2022	31	4 रविवार + 2 अवकाश	25
4.	अप्रैल 2022	30	4 रविवार + 5 अवकाश	21
5.	मई 2022	31	5 रविवार + 1 अवकाश	25
6.	जून 2022	30	4 रविवार	26
	कुल दिवस	161	33	128

स्नातकोत्तर सेमेस्टर पद्धति द्वितीय/चतुर्थ हेतु शैक्षणिक कार्य दिवसों की
गणना सत्र 2021-22

क्रमांक	विवरण	कार्य दिवस
1.	21 जनवरी 2022 से 30 जून 2022 तक कुल कार्य दिवस	128
2.	अवकाश एवं शैक्षणिक गतिविधि/परीक्षा हेतु अशैक्षणिक दिवस 1. महाविद्यालय स्तर गतिविधियां- 03 कार्य दिवस 2 स्थानीय अवकाश- 01 2. परीक्षा 17 कार्य दिवस 3. ग्रीष्म अवकाश 34 कार्य दिवस	55
3.	कुल शैक्षणिक दिवस (1-2) (128-55)	73

सत्र 2021-22 अकादमिक कैलेण्डर
(वार्षिक पद्धति-स्नातक प्रथम/द्वितीय/तृतीय वर्ष कक्षाओं हेतु प्रभावशील)

स.क्र	विवरण	तिथि
1.	प्रवेश प्रारंभ	01 अगस्त 2021
2.	शिक्षण कार्य प्रारंभ	01 सितम्बर 2021
3.	प्रवेश उत्सव कार्यक्रम	अक्टूबर 2021
छात्र संघ/सांस्कृतिक, साहित्यिक/ खेलकूद एवं अन्य महाविद्यालयीन गतिविधियाँ		
1.	छात्रसंघ गठन	अक्टूबर 2021
2.	विश्वविद्यालयीन/महाविद्यालयीन/जिला/संभाग/राज्य स्तरीय प्रतिस्पर्धाएं	ये सभी गतिविधियां नवम्बर 2021 तक पूर्ण कर ली जाएं।
3.	खेलकूद/एन.सी.सी./एन.एस.एस/युवा उत्सव/दीक्षान्त समारोह एवं अन्य गतिविधियाँ	
4.	वार्षिक स्नेह सम्मेलन/वार्षिक पत्रिका का प्रकाशन एवं विमोचन	मार्च प्रथम सप्ताह 2022 (अधिकतम 04 कार्य दिवस)
आंतरिक मूल्यांकन/वार्षिक परीक्षाएँ		
1.	पूरक परीक्षा प्रारंभ	16.10.2021 से 23.10.2021
2.	पूरक परीक्षा परिणाम की घोषणा	30.10.2021
3.	तिमाही परीक्षा आंतरिक मूल्यांकन	नवम्बर के अंतिम सप्ताह 2021
4.	छःमाही आंतरिक मूल्यांकन	फरवरी के अंतिम सप्ताह 2022
5.	सैद्धान्तिक परीक्षा कार्यक्रम की विस्तृत घोषणा	21 मार्च 2022
6.	सभी स्नातक कक्षाओं की प्रायोगिक परीक्षाओं की तिथि	01 मार्च से 25 मार्च 2022
7.	परीक्षा पूर्व तैयारी अवकाश	26 मार्च से 31 मार्च 2022
8.	वार्षिक परीक्षा प्रारंभ	01 अप्रैल 2022 से 21 मई 2022
9.	सभी परीक्षा परिणाम घोषित होने की तिथि	30 जून 2022
अवकाश		
1.	दीपावली	दिनांक 01 नवम्बर से 06 नवम्बर 2021 तक (05 कार्य दिवस)
2.	ग्रीष्म अवकाश (शिक्षकों हेतु)	22.05.2022 से 30.06.2022 (कुल 40 दिवस)

- नोट :-1. स्नातक द्वितीय/तृतीय वर्ष में प्रवेश नवीनीकरण की प्रक्रिया को अपनाते हुए शैक्षणिक कार्य प्रारंभ किया जाए।
2. कोरोना वायरस महामारी के चलते शैक्षणिक कार्य दिवस निर्धारित मानक से कम हो जाने के कारण महाविद्यालय/ विश्वविद्यालय स्तर पर शैक्षणिक काल खण्डों की अवधि में आवश्यकता अनुसार वृद्धि कर शैक्षणिक कार्य दिवसों की पूर्ति की जाये ताकि अकादमिक कैलेण्डर का पालन समयानुसार हो जावे। साथ ही साथ ऑनलाईन अतिरिक्त कक्षाएँ संचालित कर पाठ्यक्रम पूर्ण किया जाए।

2021-22 कला संकाय

Swami Vivekanand Govt. P.G. College, Harda (M.P.)
Time Table - (आनलाईन) कला संकाय 2021-22 दिनांक 15.09.2021 से प्रारंभ

कक्षा	10:10 से 10:50	10:50 से 11:30	11:30 से 12:10	12:10 से 12:50	1:05 से 01:45	1:45 से 02:25	2:25 से 3:05	3:05 से 3:45	3:45 से 04:25
बी.ए. प्रथम वर्ष	वैकल्पिक विषय (इलेक्टिव) पर्यावरणीय मुद्दे एवं आपदा प्रबंधन डॉ. डी. सेठे - T यावसायिक अर्थशास्त्र डॉ. डी. अग्रवाल - N3 दैनिक जीवन में रसायनशास्त्र डॉ. अरविंद द्विवेदी - Lab कम्प्यूटर फंडामेंटल श्री के.एल.मालवीय - G1	कौशल संवर्धन (बोकेशनल) कार्यक्रम / इंटरनेट परियोजना विकास डॉ. आर.एस.परस्ते - T विक्री कौशल डॉ. एस. गिराजुने - N3 वर्मी कम्पोजिट सुश्री रचना अनार - Lab डीटीपी श्री हरिहर लभानिया - G2	आ.पा. प्रथम हिन्दी डॉ. डी. कोरी - H (सोम.मंगल) आ.पा. द्वितीय अंग्रेजी डॉ. आर.एस.परस्ते - H (बुध.गुरु) आ.पा. तृतीय पर्यावरण डॉ. डी. सेठे - H (शुक्र.शनि)	नेजर प्रथम - इतिहास डॉ. डी. शाह - H अर्थशास्त्र डॉ. आर. सिंह - G2 राजनीति डॉ. बी. के. विश्वाकर्ष - N6 गृह विज्ञान डॉ. डी. सेठे - Lab हिन्दी सा. अतिथि - N3 अंग्रेजी साहित्य डॉ. आर.एस.परस्ते - G1 समाजशास्त्र - अतिथि विद्वान	नेजर द्वितीय - इतिहास डॉ. एस. पी. गुप्ता - H अर्थशास्त्र डॉ. एन. जोगरे - G2 राजनीति डॉ. डी. तेली - N6 गृह विज्ञान डॉ. डी. सेठे - Lab हिन्दी सा. अतिथि - N3 अंग्रेजी साहित्य डॉ. आर.एस.परस्ते - G1 समाजशास्त्र अतिथि विद्वान	माईनर - इतिहास डॉ. एस. पी. गुप्ता - H अर्थशास्त्र डॉ. एन. जोगरे - G2 राजनीति डॉ. डी. तेली - N6 गृह विज्ञान डॉ. डी. सेठे - Lab हिन्दी सा. डॉ. धर्मनंद कोरी - N3 अंग्रेजी साहित्य डॉ. आर.एस.परस्ते - G1 समाजशास्त्र अतिथि विद्वान	अंग्रेजी साहित्य डॉ. एस. पी. परस्ते (टी-1)	समाजशास्त्र अतिथि विद्वान (टी-1)	गृह विज्ञान डॉ. दीपिका सेठे लेब
कक्षा	11:30 से 12:10	12:10 से 12:50	1:05 से 1:45	1:45 से 2:25	2:25 से 3:05	3:05 से 3:45	3:45 से 04:25	04:25 से 05:05	
बी.ए. द्वितीय वर्ष	आ.पा. प्रथम, डॉ. डी. कोरी (बुध.गुरु) आ.पा. द्वितीय - डॉ. आर.परस्ते (शुक्र.शनि) आ.पा. तृतीय डॉ. डी. सेठे (सोम.मंगल)	इतिहास डॉ. एस. पी. गुप्ता अर्थशास्त्र पूनम गुर्जर टी-1/2	हिन्दी साहित्य डॉ. डी. कोरी (टी-1)	राजनीतिशास्त्र डॉ. जे. पी. अहिरवार (टी-1)	अंग्रेजी साहित्य डॉ. आर. एस. परस्ते (टी-1)	समाजशास्त्र अतिथि विद्वान (टी-1)	हिन्दी साहित्य - डॉ. एम. रावौर (टी-2)	अंग्रेजी साहित्य सोम, शनि डॉ. आर.एस.परस्ते अंग्रेजी विभाग	
बी.ए. तृतीय वर्ष	आ.पा. प्रथम - डॉ. डी. कोरी (शुक्र.शनि) द्वितीय - डॉ. आर.एस.परस्ते (सोम.मंगल) तृतीय - श्री अंशुल जोशी (बुध.गुरु)	-	राजनीतिशास्त्र बी.के. विश्वाकर्ष (टी-2)	समाजशास्त्र अतिथि विद्वान (टी-2)	इतिहास डॉ. डी. शाह अर्थशास्त्र डॉ. आर. सिंह (टी-2)	हिन्दी साहित्य - डॉ. एम. रावौर (टी-2)	अंग्रेजी साहित्य सोम, शनि डॉ. आर.एस.परस्ते अंग्रेजी विभाग		

डॉ. डी. सेठे डॉ. एन. जोगरे डॉ. डी. अग्रवाल डॉ. आर.एस.परस्ते डॉ. जे. पी. अहिरवार डॉ. आर. सिंह डॉ. एस. पी. गुप्ता डॉ. एम. रावौर श्री राजेश दीक्षित
 डॉ. बी. के. विश्वाकर्ष डॉ. अरविंद द्विवेदी डॉ. जे. पी. अहिरवार सुश्री पूनम गुर्जर डॉ. एस. पी. गुप्ता डॉ. एम. रावौर श्री डी. तेली श्री हरिहर लभानिया
 श्री के.एल. मालवीय श्री अंशुल जोशी
 (डॉ. डी. शाह)
 सकाय प्रभारी

Time Table

Department of Science

(Effective From 15/09/2021)

Class	10:10-10:50am	10:50-11:30am	11:30-12:10pm	12:10-12:50pm	12:50-01:30pm	01:30-02:10pm	02:10-02:50pm	02:50-03:30pm	03:30-05:00pm	
B.Sc. I	Elective Dr. A.P. Dwivedi	Vocational / Internship (Mon to Thu) R. Anare FC Yoga & Meditation (Fri, Sat) Guest Faculty	FC Hindi (Mon, Tue)	Major I Maths N6	Major II Maths N6	Minor Maths N6				
			Guest Faculty English (Wed, Thu)	Dr. S. Biley/GF Phy. M. Parsai Zoo. R Anare Che. Dr. Dwivedi Bot. C.K.Lokhande	Dr. S. Biley/GF Phy. M. Parsai Zoo. R Anare Che. Dr-S. Jain Bot. C.K.Lokhande	Dr. S. Biley/GF Phy. M. Parsai Zoo. R Anare Che. GF Bot. C.K.Lokhande	Phy M Parsai Zoo. R Anare Lab	Maths N6 Dr. S Biley/GF Bot. C K Lokhande Lab	Maths N6 Dr. S Biley/GF Bot. C K Lokhande Lab	Practicals Phy/Zoo. Mon. Tue Che.Wed,Thr. Bot., Fri Sat.
B.Sc. II			FC Environment (Mon, Tue) Dr. D Sethe							
			Hindi (Wed, Thu) GF							
			English (Fri, Sat) Dr. R Paraste							
B.Sc. III			FC English (Mon, Tue) Dr. R Paraste	Dr. S Jain Lab	GF T2					
			FC Computer (Wed, Thu) H Labhaniya							
			FC Hindi (Fri, Sat) GF							
M.Sc. I Che.			Dr. A.P. Dwivedi T1							
				Dr. S Jain Lab						
M.Sc. III										
M.Sc. I	Dr..S. Biley/GF N3	Dr. S Biley/ GF N3	Dr. S Biley/ GF N3	Dr. S Biley/ GF N3		Dr. S Biley/ GF N3				
Maths										
M.Sc. III	Dr.S Biley/GF N6	Dr.S Biley/GF N6	Dr. S Biley/ GF N6							
Maths										

Guest Faculty
Department of Science

Department of Science

Principal

प्रचारक

राजीव बिद्वानंद शर्मा, स्नातकोत्तर भूगर्भशास्त्र
बिला-कला (म.प्र.)

20/09/2021

HOD

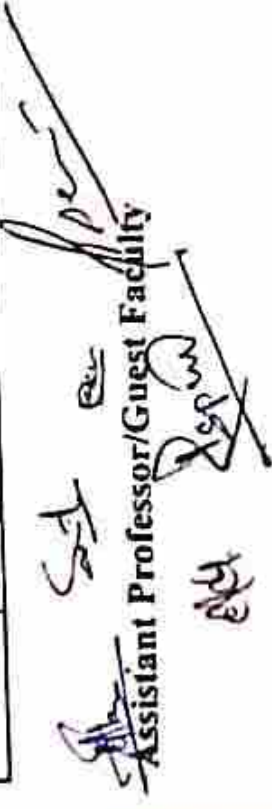
Swami Vivekanand Govt. PG College Harda

Time Table Offline - Department of Commerce 2021-22

Class/Time	Room No.	08:00 - 08:40 am	08:40 - 09:20 am	09:30 - 10:10 am	10:10 - 10:50 am	10:50 - 11:30 am	11:30 - 12:10 pm
B.Com. 1st Year	N-3	Core Subject-I Dr. Dipti Agrawal	Core Subject -II Shri Yashwant Alava	Minor Subject Dr. Smita Girgune	Elective Subject Dr. Dipti Agrawal	Vocational Subject / Internship (Mon to Thu) Dr. Smita Girgune	FC Hindi (Mon, Tue) Guest Faculty
		Economics Group-I Shri K. Malajpore	Accounting Group-II Smt. Sharmila Meena	Accounting Group-I Dr. Dipti Agrawal	Economics Group-II Shri K. Malajpore	FC Yoga & Meditation (Fri, Sat) Guest Faculty	FC English (Wed, Thu) Dr. Rakesh Paraste
B.Com. 2nd Year	H-1	Economics Group-I Shri K. Malajpore	Accounting Group-II Smt. Sharmila Meena	Accounting Group-I Dr. Dipti Agrawal	Economics Group-II Shri K. Malajpore	Management Group Shri Yashwant Alava	FC Environment (Mon, Tue) Dr. Deepika Sethe
		Economics Group Dr. Smita Girgune	Management Group-II Shri K. Malajpore	Management Group-I Smt. Sharmila Meena	Accounting Group-I Shri Yashwant Alava	Accounting Group-II Dr. Dipti Agrawal	FC English (Fri, Sat) Dr. Rakesh Paraste
M.Com. 1st Sem	N-6	Advanced Accounting Shri Yashwant Alava	Cost Analysis & Control Dr. Dipti Agrawal	Business Environment Shri K. Malajpore	Management Concept Dr. Smita Girgune	FC English (Mon, Tue) Dr. Rakesh Paraste	FC Computer (Wed, Thu) Shri Harihar Labhaniya
M.Com. 3rd Sem	H-3	Accounting for Managerial Decision Smt. Sharmila Meena	Managerial Economics Dr. Smita Girgune	Tax Planning & Management Shri Yashwant Alava	Entrepreneurship Skill Development Smt. Sharmila Meena	FC Hindi (Fri, Sat) Guest Faculty	FC Hindi (Fri, Sat) Guest Faculty


HOD


Principal


Assistant Professor/Guest Faculty

Smt. 
EVA

**M.Sc. CHEMISTRY
(FOUR SEMESTER COURSE)**

SCHEME OF EXAMINATION

M.Sc. (Previous)

SEMESTER I

Paper	Course No.	Course	Hrs	Marks
Paper I	MCH-401	Inorganic Chemistry I	60	50
Paper II	MCH-402	Organic Chemistry I	60	50
Paper III	MCH-403	Physical Chemistry I	60	50
Paper IV	MCH-404	Group Theory & Spectroscopy I	60	50
Paper V	MCH-405	a) Mathematics for Chemists*	60	50
		b) Biology for Chemists**	60	50
Practical			270	100
Total Marks				350

* For student without Mathematics in B.Sc.

** For student without Biology in B.Sc.

SEMESTER II

Paper	Course No.	Course	Hrs	Marks
Paper VI	MCH-406	Inorganic Chemistry II	60	50
Paper VII	MCH-407	Organic Chemistry II	60	50
Paper VIII	MCH-408	Physical Chemistry II	60	50
Paper IX	MCH-409	Spectroscopy II	60	50
Paper X	MCH-410	Computers for Chemists	60	50
Practical			270	100
Total Marks				350

M.Sc. (Final)

SEMESTER III

Paper	Course No.	Course	Hrs	Marks
Paper XI	MCH-501	Applications of Spectroscopy (Inorganic Chemistry)	60	50
Paper XII	MCH-502	Photochemistry	60	50

Paper XIII	MCH-503	Biochemistry	60	50
Paper XIV		Elective Paper	60	50
Paper XV		Elective Paper	60	50
Practical			270	100
Total Marks				350

SEMESTER IV

Paper	Course No.	Course	Hrs	Marks
Paper XVI	MCH-504	Applications of Spectroscopy (Organic Chemistry)	60	50
Paper XVII	MCH-505	Solid State Chemistry	60	50
Paper XVIII	MCH-506	Environmental Chemistry	60	50
Paper XIX		Elective Paper	60	50
Paper XX		Elective Paper	60	50
Practical			270	100*
Total Marks				350
Grant Total Marks M.Sc. (Previous & Final)				1400

*** Instead of laboratory work, student may performed Project work/Industrial Training.**

The following elective papers are approved for M.Sc. II year course.

- MCH-601: Organotransition Metal Chemistry.
- MCH-602: Polymers
- MCH-603: Organic Synthesis
- MCH-604: Heterocyclic Chemistry
- MCH-605: Chemistry of Natural Products
- MCH-606: Analytical Chemistry
- MCH-607: Physical Organic Chemistry
- MCH-608: Electrochemistry
- MCH-609: Medicinal Chemistry

3. Inorganic biochemistry vol. I and II ed. G.L. Eichhorn, Elsever.
4. Progress in Inorganic Chemistry, Vol 18 and 38 ed J.J. Lippard, Wiley.
5. Bioorganic Chemistry : A chemical Approach to Enzyme Action, Hermann Dugas and C. Penny, Springer Verlag.
6. Understanding Enzymes, Trevor Palmer, Prentice Hall.
7. Enzyme Chemistry : Impact and applications, Ed. Collin J suckling, chemistry.
8. Enzyme Mechanisms Ed. M.I. Page and A Williams, Royal Society of Chemistry.
9. Fundamentals of Enzymology, N.C. Price and L. Stevens. Oxford University Press.
10. Immobilized Enzymes : An Introduction and Applications in Biotechnology, Michael ID. Trevan, Hohn Wiley.
11. Enzymatic Reaction Mechanisms. C. Walsh. W.H. Freeman.
12. Enzyme Structure and Mechanism, A Fersht, W.H. Freeman
13. Biochemistry : The Chemical Reactions of Living Cells, D.E. Metzler, Academic Press.

Paper XIV: Elective Paper

Paper XV: Elective Paper

Practical

(Duration: 6-8 hrs in each branch)

Practical examination shall be conducted separately for each branch.

Inorganic Chemistry

Quantitative determinations of a three component mixture	12
Chromatographic Separations	12
Record	04
Viva Voice	05

Quantitative determinations of a three component mixture :

One Volumetrically and two gravimetrically

- a. Cu^{+2} , Ni^{+2} , Zn^{+2}
- b. Cu^{+2} , Ni^{+2} , Ng^{+2}

Chromatographic Separations

- a. Cadmium and zinc
- b. Zinc and magnesium.
- c. Thin-layer chromatography-separation of nickel, manganese, cobalt and zinc. Determination of R_f values.

Separation and identification of the sugars present in the given mixture of glucose, fructose and sucrose by paper chromatography and determination of R_f values.

Organic Chemistry

Multi-step Synthesis of Organic Compounds	12
Paper Chromatography	12
Record	04
Viva Voice	05

Multi-step Synthesis of Organic Compounds

The exercise should illustrate the use of organic reagents and may involve purification of the products by chromatographic techniques. Photochemical reaction Benzophenone \rightarrow Benzpinacol \rightarrow Benzpinacolone Beckmann rearrangement : Benzanilide from benzene Benzene \rightarrow Benzophenone \rightarrow Benzophenone oxime \rightarrow Benzanilide Benzilic acid rearrangement : Benzilic acid from benzoin Benzoin \rightarrow Benzil \rightarrow Benzilic acid Synthesis of heterocyclic compounds Skraup synthesis : Preparation of quinoline from aniline Fisher Indole synthesis : Preparation of 2-phenylindole from phenylhydrazine. Enzymatic synthesis Enzymatic synthesis Enzymatic reduction : reduction of ethyl acetoacetate using Baker's yeast to yield enantiomeric excess of S (+) ethyl-3-hydroxybutanoate and determine its optical purity. Biosynthesis of ethanol from sucrose. Synthesis using microwave Alkylation of diethyl malonate with benzyl chloride. Synthesis using phase transfer catalyst. Alkylation of diethyl malonate or ethyl acetoacetate with an alkylhalide.

Paper Chromatography

Separation and identification of the sugars present in the given mixture of glucose, fructose and sucrose by paper chromatography and determination of RF values/

Physical Chemistry

Spectroscopy	13
Chemical Kinetics	12
Record	04
Viva Voice	05

Spectroscopy

- Determination of PKa of an indicator (e.g. methyl red) in (a) aqueous and (b) micellar media.
- Determination of stoichiometry and stability constant of Ferricisothiocyanation complex ion in solution.
- Determination of rate constant of alkaline bleaching of Malachite green and effect of ionic strength on the rate of reaction.

Chemical Kinetics

- Determination of rate constant and formation constant of an intermediate complex in the reaction of Ce(IV) and Hypophosphorous acid at ambient temperature.

- ii. Determination of energy and enthalpy of activation in the reaction of KMnO_4 and benzyl alcohol in acid medium.
- iii. Determination of energy of activation and entropy of activation from a single kinetic run.
- iv. Kinetics of an enzyme catalyzed reaction.

Books Suggested

1. Inorganic Experiments, J. Derek Woolings, VCH.
2. Microscale Inorganic Chemistry, Z. Szafran, R.M. Pike and M.M. Singh, Wiley.
3. Practical Inorganic Chemistry, G. Marr and B. W. Rockett, Van Nostrand.
4. The systematic Identification of Organic Compounds, R.L. Shriner and D.Y. Curtin.

SEMESTER IV

Paper-XVI
MCH-501 : APPLICATION OF SPECTROSCOPY
(Organic Chemistry)

Unit-I

Ultraviolet and Visible spectroscopy

Various electronic transitions (185-800 nm) Beer-Lambert law, effect of solvent on electronic transitions, ultraviolet bands for carbonyl compounds, unsaturated carbonyl compounds, dienes, conjugated polyenes, Fieser Woodward rules for conjugated dienes and carbonyl compounds, ultraviolet spectra of aromatic compounds. Steric effect in biphenyls.

Unit II

Infrared Spectroscopy

Characteristic vibrational frequencies of alkanes, alkenes, alkynes, aromatic compounds, alcohols, ether's, phenols and amines. Detailed study of vibrational frequencies of carbonyl compounds (ketone's, aldehyde's, esters, amides, acids, anhydride's, lactones, lactams and conjugated carbonyl compounds). Effect of hydrogen bonding and solvent effect on vibrational frequencies, overtones, combination bands and fermi resonance.

Optical Rotatory Dispersion (ORD) and Circular Dichromism (CD)

Definition, deduction of absolute configuration, octant rule for ketones.

Unit-III

Nuclear Magnetic Resonance Spectroscopy

General introduction and definition, chemical shift, spin-spin interaction, shielding mechanism, mechanism of measurement, chemical shift values and correlation for protons bonded to carbon (aliphatic, olefinic, aldehydic and aromatic) and other nuclei (alcohols, phenols, enols, carboxylic acids, amines, amides & mercapto), chemical exchange, effect of deuteration, complex spinspin interaction between two, three, four and five nuclei (first order spectra), Stereochemistry, hindered rotation, Karplus curve-variation of coupling constant with disordered angle. Simplification of complex spectranuclear magnetic double resonance, NMR shift reagents, solvent effects. Fourier transform technique, nuclear overhauser effect (NOE).

Unit-IV

Carbon-13 NMR Spectroscopy

General considerations, chemical shift (aliphatic olefinic , alkyne, aromatic, heteroaromatic and carbonyl carbon), coupling constants. Two dimension NMR spectroscopy-COSY, NOESY, DEPT, IONEPT, APT and INADEQUATE techniques.

Unit V

Mass Spectrometry

Introduction ion production E1, C1 FD, ESI and FAB, factors affecting fragmentation, ion analysis, ion abundance Mass spectral fragmentation of organic compounds, common functional groups, molecular ion peak, metastable peak. Me Lafferty rearrangement. Nitrogen rule. High resolution mass spectrometry. Example of mass spectral fragmentation of organic compounds with respect to their structure determination.

Book Suggested

13. Physical Methods for Chemistry, R.S. Drago, Saunders Compnay.
14. Structural Methods in Inorganic Chemistry, E.A.V. Ebsworth, D.W.H. Rankin and S. Cradock, ELBS.
15. Infrared and Raman Spectral : Inorganic and Coordination Compounds K. Nakamoto, Wiley.
16. Progress in Inorganic Chemistry vol., 8, ed., F.A. Cotton, vol., 15 ed. S.J. Lippard, Wiley.
17. Transition Metal Chemistry ed. R.L. Carlin vol. 3 dekker.
18. Inorganic Electronic Spectroscopy, A.P.B. Lever, Elsevier.
19. NMR, NQR, EPR and Mossbauer Spectroscopy in Inorganic Chemistry, .V. Parish, Ellis Haywood.
20. Practical NMR Spectroscopy, M.L. Martin. J.J. Deepish and G.J. Martin, Heyden.
21. Spectrometric Identification of Organic Compounds, R.M. Silverstein, G.C. Bassler adn T.C. Morrill, John Wiley.
22. Introduction to NMR spectroscopy, R.J. Abraham, J. Fisher and P. Loftus, Wiley.
23. Application of Spectroscopy of Organic Compounds, J.R. Dyer Prentice Hall.
24. Spectroscopic Methods in Organic Chemistry D.H. Williams, I. Fleming, Tata McGraw-Hill.

Paper XVII

MCH-505: SOLID STATE CHEMISTRY

Unit I

Solid State Reactions

General principles, experimental procedure, co-precipitation as a precursory to solid state reactions, kinetics of solid state reactions.

Unit II

Crystal Defects and Non-Stoichiometry

Perfect and imperfect crystals, intrinsic and extrinsic defects-point defects, line and plane defects, vacancies-Schottky defects and Frenkel defects. Thermodynamics of Schottky and Frenkel defect formation, colour centres, non-stoichiometry and defects.

Unit III

Electronic Properties and Band Theory

Metal, insulators and semiconductors, electronic structure of solids band theory band structure of metals, insulators and semiconductors, Intrinsic and extrinsic semiconductors, doping semiconductors, p-n junctions, super conductors. Optical properties-Application of optical and electron microscopy. Magnetic Properties-Classification of materials : Effect of temperature calculation of magnetic moment, mechanism of ferro and anti ferromagnetic ordering super exchange.

Unit IV

Organic Solids

Electrically conducting solids. organic charge transfer complex, organic metals, new superconductors.

Unit IV

Liquid Crystals:

Types of liquid crystals: Nematic, Smectic, Ferroelectric, Antiferroelectric, Various theories of LC, Liquid crystal display, New materials.

Books Suggested.

1. Solid state chemistry and its applications, A.R. West. Peenum.
2. Principles of the Solid State, H.V. Keer, Wiley Eastern.
3. Solid State Chemistry, N.B. Hannay.
4. Solid State Chemistry, D.K. Chakrabarty, New Wiley Eastern.

Paper XVIII

MCH-506 : ENVIRONMENTAL CHEMISTRY

Unit-I

Atmosphere

Atmospheric layers, Vertical temperature profile, heat/radiation budget of the earth atmosphere systems. Properties of troposphere, thermodynamic derivation of lapse rate. Temperature inversion. Calculation of Global mean temperature of the atmosphere. Pressure variation in atmosphere and scale height. Biogeochemical cycles of carbon, nitrogen, sulphure, phosphorus oxygen. Residence times.

Atmospheric Chemistry

Sources of trace atmospheric constituents : nitrogen oxides, sulphure dioxide and other sulphure compounds, carbon oxides, chlorofluorocarbons and other halogen compounds, methane and other hydrocarbons.

Tropospheric Photochemistry

Mechanism of Photochemical decomposition of NO₂ and formation of ozone. Formation of oxygen atoms, hydroxyl, hydroperoxy and organic radicals and hydrogen peroxide. Reactions of hydroxyl radicals with methane and other organic compounds. Reaction of

OH radicals with SO₂ and NO₂. Formation of Nitrate radical and its reactions. Photochemical smog meteorological conditions and chemistry of its formation.

Unit-II

Air Pollution

Air pollutants and their classifications. Aerosols-sources, size distribution and effect on visibility, climate and health.

Acid Rain

Definition, Acid rain precursors and their aqueous and gas phase atmospheric Oxidation reactions. Damaging effects on aquatic life, plants, buildings and health. Monitoring of SO₂ and NO_x. Acid rain control strategies.

Stratospheric Ozone Depletion

Mechanism of Ozone formation, Mechanism of catalytic Ozone depletion, Discovery of Antarctic Ozone hole and Role of chemistry and meteorology. Control Strategies.

Green House Effect

Terrestrial and solar radiation Spectra, Major green house gases and their sources and Global warming potentials. Climate change and consequences.

Urban Air Pollution

Exhaust emissions, damaging effects of carbon monoxide. Monitoring of CO. Control strategies.

Unit-III

Aquatic Chemistry and Water Pollution

Redox chemistry in natural waters. Dissolved oxygen, biological oxygen demand, chemical oxygen demand, determination of DO, BOD and COD. Aerobic and anaerobic reactions of organic sulphure and nitrogen compounds in water acid-base chemistry of fresh water and sea water. Aluminum, nitrate and fluoride in water. Petrification. Sources of water pollution. Treatment of waste and sewage. Purification of drinking water, techniques of purification and disinfection.

Unit IV

Environmental Toxicology

Toxic heavy metals : Mercury, lead, arsenic and cadmium. Causes of toxicity.

Bioaccumulation, sources of heavy metals. Chemical speciation of Hg, Pb, As, and Cd. Biochemical and damaging effects.

Toxic Organic Compound : Pesticides, classification, properties and uses of organochlorine and ionospheres pesticides detection and damaging effects.

Polychlorinated biphenyls : Properties, use and environmental continuation and effects.

Polynuclear Aromatic Hydrocarbons : Source, structures and as pollutants.

Unit-V

Soil and Environmental Disasters

Soil composition, micro and macronutrients, soil pollution by fertilizers, plastic an metals. Methods of re-mediation of soil. Bhopal gas tragedy, Chernobyl, three mile island, Minimata Disease, Sevoso (Italy), London smog.

Books Suggested

1. Environmental Chemistry, Colin Baird, W.H. Freeman Co. New York, 1998.
2. Chemistry of Atmospheres, R.P. Wayne, Oxford.
3. Environment Chemistry, A.K. De, Wiley Eastern, 2004.
4. Environmental Chemistry, S.E. Manahan, Lewis Publishers.
5. Introduction to atmospheric Chemistry, P.V. Hobbs, Cambridge.

Paper XIX: Elective Paper

Paper XX: Elective Paper

Elective Papers

MCH-601 Organotransition Metal Chemistry

MCH-602 Polymers

MCH-603 Organic synthesis

MCH-604 Heterocyclic Chemistry

MCH-605 Chemistry of Natural Products

MCH-606 Analytical Chemistry

MCH-607 Physical Organic Chemistry

MCH-608 Chemical Dynamics

MCH-609 Electro Chemistry

MCH-610 Medicinal Chemistry

MCH-611 Advanced Quantum Chemistry

MCH-601: Organotransition Metal Chemistry

Unit I

Alkyls and Aryls of Transition Metals

Types, routes of synthesis, stability and decomposition pathways organocopper in organic synthesis.

Compounds of Transition Metal-Carbon Multiple Bonds

Alkylidenes, alkylidynes, low valent carbenes and carbynes-synthesis, nature of bond, structural characteristics, nucleophilic and electrophilic reactions on the ligands, role in organic synthesis.

Unit II

Transition Metal π -Complexes

Transition metal π -Complexes with unsaturated organic molecules, alkenes, alkynes, allyl, diene, dienyl, arene and trienyl complexes, preparation, properties, nature of bonding and structural features. Important reactions relating to nucleophilic and electrophilic attack on ligands and to organic synthesis.

Unit III

Transition metal compounds with bonds to hydrogen, boron, silicon :

Transition metal compounds with bonds to hydrogen, boron, silicon

Unit IV

Homogeneous Catalysis

Stoichiometric reactions for catalysis, homogeneous catalytic hydrogenation, Zeigler-Natta polymerization of olefins, catalytic reactions involving carbon monoxide such as hydrocarbonylation of olefins (oxoreaction), explanation reactions, activation of C-H bond.

Unit V

Fluxional Organometallic Compounds

Flexionality and dynamic equilibrium in compounds such as η^2 -olefine, η^3 -allyl and dienyl complexes.

Books Suggested

1. Principles and Application of Organotransition Metal Chemistry, J.P. Collman, L.S. Hedges, J.R. Norton and R.G. Finke, University Science Books.
2. The Organometallic Chemistry of the Transition Metals, R.H. Crabtree. John Wiley.
3. Metallo-organic Chemistry, A.J. Pearson, Wiley.
4. Organometallic Chemistry, R.C. Mehrotra and A. Singh New Age International.

MCH-602: Polymers

Unit-I

Basics

Importance of polymers. Basic concepts : Monomers, repeat units, degree of polymerization Linear, branched and network polymers. Classification of polymers. Polymerization : condensation, addition/radical chain-ionic and co-ordination and copolymerization. Polymerization conditions and polymer reactions. Polymerization in homogeneous and heterogeneous systems.

Unit-II

Polymer Characterization

Polydispersion-average molecular weight concept. Number, weight and viscosity average molecular weights. Polydispersity an molecular weight distribution. The practical significance of molecular weight. Measurement of molecular-weights. End-group, viscosity, light scattering, osmotic and ultracentrifugation methods.

Unit-III

Analysis and testing of polymers

Chemical analysis of polymers, spectroscopic methods, X-ray diffraction study. Microscopy. Thermal analysis and physical testing-tensile strength. Fatigue, impact. Tear resistance, Hardness and abrasion resistance.

Unit-IV

Inorganic Polymers

A general survey and scope of Inorganic Polymers special characteristics, classification, homo and hetero atomic polymers.

Structure, Properties and Applications of

Potential Sweep Method :

Linear sweep Voltammetry, Cyclic Voltammetry, theory and applications. Diagnostic criteria of cyclic voltammetry. Controlled current microelectrode techniques : comparison with controlled potentials methods, chronopotentiometry, theory and applications.

Bulk Electrolysis Methods :

Controlled potential coulometry, Controlled Coulometry, Electroorganic synthesis and its important applications. Stripping analysis : anodic and Cathodic modes, Pre electrolysis and Stripping steps, applications of Stripping Analysis.

Books Suggested

1. Modern Electrochemistry Vol. I, IIa, Vol. IIB J'OM Bockris and A.K.N. Reddy, Plenum Publication, New York.
2. Polarographic Techniques by L. Meites, Interscience.
3. "Fuel Cells : Their electrochemistry". McGraw Hill Book Company, New York.
4. Modern Polarographic Methods by A.M. Bond, Marcell Dekker.
5. Polarography and allied techniques by K. Zutshi, New age International publication. New Delhi.
6. "Electroanalytical Chemistry by Basil H. Vessor & Galen W. ; Wiley Interscience.
7. Electroanalytical Chemistry by Basil H. Vessor & Galen W. ; Wiley Interscience.
8. Topics in pure and Applied Chemistry, Ed. S. K. Rangrajan, SAEST Publication, Karaikudi (India)

MCH-609: Medicinal Chemistry**Unit I**

Structure and activity : Relationship between chemical structure and biological activity (SAR). Receptor Site Theory. Approaches to drug design. Introduction to combinatorial synthesis in drug discovery. Factors affecting bioactivity. QSAR-Free-Wilson analysis, Hansch analysis, relationship between Free-Wilson analysis and Hansch analysis.

Unit II

Pharmacodynamics:

Introduction, elementary treatment of enzymes stimulation, enzyme inhibition, sulfonamides, membrane active drugs, drug metabolism, xenobiotics, biotransformation, significance of drug metabolism in medicinal chemistry.

Unit III

Antibiotics and antibacterials

Introduction, Antibiotic β -Lactam type - Penicillins, Cephalosporins, Antitubercular – Streptomycin, Broad spectrum antibiotics – Tetracyclines, Anticancer - Dactinomycin (Actinomycin D)

Unit IV

Antifungal – polyenes, Antibacterial – Ciprofloxacin, Norfloxacin, Antiviral – Acyclovir

Antimalarials : Chemotherapy of malaria. SAR. Chloroquine, Chloroguanide and Mefloquine

Unit V

Non-steroidal Anti-inflammatory Drugs : Diclofenac Sodium, Ibuprofen and Netopam

Antihistaminic and antiasthmatic agents : Terfenadine, Cinnarizine, Salbutamol and Beclomethasone dipropionate.

PRACTICAL

(Duration: 6-8 hrs in each branch)

Practical examination shall be conducted separately for each branch.

Inorganic Chemistry

Preparation	12
Spectrophotometric Determinations/ Flame Photometric Determinations	12
Record	04
Viva Voice	05

Preparation

Preparation of selected inorganic compounds and their study by IR, electronic spectra, and magnetic susceptibility measurements. Handling of air and moisture sensitive compounds involving vacuum lines. Selection can be made from the following :

1. Sodium amide. Inorg. Synth., 1946, 2, 128.
2. Atomic absorption analysis of Mg and Ca.
3. Synthesis of trichlorodiphenylantimony (V) hydrate. Inorg. Synths., 1985, 23, 194
4. Sodium tetrathionate $\text{Na}_2\text{S}_4\text{O}_6$.
5. Metal complex of dimethyl sulfoxide : $\text{CuCl}_2 \cdot 2\text{DMSO}$ J.Chem. Educ., 1982, 59, 57.
6. Synthesis of metal acetylacetonate : Inorg. Synths, 1957, 5, 130, 1963, 1, 183.
7. Cis and Trns $[\text{Co}(\text{en})_2\text{Cl}_2]^+$.
8. Determination of Cr (III) complex. $[\text{Cr}(\text{H}_2\text{O})_6]\text{NO}_3 \cdot 3\text{HO}$, Inorg. synths., 1972, 13, 184.
9. Preparation and use of Ferrocene. J. Chem. Edu. 1966, 43, 73; 1976, 53, 730.
10. Preparation of $[\text{Co}(\text{phenathroline-5,6 quinone})]$.

Spectrophotometric Determinations

- a. Manganese/Chromium in steel sample.
- b. Nickel by extractive spectrophotometric method.
- c. Fluoride/nitrite/phosphate.

- d. Copper-Ethylene diamine complex : Slope-ratio method.

Flame Photometric Determinations

- a. Sodium and potassium when present together.
- b. Lithium/calcium/barium/strontium.
- c. Cadmium and magnesium in tap water.

Organic Chemistry

Extraction of Organic Compounds from Natural Sources	12
Spectrophotometric Determinations	12
Record	04
Viva Voice	05

Extraction of Organic Compounds from Natural Sources

1. Isolation of caffeine from tea leaves.
2. Isolation of casein from milk (the students are required to try some typical colour reactions of proteins).
3. Isolation of lactose from milk (purity of sugar should be checked by LC and PC and Rf values reported).
4. Isolation of nicotine dipicrate from tobacco.
5. Isolation of piperine from black pepper.
6. Isolation of lycopene from tomatoes.
7. Isolation of b-carotene from carrots.
8. Isolation of eugenol from clove.
9. Isolation of (+) limonine from citrus rind.

Spectroscopy

Identification of organic compounds by the analysis of their spectral data (UV, IR, PMR, CMR & MS) Spectrophotometric (UV/VIS) Estimations

1. Amino acids
2. Proteins
3. Carbohydrates
4. Ascorbic acid
5. Aspirin
6. Caffeine

Physical Chemistry

Thermodynamics	12
Polarography	12
Record	04

Thermodynamics

- i. Determination of partial molar volume of solute (e.g. KCl) and solvent in a binary mixture.
- ii. Determination of the temperature dependence of the solubility of a compound in two solvents having similar intramolecular interactions (benzoic acid in water and in DMSO water mixture and calculate the partial molar heat of solution).

Polarography

- i. Identification and estimation of metal ions such as Cd^{2+} , Pb^{2+} , Zn^{2+} , and Ni^{2+} etc. polarographically.
- ii. Study of a metal ligand complex polarographically (using Lingane's Method).

Books Suggested

5. Inorganic Experiments, J. Derek Woolings, VCH.
6. Microscale Inorganic Chemistry, Z. Szafran, R.M. Pike and M.M. Singh, Wiley.
7. Practical Inorganic Chemistry, G. Marr and B. W. Rockett, Van Nostrand.
8. The systematic Identification of Organic Compounds, R.L. Shriner and D.Y. Curtin.

Note: Instead of fourth semester laboratory work, student may performed PROJECT WORK/Industrial Training in any Industrial/Research/academic Laboratory