Faculty of Sciences

Syllabus for

Bachelor of Science (Honours) Physics

(Under Continuous Evaluation System)

(SEMESTER: I-VI)

Session – (2022-23)

Kanya Maha Vidyalaya, Jalandhar
(Autonomous)
The Heritage Institution

SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAMME

Bachelor of Science (Honours) Physics

Session-2022-23

Semester-I

Sr. No.	Course Code	Course Type	Course Title	Max Marks				Examination time in Hours)
				Total	Ext		CA	
					L	P		
1.	BOPL-1421 BOPL-1031 BOPL-1431	C	Punjabi(Compulsory [1]Basic Punjabi [2]Punjab History and Culture	50	40	-	10	3
2.	BOPL-1102	C	Communication skills in English	50	40	-	10	3
3.	BOPL-1393	C	Mechanics-I	75	60	-	15	3
4.	BOPL-1394	C	Electricity and Magnetism-I	75	60	-	15	3
5.	BOPL-1335	C	Mathematics-I	50	40	-	10	3
6.	BOPL-1086	C	Chemistry-I	50	40	-	10	3
7.	BOPP-1397	C	Physics Lab-I	50	-	40	10	3
8.	BOPP-1088	C	Chemistry Lab-I	50	-	40	10	3
9.	AECD-1161	AC	*Drug Abuse: Problem Management and Prevention (Compulsory)	50	40	-	10	3
10.	SECF-1492	AC	*Foundation Course	25	20	-	5	1
	Total			**450**				

***Marks of these papers will not be added in total marks**

1 In Lieu of Punjabi (Compulsory) for students from Punjab

2. In Lieu of Punjabi (Compulsory) for students outside Punjab (Other States)

SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAMME

Bachelor of Science (Honours) Physics

Session-2022-23

SEMESTER -II

Sr. No.	Course Code	Course Type	Course Title	Max Marks				Examination time in Hours)
				Total	Ext		CA	
					L	P		
1	BOPL-2421 BOPL-2031 BOPL-2431	C	Punjabi(Compulsory [1]Basic Punjabi [2]Punjab History and Culture	50	40	-	10	3
2	BOPM-2102	C	Communication Skills in English	50	25	15	10	3
3	BOPL-2393	C	Electricity and Magnetism-II	75	60	-	15	3
4	BOPL-2394	C	Vibrations and Waves	75	60	-	15	3
5	BOPL- 2335	C	Mathematics-II	50	40	-	10	3
6	BOPL-2086	C	Chemistry-II	50	40	-	10	3
7	BOPP-2397	C	Physics Lab-II	50	-	40	10	3
8	BOPP-2088	C	Chemistry Lab-II	50	-	40	10	3
9	AECD-2161	AC	*Drug Abuse: Problem, Management and Prevention (Compulsory)	50	40	-	10	3
10	SECM-2502	AC	* Moral Education	25	20	-	5	1
	Total			**450**				

****Marks of these papers will not be added in total marks**

1 In Lieu of Punjabi (Compulsory) for students from Punjab

2. In Lieu of Punjabi (Compulsory) for students outside Punjab (Other States)

SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAMME

Bachelor of Science (Honours) Physics

Session-2022-23

Semester-III

Sr. No.	Course Code	Course Type	Course Title	Max Marks				Examination time in ..
				Total	Ext		CA	
					L	P		
1	BOPL-3391	C	Optics	75	60	-	15	3
2	BOPL-3392	C	Statistical and Thermal Physics	75	60	-	15	3
3	BOPL-3333	C	Mathematics –III	50	40	-	10	3
4	BOPL-3084	C	Chemistry-III	50	40	-	10	3
5.	BOPM-3135	C	Python Programming Interdisciplinary Course (ID)-I	50	25	15	10	3
5	BOPP-3396	C	Physics Lab –III	50	-	40	10	3
6	BOPP-3087	C	Chemistry Lab –III	50	-	40	10	3
8	AECE-3221	AC	*Environmental Studies (compulsory)	100	60	20	20	3
9	SECP-3512	AC	* Personality Development	25	20	-	5	1
	Total			**400**				

***Marks of these papers will not be added in total marks**

SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAMME

Bachelor of Science (Honours) Physics

Session-2022-23

Semester-IV

Sr. No.	Course Code	Course Type	Course Title	Max Marks				Examination time in Hours)
				Total	Ext		Int	
					L	P		
1	BOPL-4391	C	Mechanics-II	75	60	-	15	3
2	BOPL-4392	C	Atomic Spectroscopy	75	60	-	15	3
3	BOPL-4333	C	Mathematics –IV	50	40	-	10	3
4	BOPL-4084	C	Chemistry-IV	50	40	-	10	3
5	BOPL -4335	C	Numerical Methods and Error Analysis Interdisciplinary Course (ID)-II	50	40	-	10	3
6	BOPP-4396	C	Physics Lab –IV	50	-	40	10	3
7	BOPP-4087	C	Chemistry Lab –IV	50	-	40	10	3
8	SECS-4522	AC	*Social Outreach	25	20	-	5	1
	Total			**400**				

***Marks of this paper will not be added in total marks**

SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAMME

Bachelor of Science (Honours) Physics

Session-2022-23

Semester V

Sr. No.	Course Code	Course Type	Course Title	Max Marks				Examination time in Hours)
				Total	Ext		Int	
					L	P		
1	BOPL-5391	C	Condensed Matter Physics – I	75	60	-	15	3
2	BOPL-5392	C	Quantum Mechanics	75	60	-	15	3
3	BOPL-5393	C	Nuclear Physics	75	60	-	15	3
4	BOPL-5394	C	Electronics	75	60	-	15	3
5	BOPP -5395	C	Physics Lab-V	50	-	40	10	3
6	BOPS-5396	C	Seminar and Assignment	50	-	40	10	3
7	SECJ-5522	AC	*Job Readiness Course	25	20	-	5	1
	Total			**400**				

Semester VI

Sr. No.	Course Code	Course Type	Course Title	Max Marks				Examination time in Hours)
				Total	Ext		Int	
					L	P		
1	BOPL-6391	C	Radiation and Particle Physics	75	60	-	15	3
2	BOPL-6392	C	Condensed Matter Physics – II	75	60	-	15	3
3	BOPL-6393	C	Molecular Spectroscopy and Laser	75	60	-	15	3
4	BOPL-6394	C	Digital Electronics and Applications	75	60	-	15	3
5	BOPP -6395	C	Physics Lab-VI	50	-	40	10	3
6	BOPP-6396	C	Physics Lab-VII	50	-	40	10	3
	Total			**400**				

***Marks of this paper will not be added in total marks**

Session 2022-23

Punjabi (Compulsory)

BACHELOR OF SCIENCE (HONOURS)MATHEMATICS/ BACHELOR OF ARTS (HONOURS) ENGLISH/ BACHELOR OF SCIENCE (HONOURS) PHYSICS
SEMESTER–I

COURSE CODE- BOEL/BOML/BOPL-1421

COURSE OUTCOMES

Co1:‘ਸਾਹਿਤ ਦੇ ਰੰਗ’ ਪੁਸਤਕ ਦੇ ਕਵਿਤਾ ਭਾਗ ਨੂੰ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਕਵਿਤਾ ਪ੍ਰਤੀ ਦਿਲਚਸਪੀ, ਸੂਝ ਨੂੰ ਪੈਦਾ ਕਰਨਾ ਹੈ ਤਾਂ ਕਿ ਉਹ ਆਧੁਨਿਕ ਦੌਰ ਵਿਚ ਚਲ ਰਹੀਆਂ ਕਾਵਿਧਾਰਾਵਾਂ ਅਤੇ ਕਵੀਆਂ ਬਾਰੇ ਗਿਆਨ ਹਾਸਲ ਕਰ ਸਕਣ।ਇਸ ਦਾ ਹੋਰ ਮਨੋਰਥ ਕਵਿਤਾ ਦੀ ਵਿਆਖਿਆ, ਵਿਸ਼ਲੇਸ਼ਣ ਤੇ ਮੁਲੰਕਣ ਦੀ ਪ੍ਰਕਿਰਿਆ ਤੋਂ ਜਾਣੂ ਕਰਾਉਣਾ ਵੀ ਹੈ ਤਾਂਕਿ ਉਹ ਸਮਕਾਲੀ ਸਮਾਜ ਦੀਆਂ ਸਮੱਸਿਆਵਾਂ ਨੂੰ ਸਮਝ ਸਕਣ ਅਤੇ ਆਲੋਚਨਾਤਮਕ ਦ੍ਰਿਸ਼ਟੀ ਬਣਾ ਸਕਣ।

Co2:‘ਸਾਹਿਤ ਦੇ ਰੰਗ’ ਪੁਸਤਕ ਦੇ ਕਹਾਣੀ ਭਾਗ ਨੂੰ ਸਿਲੇਬਸ ਵਿਚ ਸ਼ਾਮਿਲ ਕਰ ਕੇ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਕਹਾਣੀ ਪੜ੍ਹਣ ਦੀ ਰੁਚੀ ਨੂੰ ਪੈਦਾ ਕਰਨਾ ਹੈ ਅਤੇ ਕਹਾਣੀ ਜਗਤ ਨਾਲ ਜੋੜਣਾ ਹੈ ।

Co3:ਪੈਰ੍ਹਾ ਰਚਨਾ ਅਤੇ ਪੈਰ੍ਹਾ ਪੜ੍ਹ ਕੇ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉਤਰ ਦੇਣ ਦਾ ਮਨਰੋਥ ਵਿਦਿਆਰਥੀਆਂ ਦੀ ਬੁੱਧੀ ਨੂੰ ਤੀਖਣ ਕਰਦਿਆਂ ਉਨਾਂ ਦੀ ਲਿਖਣ ਪ੍ਰਤਿਭਾ ਨੂੰ ਉਜਾਗਰ ਕਰਨਾ ਹੈ ।

Co4:ਧੁਨੀ ਵਿਉਂਤ ਪੜ੍ਹਣ ਨਾਲ ਵਿਦਿਆਰਥੀ ਧੁਨੀਆਂ ਦੀ ਉਚਾਰਨ ਪ੍ਰਣਾਲੀ ਤੋਂ ਵਾਕਫ਼ ਹੋਣਗੇ।

Session 2022-23

Punjabi (Compulsory)

BACHELOR OF SCIENCE (HONOURS) PHYSICS
SEMESTER–I

COURSE CODE- BOPL-1421

ਸਮਾਂ : 3 ਘੰਟੇ

Maximum Marks: 50
Theory : 40
CA :10

ਪਾਠਕ੍ਰਮ ਅਤੇ ਪਾਠ ਪੁਸਤਕਾਂ
ਯੂਨਿਟ-I

ਸਾਹਿਤ ਦੇ ਰੰਗ (ਸੰਪਾ.ਡਾਮਹਿਲਸਿੰਘ),ਭਾਗਪਹਿਲਾ(ਕਵਿਤਾ),

ਰਵੀ ਸਾਹਿਤ ਪ੍ਰਕਾਸ਼ਨ,ਅੰਮ੍ਰਿਤਸਰ।
(ਸਾਰ,ਵਿਸ਼ਾ ਵਸਤੂ)
(ਡਾ.ਹਰਿਭਜਨ ਸਿੰਘ,ਪਾਸ਼,ਸੁਰਜੀਤ ਪਾਤਰ ਕਵੀ ਪਾਠ ਕ੍ਰਮ ਦਾ ਹਿੱਸਾ ਨਹੀਂ ਹਨ)8 ਅੰਕ

ਯੂਨਿਟ-II

ਸਾਹਿਤ ਦੇ ਰੰਗ (ਸੰਪਾ.ਡਾ ਮਹਿਲ ਸਿੰਘ),ਭਾਗ ਪਹਿਲਾ (ਕਹਾਣੀ),
ਰਵੀ ਸਾਹਿਤ ਪ੍ਰਕਾਸ਼ਨ,ਅੰਮ੍ਰਿਤਸਰ।
(ਸਾਰ,ਵਿਸ਼ਾ ਵਸਤੂ)
(ਕੋਈ ਇਕ ਸਵਾਰ,ਘੋਟਣਾ, ਆਪਣਾ ਆਪਣਾ ਹਿੱਸਾ ਕਹਾਣੀਆਂ ਪਾਠ ਕ੍ਰਮ ਦਾ ਹਿੱਸਾ ਨਹੀਂ ਹਨ) 8 ਅੰਕ

ਯੂਨਿਟ-III

ਪੈਰ੍ਹਾਰਚਨਾ

ਪੈਰ੍ਹਾ ਪੜ੍ਹ ਕੇ ਪਸ਼੍ਨਾਂ ਦੇ ਉਤਰ। 8 ਅੰਕ

ਯੂਨਿਟ-IV

(ੳ) ਪੰਜਾਬੀ ਧੁਨੀ ਵਿਉਂਤ :ਪਰਿਭਾਸ਼ਾ ਤੇ ਉਚਾਰਨ ਅੰਗ

(ਅ) ਸਵਰ, ਵਿਅੰਜਨ 8 ਅੰਕ

ਅੰਕ ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਚਾਰ ਸੈਕਸ਼ਨ ਹੋਣਗੇ।ਸੈਕਸ਼ਨA-Dਤੱਕ ਦੇ ਪ੍ਰਸ਼ਨ ਯੂਨਿਟI-IV ਵਿਚੋਂ ਪੁੱਛੇ ਜਾਣਗੇ। ਹਰ ਸੈਕਸ਼ਨ ਵਿਚ ਦੋ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।
2. ਵਿਦਿਆਰਥੀ ਨੇ ਕੁਲ ਪੰਜ ਪ੍ਰਸ਼ਨ ਕਰਨੇ ਹਨ। ਹਰ ਸੈਕਸ਼ਨ ਵਿਚੋਂ ਇਕ ਪ੍ਰਸ਼ਨ ਲਾਜ਼ਮੀ ਹੈ । ਪੰਜਵਾਂ ਪ੍ਰਸ਼ਨ ਕਿਸੇ ਵੀ ਸੈਕਸ਼ਨ ਵਿਚੋਂ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ।
3. ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ 08 ਅੰਕਹਨ।
4. ਪੇਪਰ ਸੈੱਟ ਕਰਨ ਵਾਲਾ ਜੇਕਰ ਚਾਹੇ ਤਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਵੰਡ ਅਗੋਂ ਵੱਧ ਤੋਂ ਵੱਧ ਚਾਰ ਉਪ ਪ੍ਰਸ਼ਨਾਂ

ਵਿਚ ਕਰ ਸਕਦਾ ਹੈ ।

Session 2022-23

BACHELOR OF SCIENCE (HONOURS) PHYSICS SEMESTER–I

BASIC PUNJABI

In lieu of Punjabi(Compulsory)

COURSE CODE -/BOPL-1031

Course outcomes

CO1:ਮੁੱਢਲੀ ਪੰਜਾਬੀ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਨੂੰ ਸਿਖਾਉਣ ਦੀ ਪ੍ਰਕਿਰਿਆ ਵਿਚ ਪਾ ਕੇ ਇਕ ਹੋਰ ਭਾਸ਼ਾ ਸਿੱਖਣ ਦਾ ਮੌਕਾ ਪ੍ਰਦਾਨ ਕਰਨਾ ਹੈ।

CO2:ਇਸ ਵਿਚ ਵਿਦਿਆਰਥੀ ਨੂੰ ਬਾਰੀਕਬੀਨੀ ਨਾਲ ਭਾਸ਼ਾ ਦਾ ਅਧਿਐਨ ਕਰਵਾਇਆ ਜਾਵੇਗਾ।

CO3:ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਪੰਜਾਬੀ ਸ਼ਬਦ ਰਚਨਾ ਤੋਂ ਜਾਣੂ ਕਰਵਾਇਆ ਜਾਵੇਗਾ।

CO4:ਮੁੱਢਲੀ ਪੰਜਾਬੀ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਨਿੱਤ ਵਰਤੋਂ ਦੀ ਪੰਜਾਬੀ ਸ਼ਬਦਾਵਲੀ ਬਾਰੇ ਦੱਸਣਾ ਹੈ।

CO5:ਮੁੱਢਲੀ ਪੰਜਾਬੀ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਦਾ ਸ਼ਬਦ ਘੇਰਾ ਵਿਸ਼ਾਲ ਕਰਨਾ ਹੈ।

CO6:ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਪੰਜਾਬੀ ਵਿਚ ਹਫ਼ਤੇ ਦੇ ਸੱਤ ਦਿਨਾਂ ਦੇ ਨਾਂ, ਬਾਰ੍ਹਾਂ ਮਹੀਨਿਆਂ ਦੇ ਨਾਂ, ਰੁੱਤਾਂ ਦੇ ਨਾਂ, ਇਕ ਤੋਂ ਸੌ ਤੱਕ ਗਿਣਤੀ ਸ਼ਬਦਾਂ ਵਿਚ ਸਿਖਾਉਣਾ ਹੈ।

Session 2022-23

BACHELOR OF SCIENCE (HONOURS) PHYSICS SEMESTER–I

BASIC PUNJABI

In lieu of Punjabi(Compulsory)

COURSE CODE -/BOPL-1031

ਸਮਾਂ : 3 ਘੰਟੇ **Maximum Marks: 50**

Theory : 40

CA : 10

ਪਾਠਕ੍ਰਮ

ਯੂਨਿਟ-I

ਪੈਂਤੀ ਅੱਖਰੀ, ਅੱਖਰ ਕ੍ਰਮ, ਪੈਰ ਬਿੰਦੀ ਵਾਲੇ ਵਰਣ ਅਤੇ ਪੈਰ ਵਿਚ ਪੈਣ ਵਾਲੇ ਵਰਣ ਅਤੇ ਮਾਤ੍ਰਵਾਂ (ਮੁੱਢਲੀ ਜਾਣ ਪਛਾਣ) ਲਗਾਖਰ (ਬਿੰਦੀ, ਟਿੱਪੀ, ਅੱਧਕ) : ਪਛਾਣ ਅਤੇ ਵਰਤੋਂ । 08ਅੰਕ

ਯੂਨਿਟ-II

ਪੰਜਾਬੀ ਸ਼ਬਦ ਬਣਤਰ : ਮੁੱਢਲੀ ਜਾਣ ਪਛਾਣ (ਸਾਧਾਰਨ ਸ਼ਬਦ, ਸੰਯੁਕਤ ਸ਼ਬਦ, ਮਿਸ਼ਰਤ ਸ਼ਬਦ, ਮੂਲ ਸ਼ਬਦ, ਅਗੇਤਰ ਅਤੇ ਪਿਛੇਤਰ) 08ਅੰਕ

ਯੂਨਿਟ-III

ਨਿੱਤ ਵਰਤੋਂ ਦੀ ਪੰਜਾਬੀ ਸ਼ਬਦਾਵਲੀ : ਬਾਜ਼ਾਰ, ਵਪਾਰ, ਰਿਬਤੇ ਨਾਤੇ, ਖੇਤੀ ਅਤੇ ਹੋਰ ਧੰਦਿਆਂ ਆਦਿ ਨਾਲ ਸੰਬੰਧਤ। 08 ਅੰਕ

ਯੂਨਿਟ-IV

ਹਫ਼ਤੇ ਦੇ ਸੱਤ ਦਿਨਾਂ ਦੇ ਨਾਂ, ਬਾਰ੍ਹਾਂ ਮਹੀਨਿਆਂ ਦੇ ਨਾਂ, ਰੁੱਤਾਂ ਦੇ ਨਾਂ, ਇਕ ਤੋਂ ਸੌ ਤਕ ਗਿਣਤੀ ਸ਼ਬਦਾਂਵਿਚ ।

ਅੰਕ ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਚਾਰ ਸੈਕਸ਼ਨ ਹੋਣਗੇ। ਸੈਕਸ਼ਨ **A-D** ਤੱਕ ਦੇ ਪ੍ਰਸ਼ਨ ਯੂਨਿਟ **I-IV** ਵਿਚੋਂ ਪੁੱਛੇ ਜਾਣਗੇ। ਹਰ ਸੈਕਸ਼ਨ ਵਿਚ ਦੋ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।
2. ਵਿਦਿਆਰਥੀ ਨੇ ਕੁੱਲ ਪੰਜ ਪ੍ਰਸ਼ਨ ਕਰਨੇ ਹਨ। ਹਰ ਸੈਕਸ਼ਨ ਵਿਚੋਂ ਇਕ ਪ੍ਰਸ਼ਨ ਲਾਜ਼ਮੀ ਹੈ । ਪੰਜਵਾਂ ਪ੍ਰਸ਼ਨ ਕਿਸੇ ਵੀ ਸੈਕਸ਼ਨ ਵਿਚੋਂ ਕੀਤਾਜਾ ਸਕਦਾ ਹੈ।
3. ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ 08 ਅੰਕ ਹਨ।
4. ਪੇਪਰ ਸੈੱਟ ਕਰਨ ਵਾਲਾ ਜੇਕਰ ਚਾਹੇ ਤਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਵੱਧ ਤੋਂ ਵੱਧ ਚਾਰ ਉਪ ਪ੍ਰਸ਼ਨਾਂ ਵਿਚ ਕਰ ਸਕਦਾ ਹੈ ।

(Semester-I)
Session 2022-23
Course Title: Punjab History and Culture (From Earliest Times to C 320) (Special paper in lieu of Punjabi Compulsory)
(For those students who are not domicile of Punjab)

Course Code: BOPL-1431

COURSE OUTCOMES

After completing Semester I and course on Punjab History and Culture students of History will be able to identify and have a complete grasp on the sources & writings of Ancient Indian History of Punjab.

CO1: Identify and describe the emergence of earliest civilizations in: Indus Valley Civilization and Aryan Societies.

CO2: Identify and analyses the Buddhist, Jain and Hindu faith in the Punjab

CO3: Analyses the emergence of Early Aryans and Later Vedic Period, their Society, Culture, Polity and Economy

CO4: To make students understand the concepts of two faiths Jainism and Buddhism, its principles and their application and relevance in present times

(Semester-I)
Session 2022-23
Course Title: Punjab History and Culture (From Earliest Times to C 320) (Special paper in lieu of Punjabi Compulsory)
(For those students who are not domicile of Punjab)

Course Code: BOPL-1431 **Examination Time: 3 Hours**

Max. Marks: 50 **Theory: 40, C A: 10**

Instructions for the Paper Setters

1. Question paper shall consist of four Units
2. Examiner shall set 8 questions in all by selecting **Two Questions** of equal marks from each Unit.
3. Candidates shall attempt **5 questions** in **600 words,** by at least selecting **One Question** from each Unit and the **5th question** may be attempted from any of the **four Units**.
4. Each question will carry 8 marks.

Unit-I

1. Physical features of the Punjab
2. Sources of the ancient history of Punjab

Unit-II

3. Harappan Civilization: social, economic and religious life of the Indus Valley People.
4. The Indo-Aryans: Original home

Unit-III

5. Social, Religious and Economic life during Early Vedic Age.
6. Social, Religious and Economic life during Later Vedic Age.

UNIT-IV

7. Teachings of Buddhism
8. Teachings of Jainism

Suggested Readings

- L. M Joshi (ed.), *History and Culture of the Punjab*, Art-I, Patiala, 1989 (3rd edition)
- L.M. Joshi and Fauja Singh (ed.), *History of Punjab*, Vol.I, Patiala 1977.
- Budha Parkash, *Glimpses of Ancient Punjab*, Patiala, 1983.
- B.N. Sharma, *Life in Northern India*, Delhi. 1966.
- Chopra, P.N., Puri, B.N., & Das, M.N.(1974). *A Social, Cultural & Economic History of India,* Vol. I, New Delhi: Macmillan India.

BACHELOR OF SCIENCE (HONOURS) PHYSICS

(Semester I)

Session 2022-23

COMMUNICATION SKILLS IN ENGLISH

(Theory)

Course Code:

BOPL -1102

COURSE OUTCOMES

At the end of this course, the students will develop the following Skills:

CO 1: Reading skills that will facilitate them to become an efficient reader

CO 2: Through reading skills, the students will have an ability to have a comprehensive understanding of the ideas in the text and enhance their critical thinking

CO 3: Writing skills of students which will make them proficient enough to express ideas in clear and grammatically correct English

CO 4: The skill to use an appropriate style and format in writing letters (formal and informal) and resume, memo, notices, agenda, minutes

BACHELOR OF SCIENCE (HONOURS) PHYSICS

(Semester I)

Session 2022-23

COMMUNICATION SKILLS IN ENGLISH

(Theory)

Course Code:

BOPL -1102

Total Marks: 50

Examination Time: 3 Hrs **Theory: 40**

CA: 10

Instructions for the paper setter and distribution of marks:

The question paper will consist of four sections. The candidate will have to attempt five questions in all selecting one from each section and the fifth question from any of the four sections. Each question will carry 8 marks.

Section-A: Two questions of theoretical nature will be set from Unit I.

Section-B: Two comprehension passages will be given to the students from Unit II.

Section-C: Two questions will be given from Unit III.

Section-D: Two questions will be set from Unit IV.

(8 x 5 = 40)

The syllabus is divided in four units as mentioned below:

Unit I

Reading Skills: Reading Tactics and strategies; Reading purposes–kinds of purposes and associated comprehension; Reading for direct meanings.

Unit II

Reading for understanding concepts, details, coherence, logical progression and meanings of phrases/ expressions.

Activities:

- Comprehension questions in multiple choice format
- Short comprehension questions based on content and development of ideas

Unit III

Writing Skills: Guidelines for effective writing; writing styles for application, personal letter, official/ business letter.

Activities

- Formatting personal and business letters.
- Organizing the details in a sequential order

Unit IV

Resume, memo, notices, agenda, minutes, Tips for effective blog writing

Activities:

- Converting a biographical note into a sequenced resume or vice-versa
- Ordering and sub-dividing the contents while making notes.
- Writing notices for circulation/boards
- Writing blogs

Recommended Books:

1. *Oxford Guide to Effective Writing and Speaking* by JohnSeely.
2. *Business Communication,* by Sinha, K.K. GalgotiaPublishers,2003.
3. *Business Communication* by Sethi, A and Adhikari, B., McGraw Hill Education2009.
4. *Communication Skills* by Raman, M. & S. Sharma, OUP, New Delhi, India(2011).

BACHELOR OF SCIENCE (HONOURS) PHYSICS
SEMESTER–I
SESSION 2022-23
MECHANICS-I

Course Code: BOPL-1393

Course Outcomes: Mechanics -I

After passing this course, students will be able to:

CO1: Understand the various coordinate systems and its applications. Students will be able to understand the conservative and non-conservative forces and calculation of work for various kinds of forces.

CO2: Learn various conservation laws. They will understand the elastic collision in different systems, cross section of elastic scattering as well as Rutherford scattering and know the motion of rigid body.

CO3: Learn about central forces and their properties. They will be able to solve motion of particle under central force and to determine the turning points of orbit.

CO4: understand the rotational motion of a rigid body in general. They will be able to solve equations of rotational motion by using Euler's equations and moment of inertia tensor for a rigid body. Further they will understand the motion of elementary gyroscope and spinning top.

BACHELOR OF SCIENCE (HONOURS) PHYSICS (**SESSION 2022-23)**

SEMESTER-I

COURSE CODE: BOPL-1393

MECHANICS-I

Maximum Marks: 75 (External 60 + Internal 15) **Examination Time: 3 Hours**
Pass Marks: 35% **Total Teaching hours: 60**

Instructions for the Paper Setters:

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section. **All questions carry 12 marks.**

Note: Students can use Non-Scientific calculators or logarithmic tables.

Unit- I

Co-ordinate system and Motion of a Particle: Cartesian and Spherical Polar co-ordinate systems; area, volume, displacement, velocity and acceleration in these systems, Introduction to cylindrical coordinate system, Solid angle, Newton's laws of motion. Conservative and non-conservative forces, Relation between conservative force and potential energy, Work done by conservative forces.

Unit- II

Conservation Laws, variable mass systems, motion of a rocket, Internal forces and momentum conservation, Centre of mass, Elastic collisions in laboratory and centre of mass systems; velocities, angles, energies in these systems and their relationships Cross-section elastic scattering and impact parameter, Rutherford scattering.

Unit- III

Inverse-Square-Law Force: Forces in nature (qualitative). Central forces, Torque due to central forces and conservation of angular momentum for central force and it's consequences. Potential energy and force between a point mass and spherical shell, a point mass and solid sphere, gravitational and electrostatic self-energy. Two body problem and concept of reduced mass. Motion of a body under central force, equation of orbit in inverse-square force field. Kepler's laws

Unit- IV

Rotational Dynamics: Angular Momentum of a particle and system of particles, Torques due to internal forces. Conservation of angular momentum. Equation of motion of a rigid body, rotational motion of a rigid body in general and that of plane lamina. Rotation of angular momentum vector about a fixed axis. Angular momentum and kinetic energy of a rigid body about principal axis, Euler's equations. Precession and elementary gyroscope, Spinning top.

Reference Books:

1. Mechanics-Berkeley Physics Course, Vol-I by C. Kittel, W. D. Knight, M. A. Ruderman, C. A. Helmholtz and R. J. Moyer-Tata McGraw Hill Publishing Company Ltd., New Delhi.
2. Fundamentals of Physics by D. Halliday, R. Resnick and J. Walker -Wiley India Pvt. Ltd., New Delhi.
3. Introduction to Classical Mechanics by R. G. Takwale & P.S. Puranik. Tata McGraw Hill Publishing Company Ltd., New Delhi
4. An introduction to Mechanics by D. Kleppne r& R. Kolenkow. Tata McGraw Hill Publishing Company Ltd., New Delhi.
5. Mechanics by H.S. Hans & S.P Puri, Tata McGraw Hill Publishing Company Ltd. New Delhi.
6. Analytical Mechanics by S. K. Gupta, Modern Publishers.

BACHELOR OF SCIENCE (HONOURS) PHYSICS
SEMESTER–I

SESSION 2022-23
ELECTRICITY and MAGNETISM-I

Course No. BOPL-1394

Course Outcomes: Electricity and Magnetism-I

After passing this course the students will be able to:

CO1: understand the vector calculus and vector algebra and its applications in electricity and magnetism. The students will be able to solve the electrostatic problems with the help of Gauss law and Coulomb's law.

CO2: understand the applications of scalar potential for the calculation of electric field and electric potential due to an arbitrary charge distribution.

CO3: solve the problems with the help of method of images and understand the conduction of electric current and fundamental laws of electricity and relate the electric and magnetic fields in two inertial frames of reference.

CO4: able to understand electric field, potential and polarization of different media and related quantities.

BACHELOR OF SCIENCE (HONOURS) PHYSICS (**SESSION 2022-23**)
SEMESTER-I

COURSE CODE: BOPL-1394

ELECTRICITY AND MAGNETISM-I

Maximum Marks: 75 (External 60 + Internal 15) **Examination Time: 3 Hours**
Pass Marks: 35% **Total Teaching hours: 60**

Instructions for the Paper Setters:

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section. **All questions carry 12 marks.**

Note: Students can use Non-Scientific calculators or logarithmic tables.

Unit- I

Calculus of Vectors : Basic ideas of Vector Calculus Gradient, Divergence, curl and their physical significance. Laplacian in rectangular, cylindrical and spherical coordinates. Coulomb's Law for point charges and continuous distribution of charges. Electric field due to dipole, line charge and sheet of charge. Electric flux, Gauss's Law and its applications. Gauss's divergence theorem and differential form of Gauss's Law. Green's theorem

Unit- II

Electrostatics and Electric Current: Work and potential difference, Relation between potential and electric field, Potential difference as line integral of electric field, Curl of electric field. Poisson's and Laplace's equations, Electric potential due to different charge distribution: Wire, Ring, Disc, Spherical Shell, Sphere, dipole etc. The potential energy for a point and continuous charge distribution.

Unit- III

Field of Moving Charges: Current and current density, drift velocity, expression for current density vector, equation of continuity. Ohm's Law and expression for electrical conductivity, limitations of Ohm's law. Equipotential surface, method of electrical images, Measurement of electrical images for plane conductors and sphere, Multipole expansion, Solution of boundary volume problems.

Unit- IV

Electric Fields in Matter: Moments of charge distribution, Potential and field of a dipole, torque and force on a dipole in an external electric field, Electric field caused by polarized matter, Electric field of Polarized Sphere, Dielectric sphere in a uniform electric field, Field of a charge in a dielectric medium, Introduction to Tensors, Electric susceptibility and atomic polarizability tensor, Polarization in alternating fields. Polarizability tensors

Text and Reference Books:

1. Introduction to Electrodynamics by D.J. Griffiths, Perason Prentice Hall of India, New Delhi
2. Electricity & Magnetism by E.M. Purcell, Berkeley Physics Course Vol. 2, McGraw Hill, New York

3. Fundamental of Physics by D. Halliday, R. Resnick and J. Walker (6th edition)-John Wiley India Pvt.Ltd.,.
4. Electricity and Magnetism by A. S. Mahajan & A. A. Rang Wala, Tata –McGraw Hill Publication Pvt. Ltd.

Bachelor of Science (Honours) Physics
Semester-I
Session: 2022-23
Course Title: Mathematics-I
Course Code: BOPL-1335
Course outcomes

After the completion of this course, students should be able to:

CO 1: Understand the concept of limits, continuity and derivative of a function, maxima and minima of a function of a single variable

CO 2: Explain the significance of Rolle's theorem, Mean Value theorem, Taylor's and Maclaurin's theorem and to find the expansions of functions.

CO 3: Demonstrate the geometrical meaning of integral calculus as an area and their uses in the determination of C.G & moments of inertia.

CO 4: Understand how to solve linear differential equations with constant coefficients and linear homogeneous and inhomogeneous differential equations of second order.

Bachelor of Science (Honours) Physics
Semester-I
Session: 2022-23
Course Title: Mathematics-I
Course Code: BOPL-1335

Examination Time: 3 Hours **Max.Marks:50**
Theory:40
CA:10

Instructions for the Paper Setters:

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

UNIT –I

Functions and Derivatives: Limits, continuity and derivative of function. Differentiation of standard functions, Successive differentiation. Geometrical significance of derivative. Maxima and Minima of a function of single variable. Partial differentiation. Chain rule of differentiation.

UNIT –II

Differential Calculus: Statement of Rolle's theorem and Mean value theorem, Taylor's and Maclaurins theorems and their applications to formal expansion of functions. Tangents and normals. Basic idea about asymptotes.

UNIT –III

Integral Calculus: Integration as inverse of differentiation. Indefinite integrals of standard forms. Method of substitution. Integration using partial fractions. Integration by parts. Reduction formulae. Definite integrals. Definite integral as limit of a sum and geometrical interpretation as an area.

UNIT –IV

Differential Equations: Definition & formation of differential equations. Linear differential equation of first order and first degree. Linear homogenous and inhomogeneous differential equation of second order. Linear differential equations with constant coefficients.

Text Book:

B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, Delhi, forty fourth edition, 2019

Reference Books:

1. S. Narayan, Differential Calculus, S.Chand, New Delhi, thirteenth edition, 1993

2. S. Narayan, Integral Calculus, S. Chand, Delhi, thirty fifth edition, 2005.

3.M.Vygodsky, Mathematical Hand Book, CBS Publishers, second revised edition, 1987.

Bachelor of Science (Honours) Physics
(Semester–I)
Session: 2022-25
Course Title: Chemistry-I
Course Code: BOPL-1086

Course outcomes:

Students will be able to

CO1: differentiate between chiral and achiral compounds, configuration and conformation and understand the concept of isomerism

CO2: understand the resolution of enantiomers and differentiate between dextrorotatory and laevorotatory compounds, do conformational analysis of ethane, butane, cyclohexane, mono substituted and disubstituted cyclohexane and explain the various methods of formation and chemical reactions of alkanes, alkenes and alkynes.

CO3: understand functional group transformation by nucleophilic substitution

CO4: describe the mechanism and stereochemistry of nucleophilic substitution reactions and understand the principles of nucleophilic addition to carbonyl groups.

(Semester–I)
Session: 2022-25
Course Title: Chemistry-I
Course Code: BOPL-1086

Examination Time: 3 Hours **Max. Marks: 50**
(Theory: 40, CA: 10)

Instructions for the Paper Setters:
Eight questions of equal marks (eight marks each) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.
Note: Students can use Non-Scientific calculators or logarithmic tables.

UNIT I

Stereochemistry: General introduction to stereochemistry and molecular chirality, properties of chiral molecules-optical activity, enantiomerism, introduction to absolute and relative configuration, the Cahn-Ingold Prelog R-S notional system physical properties of enantiomers. Stereochemistry of alkenes, naming stereo isometric alkenes by the E-Z system.
Conformational analysis. Conformational analysis of ethane, butane, cyclohexane, mono substituted and disubstituted cyclohexane

UNIT II

Chemistry of alkanes and alkenes: General chemistry of alkanes and alkenes, preparation of alkanes by decarboxylation. Wurtz reaction and Corey House reaction with mechanisms. Dehydration of alcohols and regioselectivity of these reactions. Acid catalysed dehydration of alcohols with complete mechanistic discussion, Mechanism of dehydrohalogenation of alkyl halides (Elimination mechanism), stereoselective and anti-elimination in elimination reactions. Mechanism of hydrogenation of alkenes, stereochemistry of hydrogenation of cyclo alkenes, electrophilic addition of hydrogen halides to alkenes its regioselectivity explained on the basis of mechanism, free radical addition of hydrogen bromide to alkenes, acid catalysed hydration of alkene with mechanism, stereochemistry of halogen addition to alkenes and its mechanistic explanation. Hypohalous acid addition to alkenes, epoxidation of alkenes.
Alkynes: General chemistry of alkynes, preparation of alkynes, acidity of acetylene and terminal alkenes, metal ammonia reduction of alkyne, addition of hydrogen halides and water to alkynes, with detailed discussion of mechanism of these reactions.

UNIT-III

Nucleophilic substitution reactions: Functional group transformation by nucleophilic substitution, the biomolecular (S_N2), mechanism of nucleophilic substitution, stereochemistry of S_N2 reactions, steric effect in S_N2 reactions, nucleophiles and nucleophilicity. The unimolecular (S_N1) mechanism of nucleophilicsubstitution, carbocation stability and the rate of substitution, stereochemistry of S_N1 reactions, carbocation arrangements in S_N1 reactions, solvent effects, substitution and elimination as competing reactions.

UNIT-IV

Chemistry of carbonyl compounds. Principles of nucleophillic addition to carbonyl groups: Hydration, acetal formation, cyanohydrin formation; reactions with primary and secondary amines, Wittig reaction, mechanism of halogenation, acid and base catalysed enolization, haloform reaction, aldol condensation, conjugate nucleophillic addition to unsaturated carbonyl compounds

Books Recommended:

1. Advanced Organic Chemistry, Reactions Mechanisms and Structure by J. March.
2. Organic Chemistry by F. A Carey
3. Schaum's Outlines Series Theory and Problems of Organic Chemistry by Herbert Meislick and Jacob Sharefkin
4. Problems and their solution in Organic chemistry by I.L. Finar,
5. Organic Chemistry by D.J. Cram and G.S. Hammond.
6. J.E. Banks, Naming Organic Compounds – Programmed Introduction to Organic Chemistry.
7. E.L. Eliel, Stereochemistry of carbon compounds.

Bachelor of Science (Honours) Physics Semester–I
Session – (2022-23)
Course Outcomes: Physics Lab-I Sem I

Course No. BOPP-1397

CO1: Students will be able to find the value of acceleration due to gravity using pendulums.

CO2: It will give understanding of collisions in 1-Dimension.

CO3: It helps to study the moment of inertia of a body & on what factors it depends.

BACHELOR OF SCIENCE (HONOURS) PHYSICS (**SESSION 2022-23**)

SEMESTER-I

COURSE CODE: BOPP-1397

PHYSICS LAB-I

Maximum Marks: 50 (External 40 + Internal 10) **Examination Time: 3 Hours**

Passing Marks 35% **Total Teaching hours: 90**

Instructions to Practical Examiner:

Question paper is to be set on the spot jointly by the external and internal examiners. Two copies of the same to be submitted for the record to COE office, KanyaMahaVidyalaya, Jalandhar

General Guidelines for Practical Examination

I. The distribution of marks is as follows:

i) One experiment 20 Marks

ii) Brief Theory 6 Marks

iii) Viva–Voce 7 Marks

iv) Record (Practical file) 7Marks

II. There will be one sessions of 3 hours duration. The paper will have one session and will consist of 8 experiments out of which an examinee will mark 6 experiments and one of these is to be allotted by the external examiner.

III. Number of candidates in a group for practical examination should not exceed 20.

IV. In a single group no experiment be allotted to more than three examinee in any group.

List of experiments-

1. To measure the time periods of oscillation for the objects of various geometrical shapes but of same mass.
2. To study rotational motion using a flywheel and hence show that torque is proportional to angular acceleration.
3. To find the moment of inertia of an irregular body about an axis through its centre of gravity with a torsion pendulum.
4. To determine the moment of inertia of a flywheel.
5. To determine the Young's modulus by bending.
6. Determination of Poisson's ratio for rubber.
7. To verify laws of conservation of (a) linear momentum, (b) kinetic energy in elastic collisions using one dimensional collisions of hanging spheres. (c) Also determine energy transfer and coefficient of restitution.
8. To determine modulus of rigidity of copper wire by Maxwell needle experiment.
9. To determine the coefficient of viscosity of glycerine by Stoke's method.
10. To find the unknown capacitance of a capacitor by flashing and quenching
11. of a neon lamp.
12. Measurement of capacitance, determination of permittivity of a medium air and relative permittivity by de–Sauty's bridge.
13. To study the variation in resistance of filament of a bulb with temperature.

Reference Books:

1. Practical Physics, C.L. Arora, S. Chand & Co.

Bachelor of Science (Honours) Physics
(Semester–I)
Session: 2022-25
Course Title: Chemistry Lab-I
Course Code: BOPP-1088

Course outcomes

Students will be able to

CO1: develop skills required for the qualitative analysis of organic compounds and to detect elements (N, S and halogens).

CO2: detect functional groups (phenolic, carboxylic, carbonyl, esters, carbohydrates, amines, amides, nitro) in simple organic compounds

CO3: determine the physical constants of organic compounds

CO4: prepare the derivatives of organic compounds

Bachelor of Science (Honours) Physics
(Semester–I)
Session: 2022-25
Course Title: Chemistry Lab-I
Course Code: BOPP-1088

Examination Time: 3 Hours Max. Marks: 50
Practical: 40, CA: 10

Instruction for practical examiner: Question paper is to be set on the spot jointly by the Internal and External Examiners. Two copies of the same should be submitted for the record to COE Office, Kanya Maha Vidyalaya, Jalandhar.

General Guidelines for Practical Examination
The preliminary examination of physical and chemical characteristics (physical state, colour, odor and ignition tests), elemental analysis (nitrogen, sulphur, chlorine, bromine, iodine), solubility tests including acid-base reactions, classification tests involving functional reactivity other than acid-base test, preparation of derivatives for given pure organic compounds.
The following categories of compounds should be analysed:

-Phenols
- Carboxylic acids
-Carbonyl compounds (ketones, aldehydes)
-Carbohydrates
-Aromatic amines
-Amides and Nitro compounds

Books Recommended:

1. Practical Organic Chemistry by F.G. Mann and B.C. Saunders
2. Practical Organic Chemistry by Vogel

Bachelor of Science (Honours) Physics Semester–I

SEMESTER – I
DRUG ABUSE
Course Code: AECD-1161
(Theory)

Course Outcomes:

CO 1. This information can include factual data about what substance abuse is; warning signs of addiction; information about how alcohol and specific drugs affect the mind and body;
CO 2. How to be supportive during the detoxification and rehabilitation process.
CO 3. Main focus of substance abuse education is teaching individuals about drug and alcohol abuse and how to avoid, stop, or get help for substance use disorders.
CO 4. Substance abuse education is important for students alike; there are many misconceptions about commonly used legal and illegal substances, such as alcohol and marijuana.

Bachelor of Science (Honours) Physics Semester–I

SEMESTER – I

SESSION 2021-22

DRUG ABUSE

Course Code: AECD-1161

(Theory)

Time: 3 Hrs **Max.Marks: 50**

Theory: 40 **CA: 10**

Instructions for the Paper Setter

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

UNIT-I

1)Meaning of Drug Abuse: Concept and Overview, Historical Perspective of Drug Abuse, Drug Dependence, Drug Addiction, Physical and Psychological Dependence: Drug Tolerance and withdrawal symptoms.

UNIT-II

2) Types of Abused Drugs and their Effects -I

1) Stimulants: Amphetamines – Benzedrine, Dexedrine, Cocaine.
2) Depressants: Alcohol Barbiturates: Nembutal, Seconal, Phenobarbital and Rohypnol.
3) Narcotics: Heroin, Morphine, Oxycodone.

UNIT-III

3) Types of abused drugs and their effects - II

1) Hallucinogens: Cannabis, Marijuana, Hashish, Hash Oil, MDMA, LSD.
2) Steroids.

UNIT-IV

4) Nature and Extent of the Problem: Magnitude or prevalence of the menace of Drug Abuse in India and Punjab, Vulnerable groups by age, gender and economic status, Signs and Symptoms of Drug Abuse: Physical, Academic, Behavioural and Psychological Indicators.

References:

1.Ahuja, Ram (2003), *Social Problems in India*, Rawat Publication, Jaipur.
2. Extent, Pattern and Trend of Drug Use in India, Ministry of Social Justice and Empowerment, Government of India, 2004.
3. Inciardi, J.A. 1981. *The Drug Crime Connection.* Beverly Hills: Sage Publications.
4. Kapoor. T. (1985) *Drug epidemic among Indian Youth,* New Delhi: Mittal Pub.
5. Modi, Ishwar and Modi, Shalini (1997) *Drugs: Addiction and Prevention*, Jaipur: Rawat Publication.
6. National Household Survey of Alcohol and Drug abuse. (2003) New Delhi, Clinical Epidemiological Unit, All India Institute of Medical Sciences, 2004.
7. Sain, Bhim 1991, *Drug Addiction Alcoholism,* Smoking obscenity New Delhi: Mittal Publications.
8. Sandhu, Ranvinder Singh, 2009, *Drug Addiction in Punjab*: A Sociological Study. Amritsar: Guru Nanak Dev University.
9. Singh, Chandra Paul 2000. *Alcohol and Dependence among Industrial Workers*: Delhi: Shipra.
10. Sussman, S and Ames, S.L. (2008). *Drug Abuse: Concepts, Prevention and Cessation,* Cambridge University Press.

FOUNDATION COURSE

Course Title: Foundation Course

Nature of Course: Audit Course (Value Added)

Course Duration: 30 hours

Course intended for: Semester I students of undergraduate degree programs of all 25 streams.

Course Credits: 1

Course Code: SECF-I

PURPOSE & AIM

This course has been designed to strengthen the intellectual foundation of all the new entrants in the college. One of the most common factors found in the students seeking admission in college after high school is the lack of an overall view of human history, knowledge of global issues, peaks of human intellect, social/political thinkers and inventors & discoverers who have impacted human life. For a student, the process of transition from school to college is full of apprehension and skepticism regarding adapting themselves to new system. The Foundation Programme intends to bridge the gap between high school and college education and develop an intellectual readiness and base for acquiring higher education.

INSTRUCTIONAL OBJECTIVES

- to enable the students to realise their position in the whole saga of time and space
- to inculcate in them an appreciation of life, cultures and people across the globe
- to promote, in the students, an awareness of human intellectual history
- to make them responsible and humane world citizens so that they can carry forward the rich legacy of humanity

LEARNING OUTCOMES

After the completion of this Audit course, students will be able to

- learn how past societies, systems, ideologies, governments, cultures and technologies were built, how they operated, and how they have changed
- understand how the rich history of the world helps us to paint a detailed picture of where we stand today
- understand the Vedic theism, Upanishads Philosophy and doctrines of Jainism, Buddhism and Sikhism
- acquire knowledge of women rights and courage to face day to day challenges
- acknowledge the changes in society, religion and literature in the renaissance period and the importance of empathy and compassion for humanity
- *learn about the prominent Indians (Men and Women) who contributed significantly in freedom struggle, education, economic development and in the formation and evolution of our nation*

- understand meaning of race and how that concept has been used to justify exclusion, inequality, and violence throughout history and the origin of civil right movements to fight for equality, liberty and fraternity
- critically evaluate the socio-political and economic issues at global level and its implications in the present
- upgrade and enhance learning technological skills and striking a balance between technology and their well being
- take pride in learning the saga of Indian Past Culture and Heritage
- understand the rich legacy of KMV and its progressive endeavours

MODULE	TITLE	CONTACT HOURS
I	**Introduction and Initial Assessment**	2
II	**The Human Story**	3
III	***The Vedas* and the Indian Philosophy**	2.5
IV	**The Journey of Woman** **The Story and the Dream**	2.5
V	**Changing Paradigms in Society, Religion & Literature**	2.5
VI	**Makers of Modern India**	2.5
VII	**Racism: Story of the West**	2.5
VIII	**Modern World at a Glance: Political & Economic Perspective**	2.5
IX	**Technology Vis a Vis Human Life**	2.5
X	**My Nation My Pride**	2.5
XI	**The KMV Experience**	2.5
XII	**Final Assessment, Feedback and Closure**	2.5

EXAMINATION

- **Total Marks: 25 (Final Exam: 20; Internal Assessment: 5)**
- Final Exam: multiple choice quiz**.** Marks – 20; Time: 1 hour
- Internal Assessment: 5 (Assessment: 3; Attendance:2)
  Comparative assessment questions (medium length) in the beginning and close of the programme. Marks: 3; Time: 0.5 hour each at the beginning and end.
- Total marks: 25 converted to grade for final result
- Grading system: 90% marks & above: A grade
  80% - 89% marks : B grade
  70% - 79% marks : C grade

60% - 69% marks : D grade
50% - 59% marks : E grade
Below 50% marks : F grade (Fail - must give the exam again)

SYLLABUS

Module I Being a Human: Introduction & Initial Assessment

- Introduction to the programme
- Initial Assessment of the students through written answers to a couple of questions

Module 2 The Human Story

- Comprehensive overview of human intellectual growth right from the birth of human history
- The wisdom of the Ancients
- Dark Middle Ages
- Revolutionary Renaissance
- Progressive modern times
- Most momentous turning points, inventions and discoveries

Module 3 *The Vedas* and the Indian Philosophy

- Origin, teachings and significance of *The Vedas*
- Upnishads and Puranas
- Karma Theory of *The Bhagwad Gita*
- Main tenets of Buddhism & Jainism
- Teachings of Guru Granth Sahib

Module 4 Changing Paradigms in Society, Religion & Literature

- Renaissance: The Age of Rebirth
- Transformation in human thought
- Importance of humanism
- Geocentricism to heliocentricism
- Copernicus, Galileo, Columbus, Darwin and Saint Joan
- Empathy and Compassion

Module 5 Woman: A Journey through the Ages

- Status of women in pre-vedic times
- Women in ancient Greek and Roman civilizations
- Women in vedic and ancient India
- Status of women in the Muslim world
- Women in the modern world

- Crimes against women
- Women labour workforce participation
- Women in politics
- Status of women- our dream

Module 6 Makers of Modern India

- Early engagement of foreigners with India
- Education: The first step to modernization
- Railways: The lifeline of India
- Raja Ram Mohan Roy, Gandhi, Nehru, Vivekanand, Sardar Patel etc.
- Indira Gandhi, Mother Teresa, Homai Vyarawala etc.
- The Way Ahead

Module 7 Racism: Story of the West

- European beginnings of racism
- Racism in the USA - Jim Crow Laws
- Martin Luther King Jr. and the battle against racism
- Apartheid and Nelson Mandela
- Changing face of racism in the modern world

Module 8 Modern World at a Glance: Political & Economic Perspective

- Changing world order
- World War I & II
- UNO and The Commonwealth
- Nuclear Powers; Terrorism
- Economic Scenario: IMF, World Bank
- International Regional Economic Integration

Module 9 Technology Vis a Vis Human Life

- Impact of technology on modern life
- Technological gadgets and their role in our lives
- Technology and environment
- Consumerism and materialism
- Psychological and emotional consequences of technology
- Harmonizing technology with ethics and humaneness

Module 10 My Nation My Pride

- Indian Past Culture and Heritage
- Major Discoveries (Medicinal and Scientific)
- Vedic Age
- Prominent Achievements

- Art, Architecture and Literature

Module 11 The KMV Experience

- Rich Legacy of KMV
- Pioneering role in women emancipation and empowerment
- KMV Contribution in the Indian Freedom Struggle
- Moral, cultural and intellectual heritage of KMV
- Landmark achievements
- Innovative initiatives; international endeavours
- Vision, mission and focus
- Conduct guidelines for students

Module 12 Final Assessment, Feedback & Closure

- Final multiple choice quiz
- Assessment through the same questions asked in the beginning
- Feedback about the programme from the students
- Closure of the programme

PRESCRIBED READING

- ***The Human Story*** published by Dawn Publications

SEMESTER II

Session 2022-23

Punjabi (Compulsory)

BACHELOR OF SCIENCE (HONOURS) PHYSICS
SEMESTER–II

COURSE CODE- BOPL-2421

COURSE OUTCOMES

CO1:‘ਸਾਹਿਤ ਦੇ ਰੰਗ’ ਪੁਸਤਕ ਦੇ ਵਾਰਤਕ ਭਾਗ ਨੂੰ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਵਾਰਤਕ ਪ੍ਰਤੀ ਦਿਲਚਸਪੀ, ਸੂਝ ਨੂੰ ਪੈਦਾਕਰਨਾ ਹੈ ।

CO2:ਇਸ ਦਾ ਹੋਰ ਮਨੋਰਥ ਭਾਸ਼ਣ ਕਲਾ ਤੇ ਲਿਖਣ ਕਲਾ ਦੀ ਨਿਪੁੰਨਤਾ ਪੈਦਾ ਕਰਨਾ ਹੈ ।

CO3:‘ਸਾਹਿਤ ਦੇ ਰੰਗ’ ਪੁਸਤਕ ਦੇ ਰੇਖਾ ਚਿੱਤਰ ਭਾਗ ਨੂੰ ਸਿਲੇਬਸ ਵਿਚ ਸ਼ਾਮਿਲ ਕਰ ਕੇ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਰੇਖਾ ਚਿੱਤਰ ਨੂੰ ਪੜ੍ਹਣ ਦੀ ਰੁਚੀ ਨੂੰ ਪੈਦਾ ਕਰਨਾ ਹੈ ਤੇ ਇਹਨਾਂ ਮਹਾਨ ਸ਼ਖ਼ਸੀਅਤਾਂ ਦੀ ਸਫ਼ਲਤਾ ਪਿੱਛੇ ਘਾਲੀਆਂ ਘਾਲਣਾਵਾਂ ਤੋ ਵਾਕਫ਼ ਕਰਵਾਉਂਦਿਆਂ ਜੀਵਨ ਸੇਧ ਪ੍ਰਦਾਨ ਕਰਨਾ ਹੈ।

CO4:ਪੈਰ੍ਹਾ ਪੜ੍ਹ ਕੇ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉੱਤਰ ਦੇਣ ਦਾ ਮਨਰੋਥ ਵਿਦਿਆਰਥੀਆਂ ਦੀ ਬੁੱਧੀ ਨੂੰ ਤੀਖਣ ਕਰਦਿਆਂ ਉਨਾਂ ਦੀ ਲਿਖਣ ਪ੍ਰਤਿਭਾ ਨੂੰ ਉਜਾਗਰ ਕਰਨਾ ਹੈ ।

CO6:ਸ਼ਬਦ ਸ਼੍ਰੇਣੀਆਂਨੂੰ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਪੰਜਾਬੀਭਾਸ਼ਾ ਦੀ ਅਮੀਰੀ ਦਾ ਅਤੇ ਬਾਰੀਕੀਆਂ ਨੂੰ ਸਮਝਣ ਲਈਵੱਖਰੇ -ਵੱਖਰੇ ਸਿਧਾਂਤਾਂ ਦਾ ਵਿਕਾਸ ਕਰਨਾ ਹੈ ।

CO7:ਮੁਹਾਵਰਿਆਂ ਦੀ ਵਰਤੋਂ ਨਾਲ ਗੱਲਬਾਤ ਵਿਚ ਪਰਪੱਕਤਾ ਆਉਂਦੀ ਹੈ।ਇਹ ਵਿਦਿਆਰਥੀਆਂ ਦੀ ਗੱਲਬਾਤ ਵਿਚ ਨਿਖਾਰ ਲਿਆਉਣ ਦਾ ਕੰਮ ਕਰਨਗੇ।

Session 2022-23

Punjabi (Compulsory)

BACHELOR OF SCIENCE (HONOURS) PHYSICS
SEMESTER–II

COURSE CODE- BOPL-2421

ਸਮਾਂ : 3 ਘੰਟੇ

Maximum Marks: 50
Theory : 40
CA :10

ਪਾਠਕ੍ਰਮ ਅਤੇ ਪਾਠ ਪੁਸਤਕਾਂ

ਯੂਨਿਟ-I

ਸਾਹਿਤ ਦੇ ਰੰਗ (ਸੰਪਾ.ਡਾ ਮਹਿਲਸਿੰਘ),ਭਾਗ ਦੂਜ਼ਾ(ਵਾਰਤਕ),ਰਵੀ ਸਾਹਿਤਪ੍ਰਕਾਸ਼ਨ,ਅੰਮ੍ਰਿਤਸਰ।
(ਲਾਲ ਬਾਦਸ਼ਾਹ,ਹਾਰ ਸ਼ਿੰਗਾਰ,ਡੂੰਘੀਆਂ ਸਿਖਰਾਂ ਲੇਖ ਪਾਠ ਕ੍ਰਮ ਦਾ ਹਿੱਸਾ ਨਹੀਂਹਨ)
(ਸਾਰ,ਵਿਸ਼ਾ ਵਸਤੂ)

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ਯੂਨਿਟ-II

ਸਾਹਿਤ ਦੇ ਰੰਗ (ਸੰਪਾ.ਡਾ ਮਹਿਲ ਸਿੰਘ),ਭਾਗ ਦੂਜਾ(ਰੇਖਾਚਿੱਤਰ),ਰਵੀ ਸਾਹਿਤ ਪ੍ਰਕਾਸ਼ਨ,ਅੰਮ੍ਰਿਤਸਰ।
(ਬਾਤਾਂ ਮੋਹਨ ਸਿੰਘ ਕੀਆਂ, ਗੁਲਾਬੀ ਕਾਗਜ਼ ਉਤੇ ਲਿਖੀ ਕਵੀਤਾ:ਸੰਤੋਖ ਸਿੰਘ ਧੀਰ,ਸਤਿੰਦਰ ਸਿੰਘ ਨੂਰ :ਸਾਹਿਤ ਦਾ ਜਥੇਦਾਰ ਰੇਖਾ ਚਿੱਤਰ ਪਾਠ ਕ੍ਰਮ ਦਾ ਹਿੱਸਾ ਨਹੀਂਹਨ)
(ਸਾਰ,ਵਿਸ਼ਾ ਵਸਤੂ)

08 ਅੰਕ

ਯੂਨਿਟ-III

(ੳ) ਮੁਹਾਵਰੇ
(ਅ) ਪੈਰ੍ਹਾ ਪੜ੍ਹ ਕੇ ਪਸ਼੍ਨਾਂ ਦੇ ਉਤਰ। 08 ਅੰਕ

ਯੂਨਿਟ-IV

(ੳ) ਸ਼ਬਦ ਸ਼੍ਰੇਣੀਆਂ : ਨਾਂਵ,ਪੜਨਾਂਵ,ਕਿਰਿਆ,ਵਿਸ਼ੇਸ਼ਣ
(ਅ) ਸ਼ਬਦ ਸ਼੍ਰੇਣੀਆਂ: ਕਿਰਿਆ ਵਿਸ਼ੇਸ਼ਣ,ਸੰਬੰਧਕ,ਯੋਜਕ,ਵਿਸਮਿਕ 08 ਅੰਕ

ਅੰਕ ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਚਾਰ ਸੈਕਸ਼ਨ ਹੋਣਗੇ।ਸੈਕਸ਼ਨA-Dਤੱਕ ਦੇ ਪ੍ਰਸ਼ਨ ਯੂਨਿਟI-IV ਵਿਚੋਂ ਪੁੱਛੇ ਜਾਣਗੇ। ਹਰ ਸੈਕਸ਼ਨ ਵਿਚ ਦੋ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।

2. ਵਿਦਿਆਰਥੀ ਨੇ ਕੁਲ ਪੰਜ ਪ੍ਰਸ਼ਨ ਕਰਨੇ ਹਨ। ਹਰ ਸੈਕਸ਼ਨ ਵਿਚੋਂ ਇਕ ਪ੍ਰਸ਼ਨ ਲਾਜ਼ਮੀ ਹੈ । ਪੰਜਵਾਂ ਪ੍ਰਸ਼ਨ ਕਿਸੇ ਵੀ ਸੈਕਸ਼ਨ ਵਿਚੋਂ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ।

3. ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ 08 ਅੰਕ ਹਨ।

4. ਪੇਪਰ ਸੈੱਟ ਕਰਨ ਵਾਲਾ ਜੇਕਰ ਚਾਹੇ ਤਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਵੰਡ ਅਗੋਂ ਵੱਧ ਤੋਂ ਵੱਧ ਚਾਰ ਉਪ ਪ੍ਰਸ਼ਨਾਂ

ਵਿਚ ਕਰ ਸਕਦਾ ਹੈ ।

Session 2022-23

BACHELOR OF SCIENCE (HONOURS) PHYSICS

SEMESTER–II

BASIC PUNJABI
In lieu of Punjabi (Compulsory)
COURSE CODE - BOPL-2031

Course outcomes

CO1:ਮੁੱਢਲੀ ਪੰਜਾਬੀ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਨੂੰ ਸਿਖਾਉਣ ਦੀ ਪ੍ਰਕਿਰਿਆ ਵਿਚ ਪਾ ਕੇ ਇਕ ਹੋਰ ਭਾਸ਼ਾ ਸਿੱਖਣ ਦੇ ਮੌਕੇ ਪ੍ਰਦਾਨ ਕਰਨਾ ਹੈ ।

CO2:ਇਸ ਵਿਚ ਵਿਦਿਆਰਥੀ ਨੂੰ ਬਾਰੀਕਬੀਨੀ ਨਾਲ ਭਾਸ਼ਾ ਦਾ ਅਧਿਐਨ ਕਰਵਾਇਆ ਜਾਵੇਗਾ।

CO3:ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਪੰਜਾਬੀ ਸ਼ਬਦ ਰਚਨਾ ਤੋਂ ਜਾਣੂ ਕਰਵਾਇਆ ਜਾਵੇਗਾ।

CO4:ਸ਼ਬਦ ਸ਼੍ਰੇਣੀਆਂ ਨੂੰ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੀ ਅਮੀਰੀ ਦਾ ਅਤੇ ਬਾਰੀਕੀਆਂ ਨੂੰ ਸਮਝਣ ਲਈ ਵੱਖਰੇ -ਵੱਖਰੇ ਸਿਧਾਂਤਾਂ ਦਾ ਵਿਕਾਸ ਕਰਨਾ ਹੈ ।

CO5:ਮੁੱਢਲੀ ਪੰਜਾਬੀ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਦਾ ਸ਼ਬਦ ਘੇਰਾ ਵਿਸ਼ਾਲ ਕਰਨਾ ਹੈ ।

CO6:ਵਿਦਿਆਰਥੀ ਵਾਕ ਦੀ ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਇਸਦੀ ਬਣਤਰ ਤੋਂ ਜਾਣੂ ਹੋਣਗੇ ਅਤੇ ਭਾਸ਼ਾ ਤੇ ਪਕੜ ਮਜਬੂਤ ਹੋਵੇਗੀ।

CO7:ਪੈਰ੍ਹਾ ਰਚਨਾ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਦੀ ਬੁੱਧੀ ਨੂੰ ਤੀਖਣ ਕਰਦਿਆਂ ਉਨਾਂ ਦੀ ਲਿਖਣ ਪ੍ਰਤਿਭਾ ਨੂੰ ਉਜਾਗਰ ਕਰਨਾ ਹੈ ।

CO8: ਘਰੇਲੂ ਅਤੇ ਦਫ਼ਤਰੀ ਚਿੱਠੀ ਪੱਤਰ ਲਿਖਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਇਸ ਕਲਾ ਵਿਚ ਨਿਪੁੰਨ ਕਰਨਾ ਹੈ ।

CO9:ਮੁਹਾਵਰਿਆਂ ਦੀ ਵਰਤੋਂ ਨਾਲ ਗੱਲਬਾਤ ਵਿਚ ਪਰਪੱਕਤਾ ਆਉਂਦੀ ਹੈ।ਇਹ ਵਿਦਿਆਰਥੀਆਂ ਦੀ ਗੱਲਬਾਤ ਵਿਚ ਨਿਖਾਰ ਲਿਆਉਣ ਦਾ ਕੰਮ ਕਰਨਗੇ।

SESSION 2022-23

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BACHELOR OF SCIENCE (HONOURS) PHYSICS

SEMESTER–II

BASIC PUNJABI
In lieu of Punjabi (Compulsory)
COURSE CODE - BOPL-2031

smW: 3 GMty **Maximum Marks: 50**

Theory : 40
CA : 10

ਪਾਠਕ੍ਰਮ

ਯੂਨਿਟ-I

ਸ਼ਬਦ ਸ਼੍ਰੇਣੀਆਂ : ਪਛਾਣ ਅਤੇ ਵਰਤੋਂ (ਨਾਂਵ, ਪੜਨਾਂਵ, ਕਿਰਿਆ, ਵਿਸ਼ੇਸ਼ਣ, ਕਿਰਿਆ ਵਿਸ਼ੇਸ਼ਣ, ਸਬੰਧਕ, ਯੋਜਕ ਅਤੇ ਵਿਸਮਿਕ)

08 ਅੰਕ

ਯੂਨਿਟ-II

ਪੰਜਾਬੀਵਾਕਬਣਤਰ : ਮੁੱਢਲੀਜਾਣਪਛਾਣ

(ੳ) ਸਾਧਾਰਨਵਾਕ, ਸੰਯੁਕਤ ਵਾਕ ਅਤੇ ਮਿਸ਼ਰਤ ਵਾਕ (ਪਛਾਣ ਅਤੇ ਵਰਤੋਂ)

(ਅ) ਬਿਆਨੀਆ ਵਾਕ, ਪ੍ਰਸ਼ਨ ਵਾਚਕ ਵਾਕ ਅਤੇ ਹੁਕਮੀ ਵਾਕ (ਪਛਾਣ ਅਤੇ ਵਰਤੋਂ)

08 ਅੰਕ

ਯੂਨਿਟ-III

ਪੈਰ੍ਹਾ ਰਚਨਾ

ਅਖਾਣ (ਅਖਾਣਾਂ ਦੀ ਲਿਸਟ ਨਾਲ ਨੱਥੀ ਹੈ)

08 ਅੰਕ

ਯੂਨਿਟ-IV

ਚਿੱਠੀ ਪੱਤਰ (ਘਰੇਲੂ ਅਤੇ ਦਫ਼ਤਰੀ)

ਮੁਹਾਵਰੇ (ਮੁਹਾਵਰਿਆਂ ਦੀ ਲਿਸਟ ਨਾਲ ਨੱਥੀ ਹੈ)

08 ਅੰਕ

ਅੰਕ ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਚਾਰ ਸੈਕਸ਼ਨ ਹੋਣਗੇ। ਸੈਕਸ਼ਨ A-D ਤੱਕ ਦੇ ਪ੍ਰਸ਼ਨ ਯੂਨਿਟ I-IV ਵਿਚੋਂ ਪੁੱਛੇ ਜਾਣਗੇ। ਹਰ ਸੈਕਸ਼ਨ ਵਿਚ ਦੋ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।

2. ਵਿਦਿਆਰਥੀ ਨੇ ਕੁੱਲ ਪੰਜ ਪ੍ਰਸ਼ਨ ਕਰਨੇ ਹਨ। ਹਰ ਸੈਕਸ਼ਨ ਵਿਚੋਂ ਇਕ ਪ੍ਰਸ਼ਨ ਲਾਜ਼ਮੀ ਹੈ । ਪੰਜਵਾਂ ਪ੍ਰਸ਼ਨ ਕਿਸੇ ਵੀ ਸੈਕਸ਼ਨ ਵਿਚੋਂ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ।

3. ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ 08 ਅੰਕ ਹਨ।

4. ਪੇਪਰ ਸੈੱਟ ਕਰਨ ਵਾਲਾ ਜੇਕਰ ਚਾਹੇ ਤਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਵੱਧ ਤੋਂ ਵੱਧ ਚਾਰ ਉਪ ਪ੍ਰਸ਼ਨਾਂ

ਵਿਚ ਕਰ ਸਕਦਾ ਹੈ।

ਅਖਾਣ

ਉੱਦਮ ਅੱਗੇ ਲੱਛਮੀ ਪੱਖੇ ਅੱਗੇ ਪੌਣ ,ਉਹ ਦਿਨ ਡੁੱਬਾ ਜਦੋਂ ਘੋੜੀ ਚੜ੍ਹਿਆ ਕੁੱਬਾ ,ਉੱਚੀ ਦੁਕਾਨ ਫਿੱਕਾ ਪਕਵਾਨ ,ਉਲਟੀ ਵਾੜ ਖੇਤ ਨੂੰ ਖਾਏ ,ਉੱਚਾ ਲੰਮਾ ਗੱਭਰੂ ਪੱਲੇ ਠੀਕਰੀਆਂ ,ਅੱਖੀਂ ਵੇਖ ਕੇ ਮੱਖੀ ਨਹੀਂ ਨਿਗਲੀ ਜਾਂਦੀ ,ਅੰਦਰ ਹੋਵੇ ਸੱਚ ਤਾਂ ਕੋਠੇ ਚੜ੍ਹ ਕੇ ਨੱਚ ,ਆਪੇ ਮੈਂ ਰੱਜੀ ਪੁੱਜੀ ਆਪੇ ਮੇਰੇ ਬੱਚੇ ਜਿਉਣ ,ਆਪ ਕੁਚੱਜੀ ਵਿਹੜੇ ਨੂੰ ਦੋਸ਼ ,ਅੰਨ੍ਹਾ ਵੰਡੇ ਰਿਉੜੀਆਂ ਮੁੜ ਮੁੜ ਆਪਣਿਆਂ ਨੂੰ ,ਅਕਲ ਵੱਡੀ ਕੇ ਮੱਝ ,ਅੰਨ੍ਹਿਆਂ ਵਿੱਚ ਕਾਣਾ ਰਾਜਾ ,ਆਪਣੀ ਪੀੜ੍ਹੀ ਹੇਠ ਸੋਟਾ ਫੇਰਨਾ ,ਇਕ ਅਨਾਰ ਸੌ ਬਿਮਾਰ ,ਇਕ ਹੱਥ ਨਾਲ ਤਾੜੀ ਨਹੀਂ ਵੱਜਦੀ ,ਇੱਕ ਚੁੱਪ ਸੌ ਸੁੱਖ ਝੱਟ ਮੰਗਣੀ ਪੱਟ ਵਿਆਹ ,ਸਹਿਜ ਪੱਕੇ ਸੋ ਮੀਠਾ ਹੋਵੇ ਦਾਲ ਵਿੱਚ ਕਾਲਾ ਹੋਣਾ ਦਾਲ ਵਿੱਚ ਕਾਲਾ ਹੋਣਾ ,ਸੱਦੀ ਨਾ ਬੁਲਾਈ ਮੈਂ ਲਾੜੇ ਦੀ ਤਾਈਂ ,ਸਵੈ ਭਰੋਸਾ ਵੱਡਾ ਤੋਸਾ,ਸੌ ਦਿਨ ਚੋਰ ਦੇ ਇਕ ਦਿਨ ਸਾਧ ਦਾ ,ਸੱਪ ਦਾ ਬੱਚਾ ਸਪੋਲੀਆ ,ਸੱਪ ਮਰ ਜਾਵੇ ਲਾਠੀ ਵੀ ਨਾ ਟੁੱਟੇ ,ਸਾਈਆਂ ਕਿਤੇ ਵਧਾਈਆਂ ਕਿਤੇ ,ਹੰਕਾਰਿਆ ਸੋ ਮਾਰਿਆ ,ਹਾਥੀ ਲੰਘ ਗਿਆ ਪੂਛ ਰਹਿ ਗਈ ,ਕੁੱਛੜ ਕੁੜੀ ਸ਼ਹਿਰ ਢੰਡੋਰਾ ,ਕੋਲਿਆਂ ਦੀ ਦਲਾਲੀ ਵਿੱਚ ਮੂੰਹ ਕਾਲਾ ,ਕਰੇ ਕੋਈ ਭਰੇ ਕੋਈ ,ਕਰ ਮਜ਼ੂਰੀ ਤੇ ਖਾਹ ਚੂਰੀ ,ਖ਼ਵਾਜੇ ਦਾ ਗਵਾਹ ਡੱਡੂ ,ਖੇਤੀ ਖਸਮਾਂ ਸੇਤੀ ,ਖੂਹ ਪੁੱਟਦੇ ਨੂੰ ਖਾਤਾ ਤਿਆਰ ,ਘਰ ਦਾ ਭੇਤੀ ਲੰਕਾ ਢਾਹੇ ,ਘਰ ਦੀ ਕੁੱਕੜੀ ਦਾਲ ਬਰਾਬਰ ,ਚਿੰਤਾ ਚਿਖਾ ਬਰਾਬਰ , ਛੱਜ ਤਾਂ ਬੋਲੇ ਛਾਣਨੀ ਵੀ ਬੋਲੇ,ਛੋਟੀ ਮੂੰਹ ਵੱਡੀ ਗੱਲ ,ਜਾਂਦੇ ਚੋਰ ਦੀ ਲੰਗੋਟੀ ਹੀ ਸਹੀ ,ਜਿਸ ਦੀ ਕੋਠੀ ਦਾਣੇ ਉਹਦੇ ਕਮਲੇ ਵੀ ਸਿਆਣੇ ,ਜਿਹੜੇ ਗੱਜਦੇ ਨੇ ਉਹ ਵਰ੍ਹਦੇ ਨਹੀਂ ,ਜਾਤ ਦੀ ਕੋਹੜ ਕਿਰਲੀ ਸ਼ਤੀਰਾਂ ਨੂੰ ਜੱਫੇ ,ਝੱਟ ਮੰਗਣੀ ਪੱਟ ਵਿਆਹ ,ਦਾਲ ਵਿੱਚ ਕਾਲਾ ਹੋਣਾ ,ਦਾਣੇ ਦਾਣੇ ਤੇ ਮੋਰ ,ਨਾਲੇ ਚੋਰ ਨਾਲੇ ਚਤਰ ,ਪੇਟ ਨਾ ਪਈਆਂ ਰੋਟੀਆਂ ਸਭੇ ਗੱਲਾਂ ਖੋਟੀਆਂ ,ਬਿਨਾਂ ਰੋਇਆਂ ਮਾਂ ਵੀ ਦੁੱਧ ਨਹੀਂ ਦਿੰਦੀ ,ਬੁੱਢੀ ਘੋੜੀ ਲਾਲ ਲਗਾਮ ,ਭੱਜਦਿਆਂ ਨੂੰ ਵਾਹਣ ਇੱਕੋ ਜਿਹੇ ,ਭੱਜੀਆਂ ਬਾਹਾਂ ਗਲ ਨੂੰ ਆਉਂਦੀਆਂ ਨੇ ,ਰਾਹ ਪਿਆ ਜਾਣੀਏ ਜਾਂ ਵਾਹ ਪਿਆ ਜਾਣੀਏ ,ਰਾਈ ਦਾ ਪਹਾੜ ਬਣਾਉਣਾ ,ਰੱਸੀ ਸੜ ਗਈ ਵੱਟ ਨ੍ਹੀਂ ਗਿਆ

ਮੁਹਾਵਰੇ

ਉਸਤਾਦੀ ਕਰਨੀ, ਉਂਗਲ ਕਰਨੀ, ਉੱਲੂ ਬਣਾਉਣਾ ,ਉੱਚਾ ਸਾਹ ਨਾ ਕੱਢਣਾ, ਉੱਡਦੇ ਫਿਰਨਾ ,ਉੱਘ ਸੁੱਘ ਮਿਲਣੀ,ਅੱਖਾਂ ਵਿਚ ਰੜਕਣਾ ,ਅੱਗ ਲਾਉਣਾ ,ਆਵਾ ਊਤ ਜਾਣਾ ,ਅਸਮਾਨ ਨੂੰ ਟਾਕੀਆਂ ਲਾਉਣਾ, ਅੱਖਾਂ ਵਿੱਚ ਲਾਲੀ ਉਤਰਨੀ ,ਅਕਲ ਤੇ ਪਰਦਾ ਪੈਣਾ, ਈਨ ਮੰਨਣੀ, ਈਦ ਦਾ ਚੰਨ ਹੋਣਾ, ਇੱਟ ਨਾਲ ਇੱਟ ਖੜਕਾਉਣ,ਸਿਰ ਫਿਰਨਾ, ਸਿਰ ਤੇ ਚੜ੍ਹਨਾ ,ਸਬਰ ਦਾ ਘੁੱਟ ਭਰਨਾ, ਸਿਰ ਪੈਰ ਨਾ ਹੋਣਾ, ਹੱਥ ਧੋ ਕੇ ਪਿੱਛੇ ਪੈਣਾ, ਹੱਥੀਂ ਛਾਂਵਾਂ ਕਰਨੀਆਂ, ਹੱਡ ਭੰਨਣੇ, ਹੱਥ ਤੰਗ ਹੋਣਾ ,ਹੱਥ ਮਲਣਾ,ਹੱਥ ਪੈਰ ਮਾਰਨਾ,ਕੰਨੀਂ ਕਤਰਾਉਣਾ, ਕੰਨ ਤੇ ਜੂੰ ਨਾ ਸਰਕਣਾ, ਕੰਨ ਘੇਸਲ ਮਾਰਨੀ, ਖ਼ਾਨਾ ਖ਼ਰਾਬ ਹੋਣਾ, ਖਾਨਿਓ ਜਾਣਾ, ਗੁੱਡੀ ਚੜ੍ਹਨੀ, ਗਲ ਪੈਣਾ ,ਗੰਗਾ ਨਹਾਉਣਾ ,ਚੜ੍ਹ ਮੱਚਣੀ, ਚੰਦ ਚਾੜ੍ਹਨਾ, ਚਾਦਰ ਵੇਖ ਕੇ ਪੈਰ ਪਸਾਰਨਾ ,ਚਕਮਾ ਦੇਣਾ ,ਛੱਕੇ ਛੜਾਉਣਾ ,ਛਾਪਾ ਮਾਰਨਾ, ਛਿੱਲ ਲਾਉਣੀ ,ਛਿੱਕੇ ਟੰਗਣਾ, ਜਾਨ ਤੇ ਖੇਡਣਾ, ਜ਼ੁਬਾਨ ਕਰਨੀ, ਜਾਨ ਮਾਰਨਾ, ਜੰਗਲ ਵਿੱਚ ਮੰਗਲ ਹੋਣਾ, ਝੋਲੀ ਚੁੱਕਣਾ, ਝੱਟ ਟਪਾਉਣਾ, ਟੱਸ ਤੋਂ ਮੱਸ ਨਾ ਹੋਣਾ, ਟੰਗ ਅੜਾਉਣੀ, ਟਰ ਟਰ ਕਰਨਾ, ਟੇਢੀ ਖੀਰ, ਟਕੇ ਵਰਗਾ ਜਵਾਬ ਦੇਣਾ, ਠੰਡੇ ਸਾਹ ਭਰਨਾ, ਠੂੰਗਾ ਮਾਰਨਾ, ਠੂਠਾ ਫੜਨਾ, ਠਣ ਠਣ ਗੋਪਾਲ, ਡਕਾਰ ਜਾਣਾ, ਡੁੱਬ ਮਰਨਾ, ਡੰਡੇ ਵਜਾਉਣਾ, ਢਿੱਡ ਵਿੱਚ ਰੱਖਣਾ, ਢਿੱਡ ਵਿੱਚ ਚੂਹੇ ਨੱਚਣਾ, ਢਿੱਡੀਂ ਪੀੜਾਂ ਪੈਣੀਆਂ, ਢੇਰੀ ਢਾਹੁਣਾ, ਤੱਤੀ ਵਾ ਨਾ ਲੱਗਣੀ, ਤਰਲੇ ਲੈਣਾ, ਤੀਲੀ ਲਾਉਣੀ, ਤਾਰੇ ਤੋੜਨਾ, ਤਾੜੀ ਲਾਉਣੀ,ਥੁੱਕੀਂ ਵੜੇ ਪਕਾਉਣਾ, ਥਰ ਥਰ ਕੰਬਣਾ, ਦਮ ਲੈਣਾ, ਦਿਲ ਖੱਟਾ ਹੋਣਾ, ਦੰਦ

ਖੱਟੇ ਕਰਨੇ, ਦੀਵਾ ਗੁੱਲ ਕਰਨਾ, ਧੁੱਪ ਵਿੱਚ ਵਾਲ ਚਿੱਟੇ ਹੋਣਾ, ਧਰਮ ਨਿਭਾਉਣਾ, ਧੱਕਾ ਲੱਗਣਾ, ਧਰਨਾ ਮਾਰਨਾ, ਧੁੰਮਾਂ ਪੈ ਜਾਣੀਆਂ, ਧੱਜੀਆਂ ਉਡਾਉਣੀਆਂ, ਨਹੁੰ ਮਾਸ ਦਾ ਰਿਸ਼ਤਾ, ਨੱਕ ਚਾੜ੍ਹਨਾ, ਨੱਕ ਰੱਖਣਾ, ਨੱਕ ਉੱਤੇ ਮੱਖੀ ਨਾ ਬਹਿਣ ਦੇਣਾ, ਨਜ਼ਰ ਸਵੱਲੀ ਹੋਣੀ, ਪੱਟੀ ਪੜ੍ਹਾਉਣੀ, ਪਾਰਾ ਚੜ੍ਹ ਜਾਣਾ, ਪੈਰ ਜ਼ਮੀਨ ਤੇ ਨਾ ਲੱਗਣਾ, ਪੈਰਾਂ ਹੇਠੋਂ ਜ਼ਮੀਨ ਨਿਕਲਣਾ, ਪਾਣੀ ਸਿਰੋਂ ਲੰਘਣਾ, ਪੁੱਠੀਆਂ ਛਾਲਾਂ ਮਾਰਨੀਆਂ, ਪੈਰਾਂ ਤੇ ਪਾਣੀ ਨਾ ਪੈਣ ਦੇਣਾ, ਫੁੱਲਾਂ ਵਾਂਗ ਰੱਖਣਾ, ਫੁੱਲੇ ਨਾ ਸਮਾਉਣਾ, ਫਸਲੀ ਬਟੇਰਾਂ ਹੋਣਾ, ਫੂਕਾਂ ਨਾਲ ਉਡਾ ਦੇਣਾ, ਬਾਜ਼ੀ ਲੈ ਜਾਣਾ, ਬੇੜਾ ਗਰਕ ਹੋਣਾ, ਬੇੜਾ ਪਾਰ ਕਰਨਾ, ਬੀੜਾ ਚੁੱਕਣਾ, ਬੇੜੀਆਂ ਵਿੱਚ ਵੱਟੇ ਪਾਉਣਾ, ਬੀਜ ਨਾਸ਼ ਕਰਨਾ, ਭਾਰ ਸਿਰੋਂ ਲਾਹੁਣਾ, ਭੁੱਖ ਲਹਿ ਜਾਣੀ, ਭੁੱਖੇ ਸ਼ੇਰ ਵਾਂਗ ਪੈਣਾ, ਭੂਤ ਸਵਾਰ ਹੋਣਾ, ਭੰਗ ਭੁੱਜਣੀ, ਮੱਖੀਆਂ ਮਾਰਨੀਆਂ, ਮਰ੍ਹੂੰ ਮਰ੍ਹੂੰ ਕਰਦੇ ਰਹਿਣਾ, ਮਾਤ ਪਾ ਦੇਣਾ, ਮਾਰੋਮਾਰ ਕਰਨੀ, ਮਿਰਚ ਮਸਾਲਾ ਲਾਉਣਾ, ਮਿਰਚਾਂ ਲੱਗਣੀਆਂ, ਮੂੰਹ ਦੀ ਖਾਣਾ, ਮੋਰਚਾ ਮਾਰਨਾ, ਮਿੱਟੀ ਖਰਾਬ ਕਰਨੀ, ਯੱਬਲੀਆਂ ਮਾਰਨੀਆਂ, ਰਚ ਮਿਚ ਜਾਣਾ, ਰਾਈ ਦਾ ਪਹਾੜ ਬਣਾਉਣਾ, ਰਾਤ ਦਿਨ ਇੱਕ ਕਰਨਾ, ਰਾਹ ਦਾ ਰੋੜਾ ਬਣਨਾ, ਰੰਗ ਬਦਲਣਾ, ਰੰਗ ਵਿੱਚ ਭੰਗ ਪਾਉਣਾ, ਲਹੂ ਨਾਲ ਹੱਥ ਰੰਗਣਾ, ਲਹੂ ਦੇ ਘੁੱਟ ਭਰਨਾ, ਲੱਕ ਟੁੱਟ ਜਾਣਾ, ਲਾਹ ਪਾਹ ਕਰਨੀ, ਲਾਲ ਪੀਲਾ ਹੋਣਾ, ਲੂਣ ਹਰਾਮ ਕਰਨਾ, ਵੱਡ ਵੱਡ ਖਾਣਾ।

(Semester-II)
Session 2022-23
Course Title: Punjab History and Culture (C. 320 to 1000 B.C.)
(Special paper in lieu of Punjabi Compulsory)
(For those students who are not domicile of Punjab)

Course Code: BOPL-2431

COURSE OUTCOMES

After completing Semester II and course on Ancient History of Punjab, students of History will be able to identify and have a complete grasp on the sources & writings of Ancient History of Punjab

CO 1: Analyse the emergence of Mauryan, Gupta empires during the classical age in India

CO 2: To understand the various factors leading to rise and fall of empires and emergence of new dynasties and their Culture, society, administration , polity and religion specifically of Kushans and Vardhanas in the Punjab

CO 3: Students will be adept in constructing original historical argument based on primary source material research

CO 4: To have an insight on the existing Literature of this period and understand the past developments in the light of present scenario.

CO 5: To enable students to have thorough insight into the various forms/styles of Architecture and synthesis of Indo - Muslim Art and Architecture in Punjab

Bachelor of Science (Honours) Physics

(Semester-II)

Session 2022-23

Course Title: Punjab History and Culture (C. 320 to 1000 B.C.)

(Special paper in lieu of Punjabi Compulsory)

(For those students who are not domicile of Punjab)

Course Code **BOPL-2431** **Examination Time: 3 Hours**

Max. Marks: 50 **Theory: 40**

CA: 10

Instructions for the Paper Setter:

1.Question paper shall consist of four Units

2.Examiner shall set 8 questions in all by selecting Two Questions of equal marks from each Unit.

3.Candidates shall attempt 5 questions in 600 words, by at least selecting One Question from each Unit and the 5th question may be attempted from any of the four Units.

4.Each question will carry 8 marks

Unit-I

1. Alexander's Invasion's and Impact
2. Administration of Chandragupta Maurya and Ashoka.

Unit-II

3. The Kushans: Gandhar School of Art .
4. Gupta Empire: Golden period (Science , Art and Literature)

Unit-III

5. The Punjab under the Harshvardhana
6. Socio-cultural History of Punjab from 7th to 1000 A.D.

UNIT IV

7. Development of Languages and Education with Special reference to Taxila
8. Development to Art and Architecture

Suggested Readings

1. L. M Joshi (ed), *History and Culture of the Punjab*, Art-I, Punjabi University, Patiala, 1989 (3rd edition)
2. L.M. Joshi and Fauja Singh (ed.), *History of Punjab* , Vol.I, Punjabi University, Patiala, 1977.
3. Budha Parkash, *Glimpses of Ancient Punjab*, Patiala, 1983.
4. B.N. Sharma: *Life in Northern India*, Delhi. 1966.

Session 2022-23

COMMUNICATION SKILLS IN ENGLISH

Course Code:

BOPM -2102

COURSE OUTCOMES

At the end of this course, the students will develop the following skills:

CO 1: Enhancement of listening skills with the help of listening exercises based on conversation, news and TV reports

CO 2: The ability of Note-Taking to be able to distinguish the main points from the supporting details and the irrelevant information from the relevant one using Listening Skills

CO 3: Acquisition of knowledge of phonetics which will help them in learning about correct pronunciation as well as effective speaking

CO 4: Speaking skills of the students enabling them to take active part in group discussion and present their own ideas

Session 2022-23

COMMUNICATION SKILLS IN ENGLISH

Course Code:

BOPM -2102

Time: 3 hours (Theory)

3 hours (Practical)

Max. Marks: 50

Theory: 25

Practical: 15

Continuous Assessment: 10

Instructions for the paper setters and distribution of marks:

The question paper will consist of four sections and distribution of marks will be as under:

Section-A: Two questions of theoretical nature will be set from Unit I of the syllabus and the candidates will have to attempt one carrying 5 marks.

Section-B: Two questions will be set from Unit II of the syllabus. Candidates will have to attempt one carrying 5 marks.

Section-C: Two questions will be set from Unit III of the syllabus. Candidates will have to attempt one carrying 5 marks.

Section-D: Two questions will be set from Unit IV of the syllabus. Candidates will have to attempt one carrying 5 marks.

Important Note:

The candidate will have to attempt five questions in all selecting one from each section of the question paper and the fifth question from any of the four sections.

(5 x 5 = 25)

Course Contents:

Unit I

Listening Skills: Barriers to listening; effective listening skills; feedback skills.

Activities: Listening exercises – Listening to conversation, News and TV reports

Unit II

Attending telephone calls; note taking and note making

Activities: Taking notes on a speech/lecture

Unit III

Speaking and Conversational Skills: Components of a meaningful and easy conversation, understanding the cue and making appropriate responses, forms of polite speech, asking and providing information on general topics

Activities: 1) Making conversation and taking turns

2) Oral description or explanation of a common object, situation or concept

Unit IV

The study of sounds of English, stress

Situation based

Conversation in English Essentials of Spoken English

Activities: Giving Interviews

Recommended Books:

1. *Oxford Guide to Effective Writing and Speaking* by John Seely.
2. *Business Communication* by Sethi, A and Adhikari, B., McGraw Hill Education 2009.
3. *Communication Skills* by Raman, M. & S. Sharma, OUP, New Delhi, India (2011).
4. *A Course in Phonetics and Spoken English* by J. Sethi and P.V. Dhamija, Phi Learning.

BACHELOR OF SCIENCE (HONOURS) PHYSICS (**SESSION 2022-23**)

Semester II

Course Outcome of ELECTRICITY and MAGNETISM-II

Course No. BOPL-2393

After passing this course, students will be able to:

CO1: understand source of magnetic field and application of Biot Savart's Law and Ampere's circuital law in different situations.

CO2: understand different type of magnetic materials and their characteristics.

CO3: understand the Faraday's Law of electromagnetic induction and LCR circuits.

CO4: derive Maxwell equations and their applications in propagation of e.m. waves in conductors and insulators.

BACHELOR OF SCIENCE (HONOURS) PHYSICS (**SESSION 2022-23**)
SEMESTER-II

COURSE CODE: BOPL-2393

ELECTRICITY AND MAGNETISM-II

Maximum Marks: 75 (External 60 + Internal 15) **Examination Time: 3 Hours**
Pass Marks: 21 **Total Teaching hours: 60**

Instructions for the Paper Setters:

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section. All questions carry 12 marks.

Note: Students can use Non-Scientific calculators or logarithmic tables.

Unit-I

Magnetostatics : Magnetic fields, magnetic forces, magnetic force on a current carrying wire. Torque on a current loop, Biot-Savart law. Magnetic Field due to infinite wire carrying steady current, field of rings and coils. Magnetic field due to a solenoid, Force on parallel current carrying wires. Ampere's circuital law and its applications to infinite hollow cylinder, solenoid and toroid. The divergence and curl of magnetic induction, Comparison of magnetostatics and electrostatics. Magnetic vector potential and its expression. Surface current density and Change in magnetic field at a current sheet.

Unit-II

Magnetic Fields in Matter: Some important terms associated with magnetic materials, Field of a current loop, force on magnetic dipole in a an external field, torque on current loop, potential energy of magnetic dipole, Electric currents in atoms, electron spin and magnetic moment, free and bound currents, magnetization and magnetic susceptibility, Magnetic field caused by magnetized matter,. Basics about diamagnetism paramagnetism and ferromagnetism, hysteresis curve.

Unit-III

Faraday's law and Maxwell's equations: Electromagnetic Induction, Faraday's Induction Experiments, Faraday's Laws of Electromagnetic Induction (Integral and Differential Forms), Lenz's law, Self-Induction, Expression for Self Induction : Self-Inductance of a Solenoid and a Toroidal, Energy Stored in an Inductor, Mutual Induction, Expression for Coefficient of Mutual Induction and Reciprocity theorem (Neumann's Formula,), Mutual Inductance of two Solenoids, Introduction to Coupling coefficient, Series and Parallel LCR Circuits, Average Power Associated with LCR Circuit, Modification of Ampere's Law and the Displacement Current, Maxwell's Equation of Electromagnetism,

Unit-IV

Plane Electromagnetic Waves: Production of em waves, EM wave spectrum, EM wave equation for a medium having finite μ and ε but $\sigma = 0$, Nature of em waves, Wave equation for polarized em waves and their solutions, Relation between electric and magnetic field vectors an em wave, Impedance of a dielectric to em waves, The Poynting vector and flow of energy in an em wave, Equation of continuity, EM waves for a medium having finite values of μ and ε but $\sigma \neq 0$, Solution of wave equation for a

conducting medium, Skin depth, EM wave velocity and wave dispersion in a conductor, Behaviour of a medium as a conductor or dielectric, Characteristic impedance of a conducting medium to em waves, magnetic and electric energy densities, Poynting vector and Equation of Continuity for a Conducting medium, Reflection and transmission of em waves at the boundary (Normal incidence).

Text and Reference Books:

1. Introduction to Electrodynamics by David J. Griffiths, Pearson Prentice Hall of India

2. Electricity & Magnetism, Berkeley Physics Course Vol. 2 by E.M.Purcell, McGraw Hill, NewYork

BACHELOR OF SCIENCE (HONOURS) PHYSICS (**SESSION 2022-23**)
Semester II

Course Outcomes: Vibrations and Waves

Course No. BOPL-2394

After passing this course the student will be able to:

CO1: demonstrate Lissajous figures by mechanical and analytical method with different cases.

CO2: understand Free, damped and resonance oscillations, both mechanical and electric using differential equations.

CO3: solve differential equation of forced oscillations & to obtain related quantities.

CO4: understand concept of coupled oscillators and wave motion. Student will also be able to apply the concept of waves and oscillations to any type of waves like e. m. waves, mechanical waves , longitudinal waves

BACHELOR OF SCIENCE (HONOURS) PHYSICS (**SESSION 2022-23**)
SEMESTER-II

COURSE CODE: BOPL-2394

VIBRATIONS AND WAVES

Maximum Marks: 75 (External 60 + Internal 15) **Examination Time: 3 Hours**
Pass Marks: 21 **Total Teaching hours: 60**

Instructions for the Paper Setters:

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section. All questions carry 12 marks.

Note: Students can use Non-Scientific calculators or logarithmic tables.

Unit-I

Simple and Damped Oscillations: Simple Harmonic Motion, energy of SHO, Compound pendulum, Torsional pendulum, Equation of SHM, Superposition of two perpendicular SHM, Lissajous figures–superposition of SHM's. Damped motion of mechanical and electrical oscillator, heavy damping, critical damping. Energy dissipation and energy of damped oscillator, amplitude decay, logarithmic decrement, relaxation time, Q value, comparison between Free and Damped oscillations

Unit-II

Forced Oscillations: Differential equation of forced mechanical oscillator**,** Transient and steady state behaviour of a forced oscillator, Variation of displacement and velocity with frequency of driving force, frequency dependence of phase angle between force and (a)displacement, (b) velocity, Power supplied to oscillator by driving force and its variation with driving force frequency, Resonance absorption and Q-value as a measure of power absorption bandwidth, Q-value as amplification factor, Forced electrical oscillator, Variation of current with frequency, Variation of power supplied with frequency of applied voltage, Q factor as amplification factor.

Unit-III

Coupled Oscillations: Stiffness coupled oscillators, In phase and Out phase modes, normal co-ordinates and normal modes of vibration, solutions for differential equations for normal modes and exchange of energy, inductance coupling of electrical oscillators, loose, intermediate and strong coupling, energy exchange between two electrically coupled oscillators.

Unit-IV

Wave Motion: Types of wave motion**,** The wave equation, transverse waves on a string, the string as a forced oscillator, characteristic impedance of a string, reflection and transmission of transverse waves on a string at a boundary, Energy of a progressive wave, impedance matching, standing waves on a string of fixed length, Energy of a vibrating string, normal modes and eigen frequencies. Energy in a normal mode of oscillation, wave groups, group velocity, dispersive and non-dispersive media, longitudinal waves in solids – wave equation, and its solution.

Reference Books:

1. The Physics of Vibrations and Waves by H.J. Pain, John Wiley, Chichester

2. Vibrations and Waves in Physics by I.G. Main-Cambridge University, Cambridge

Bachelor of Science (Honours) Physics
Semester-II
Session: 2022-23
Course Title: Mathematics-II
Course code: BOPL-2335
Course outcomes

After the completion of this course, students should be able to

CO 1: Manage to solve problems related to series solution of Bessel, Legendre and Hermite functions.

CO 2: Understand the concept of Partial differential equations& its applications to find the solution of Laplace, Wave & Diffusions equations.

CO 3: Apply Laplace transforms on periodic functions and differential equations with constant coefficients.

CO 4: Differentiate between Fourier Sine & Cosine series and Fourier Sine & Cosine transforms.

Bachelor of Science (Honours) Physics
Semester-II
Session: 2022-23
Course Title: Mathematics-II
Course code: BOPL-2335

Examination Time: 3 Hours **Max.Marks:50**
Theory:40
CA:10

Instructions for the Paper Setters:

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

UNIT –I

Second order Differential Equations: Linear differential equations with variable coefficients. Series Solution of Bessel, Legendre, Hermite, Laguerre and Hypergeometric differential equations by Frobenius method. Recurrence relations and orthogonality properties.

UNIT –II

Partial Differential Equations: Definition and formation of first and second order partial differential equations, Laplace, Wave and diffusion equation in one and two dimensions, Solutions of these equations by separation of variables.

UNIT –III

Laplace Transforms: Definition, elementary Laplace transforms, transforms of derivatives, integration of transforms, Laplace transform of periodic functions, solution of differential equations with constant coefficients using Laplace transforms.

UNIT –IV

Fourier series and Transforms: Periodic functions, Drichlet's conditions, Fourier coefficients, Sine and Cosine series, half range expansions, exponential series, differentiation and integration of Fourier transform, Fourier Sine and Cosine transforms, Inversion formulae, Fourier transforms of derivatives.

Text Book:

G. Arfken and Weber, Mathematical Methods for Physicists, Academic Press, New York, Sixth edition, 2009

Reference Books:

1. M. Vygodsky, Mathematical Hand Book, CBS Publishers, second revised edition, 1987.
2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, Delhi, forty fourth edition, 2019
3. Pipes and Harvill, Applied Mathematics for Engineers and Physicists, McGraw Hill, London, third edition, 1970
4. Sokolnikoff and Recheffer, Mathematics of Physics and Modern Engineering, McGraw Hill, New York, 1966

Bachelor of Science (Honours) Physics
(Semester II)
Session: 2022-25
COURSE CODE: BOPL-2086
COURSE TITLE: Chemistry-II

Course outcomes:

Students will be able to

CO1: understand the key features of coordination compounds viz. variety of structures, oxidation numbers and electronic configurations, coordination numbers and explain the bonding and stability of complexes. Describe the shapes and structures of coordination complexes with coordination numbers ranging from 4 to 12. Describe the stability of metal complexes by the use of formation constants.

CO2: Understand the splitting of d-orbitals in octahedral, tetrahedral, cubic and square planar fields of ligands. Calculate C.F.S.E. of high spin and low spin octahedral and high spin tetrahedral complexes. Explain thermodynamic effects of crystal field splitting and determine microstate and ground state terms.

CO3: Draw MOEL diagram for octahedral and tetrahedral complexes. Explain bonding in polynuclear metal carbonyls and counting of electrons in carbonyl clusters

CO4: Describe the effect of macrocyclic ligands on anion and cation complex structure.

Bachelor of Science (Honours) Physics
(Semester II)

Session: 2022-25
Course Code: BOPL-2086
COURSE TITLE: Chemistry-II

Examination Time: 3 Hours **Max. Marks: 50**
(Theory: 40, CA: 10)

Instructions for the Paper Setters:
Eight questions of equal marks (eight marks each) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.
Note: Students can use Non-Scientific calculators or logarithmic tables.

UNIT- I

Co-ordination Chemistry: Introduction, Werner's coordination theory, naming of co-ordinate complexes. Co-ordination numbers 1-12 and their stereo-chemistries. Factors affecting co-ordination numbers and stereo-chemistry
(a) Configurational Isomers
(b) Conformational isomerism, VSPER theory, molecular orbital theory applied to homoneuclear diatomic molecules and heteronuclear Diatomic molecules.

Bonding in metal complexes: Valence bond theory for co-ordinate complexes, inner and outer orbital complexes, Electro-neutrality and back bonding, limitations of V.B. theory.
Stability of coordination compounds: Introduction, Stability constant, stepwise stability constant, overall stability constant. Factors affecting the stability of metal ion complexes with general ligands, HSAB principle.

UNIT-II

Crystal field theory: Splitting of d-orbitals in octahedral, tetrahedral fields of ligands. Calculation of C.F.S.E. in high spin and low spin octahedral and High spin tetrahedral complexes, factors affecting the 10 Dq Value. Structural effects of crystal field splitting (Jahn-Teller distortion, variation of Ionic radii with increase in atomic number). Thermodynamics effects of C.F. splitting, variation in lattice energies, Hydration energies, Dissociation energies, Formation constants of 71 hexammines. Site selection in spinels, Paramagnetism, diamagnetism, ferro and anti ferromagnetism. Microstates and spectroscopic terms, a calculation of spectroscopic terms for d1 electronic configurations, L S coupling, Hund‟s rule for finding the ground state terms, Electronic spectral properties of Ist transition series, limitations of C.F.T.

UNIT-III

Molecular Orbital Theory: Evidence for covalent character in Bonding, MOEL diagram for octahedral and tetrahedral complexes involving bonding, charge transfer transitions.
πAcid Ligands: Definition Carbon monoxide complexes, bonding in linear MCO groups. polynuclear metal carbonyls, carbonyl hydrides and halides. Metal-metal bonding metal-metal multiple bonding, isolable analogies, Structure of high nuclearity carbonyl clusters, counting of electrons in carbonyl clusters.

UNIT-IV

Alkali metal and alkaline earth metal chelators: Macrocyclic ligands, macrocyclic effect, crown ethers and podands, coronands, cryptands, structure of 18 crown-6 complex with KNCS, ion cavity complex, effect of anion and cation type on complex structure, simultaneous complexation of metal ion and water or of two metal ions, sandwich formation, cryptands and their cation complexes, podands with aromatic donors and groups.

Books Recommended:

1. J.E. Huheey, Inorganic Chemistry, 3rd Ed.

2. F.A. Cotton and G. Wilkinson, Advanced Inorganic Chemistry.

3. B.E. Douglas and D.H. McDaniel, Concepts and Models of Inorganic Chemistry.

5. R. Hilgenfeld and W. Saengar, Topics in current chemistry Vol-II.

BACHELOR OF SCIENCE (HONOURS) PHYSICS (**SESSION 2022-23**)

PHYSICS LAB-II

Course No. BOPP-2397

COURSE OUTCOMES

CO1: Students will be able to study resonance in series & parallel LCR circuit.

CO2: At the end of this course, students will be able to find the value of capacitor, coefficient of self-inductance, permeability & permittivity of air.

CO3: Students will be able to study the variation of magnetic field on the axis of coil & can find the value of horizontal component of magnetic field.

CO4: Students will be able to verify various concepts related to oscillations of various pendulums and laws of vibrations of strings.

BACHELOR OF SCIENCE (HONOURS) PHYSICS (SESSION 2022-23)
SEMESTER-II

COURSE CODE: BOPP-2397

PHYSICS LAB-II

Maximum Marks: 50 (External 40 + Internal 10) **Examination Time: 3 Hours**
Pass Marks: 35% **Total Teaching hours: 90**

General Guidelines for Practical Examination

I. The distribution of marks is as follows:

i) One experiment 20 Marks **ii) Brief Theory 6 Marks**

iii) Viva–Voce 7 Marks **iv) Record (Practical file) 7 Marks**

II. There will be one sessions of 3 hours duration. The paper will have one session and will consist of 8 experiments out of which an examinee will mark 6 experiments and one of these is to be allotted by the external examiner.

III. Number of candidates in a group for practical examination should not exceed 12.

IV. In a single group no experiment be allotted to more than three examinee in any group.

1. To study the magnetic field produced by a current carrying solenoid using a search coil and calculate permeability of air.
2. To study the induced e.m.f. as a function of the velocity of the magnet.
3. To study the phase relationships using impedance triangle for LCR circuit and calculate impedance.
4. Resonance in a series and parallel LCR circuits for different R–value and calculate Q–value.
5. To determine low resistance with Carey-Foster's Bridge.
6. To measure the self-inductance L of a given coil by Anderson Bridge method.
7. To find the value of BH, the horizontal component of ear using a deflection & vibration magnetometer.
8. To study the variation of magnetic field with distance along the axis of coil carrying current by plotting a graph.
9. To plot a graph between the distance of the knife edge from the centre of gravity and the time period of a compound pendulum from graph find (a) acceleration due to gravity, (b) the radius of gyration and moment of inertia about an axis passing through centre of gravity.
10. To determine the acceleration due to gravity by Kater's Pendulum.
11. To verify the laws of vibrating string by using Meldes apparatus and to show that $/2\lambda$ is constant.
12. To measure logarithmic decrement, coefficient of damping, relaxation time and quality factor of a damped simple pendulum.

Reference Books:

1. Practical Physics by C.L. Arora, S. Chand & Co.

Bachelor of Science (Honours) Physics
(Semester II)
Session: 2022-25
COURSE CODE: BOPP-2088
COURSE TITLE: Chemistry Lab-II (Practical)

Course outcomes:

Students will be able to

CO1: separate and identify the various ions present in the mixture.

CO2: detect and remove interfering radicals present in the mixture.

CO3: understand the principle of inorganic qualitative analysis.

C04: separate, identify and confirm the various cations present in the mixture.

Bachelor of Science (Honours) Physics
(Semester II)
Session: 2022-25
COURSE CODE: BOPP-2088
COURSE TITLE: Chemistry Lab-II (Practical)

Examination Time: 3 Hours **Max. Marks: 50**
Practical: 40, CA: 10

Instruction for practical examiner: Question paper is to be set on the spot jointly by the Internal and External Examiners.Two copies of the same should be submitted for the record to COE Office,Kanya Maha Vidyalaya,Jalandhar.

Qualitative Analysis
Identification of cations and anions in a mixture which may contain combinations of acid ions. These must contain interfering acid anions.

a) Special Tests for Mixture of anions
I. Carbonate in the presence of sulphate.
II. Nitrate in the presence of nitrite
III. Nitrate in the presence of bromide and iodide.
IV. Chloride in the presence of bromide and iodide.
V. Chloride in the presence of bromide.
VI. Chloride in the presence of iodide.
VII. Bromide and iodide in the presence of each other and of chloride.
VIII. Sulphide, sulphite, thiosulphate and sulphate in the presence of each other.
IX. Borate in the presence of copper and barium salts

b) Separation and identification of cations in mixtures
i) Separation of cations in groups.
ii) Separation and identification of Group I, Group II ,Group III, Group IV, Group V and Group VI cations.

Reference Books:
1. G. Svehla, and B. Sivasankar, Vogel's Qualitative Inorganic Analysis (revised), Pearson
2. R. C. Bassett, G. H. Denney,and J. Jeffery, Mendham, Vogel's Textbook of Quantitative Inorganic Analysis (revised).
3. Vogel's book on Inorganic Qualitative Analysis.

BACHELOR OF SCIENCE (COMPUTER SCIENCE)

Bachelor of Science (Honours) Physics
Session: 2022-25
SEMESTER-II
Course title: Moral Education
Course duration: 30 hours
Course code: SECM-2502

Course Objectives:

- To sensitize students about the role and importance of human values and ethics in personal, social and professional life.
- To enable students to understand and appreciate ethical concerns relevant to modern lives.
- To prepare a foundation for appearing in various competitive examinations.
- To sensitize the students about the current issues and events of national and international importance.
- To highlight plausible implications of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with nature.

Course Contents:

- Introduction to Moral Education
- Need , content and purpose
- Vedic values
- Character building

The Self and You

- Understanding the Self –Self awareness, fighting the five evils (lust, anger, attachment, ego and greed), Self growth.
- Personal ethics
- Aspiration v/s ambition, self- seeking v/s selflessness
- Physical and mental health

The Family and You

- Importance of family- the basic unit of human interaction.
- Generation gap
- Relationship with siblings and elders

The Society and You

- Social responsibility
- Our rights and duties
- Civic sense
- Opposite sex relations
- Globalization and IT boom – cellphone menace
- Peer pressure
- Gender issues

The Nation and You

- International peace and brotherhood
- Saving the environment
- Communal harmony, Tolerance, Understanding of Cultures
- Respect for Martyrs
- National Pride

SEMESTER -III

BACHELOR OF SCIENCE (HONOURS) PHYSICS (SESSION 2022-23)
SEMESTER-III

OPTICS

Course Code: BOPL-3391

Course Outcome of Optics

After passing this programme the students will be able to:

CO1: understand the concept of interference of waves by division of wave front and its different methods and concept of coherence.

CO2: understand the interference of waves by division of Amplitude and its methods and will have knowledge of interferometers

CO3: understand the Huygen's Fresnel theory and diffraction, Fraunhoffer diffraction due to single slit, double slit and n slits, the concept of resolving power.

CO4: understand the concept the polarization of light and types of polarisers.

BACHELOR OF SCIENCE (HONOURS) PHYSICS (SESSION 2022-23)
SEMESTER-III

OPTICS

Course Code: BOPL-3391

Maximum Marks: 75 (External 60 + Internal 15) **Examination Time: 3 Hours**
Passing Marks : 21 **Total Teaching hours: 60**

Instructions for the Paper Setters:

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section. All questions carry 12 marks.

Note: Students can use Non-Scientific calculators or logarithmic tables.

UNIT–I

Interference of Light: Superposition of light waves and interference, young's double slit experiment, Distribution of intensity in young's double slit experiment, Conditions for sustained interference pattern, Coherent sources of light, Temporal and spatial coherence, Mathematical analysis of temporal coherence, Interference pattern by division of wave front, Theory of interference fringes Fresnel Biprism, thickness of thin transparent sheet Fresnel double mirror, Llyod's single mirror, Displacement of fringes,.

UNIT–II

Interference by Division of Amplitude: Change of phase on reflection, Interference in thin films due to reflected and transmitted light, colour of thin film, Need for extended source for interference by division of amplitude, Fringes of equal inclination and equal. Thickness non reflecting films, Newton's Rings and their application, Michelson Interferometer and their application, Fabry Perot interferometer and etalon. Distribution of intensity in Fabry Perot fringes. Anti reflection coatings

UNIT–III

Diffraction: Diffraction of Light, Huygen's Principle, Huygen's -fresnel Diffraction theory, half- period zones, Zone plate, Diffraction at a straight edge , Diffraction by a circular aperture, diffraction by circular disc Distinction between fresnel and fraunhoffer diffraction. Fraunhoffer

diffraction at a single slit, at double slit, at rectangular and circular apertures, Effect of diffraction in optical imaging, Diffraction of N slits, dispersive power, Rayleigh Criterion for resolving power, Resolving power of telescope in diffraction grating, its use as a spectroscopic element and its resolving power, Resolving power of microscope. Resolving power of Fabry-perot interferometer.

UNIT–IV

Polarization: Transverse nature of light, Polarization by reflection and refraction, Brewster's Law, Malus Law, Double refraction, Nicol Prism, Elliptically and circularly polarized light, Quarter wave and half-wave plates, production and detection of polarized light, Optical activity, specific rotation. Half shade polarimeter

Reference Books:

1. Text book of Optics by N. Subramanayam, B. Lal and M. N. Avadhamulu
2. Fundamentals of Optics: by Jenkins and White
3. Optics by Ajoy Ghatak

BACHELOR OF SCIENCE (HONOURS) PHYSICS (SESSION 2022-23)
SEMESTER-III

STATISTICAL AND THERMAL PHYSICS

Course No. BOPL-3392

Course Outcomes: STATISTICAL AND THERMAL PHYSICS

After passing this programme the students will be able to:

CO1: Understand the basic ideas and scope of probability as well as distribution of n particles in different compartments.

CO2: Concept of different types of Statistics and the need for Quantum Statistics.

CO3: Understand the concept of entropy, Laws of Thermodynamics and applications to thermoelectric effect.

CO4: Understand the Maxwell Thermodynamics relations, Change of state and Claypron equation. Thermodynamic Potentials and Equilibrium of Thermodynamic Systems

BACHELOR OF SCIENCE (HONOURS) PHYSICS (SESSION 2022-23)
SEMESTER-III

COURSE CODE: BOPL-3392

STATISTICAL AND THERMAL PHYSICS

Maximum Marks: 75 (External 60 + Internal 15) **Examination Time: 3 Hours**
Pass Marks: 21 **Total Teaching hours: 60**

Instructions for the Paper Setters:

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section. **All questions carry 12 marks.**

Note: Students can use Non-Scientific calculators or logarithmic tables.

UNIT–I

Basic ideas of Statistical Physics, Scope of Statistical Physics, Basic ideas about probability, Distribution of four distinguishable particles into compartments of equal size. Concept of macro states, microstates, Thermodynamic Probability, Effects of constraints on the system. Distribution of n particles in two compartments. Deviation from the state of maximum probability. Equilibrium state of dynamic system. Distribution of distinguishable n particles in k compartments of unequal sizes.

UNIT–II

Phase space and division into elementary cells. Three kinds of statistics. The basic approach in three statistics. Maxwell Boltzman (MB) statistics applied to an ideal gas in equilibrium. Experimental verification of law of distribution of molecular speeds. Need for Quantum Statistics – B.E. Statement of Planck's law of Radiation, Wien's Displacement and Stefan's law. Pressure exerted by radiations, equation of state of Photon gas, Radiation pressure and stability of massive stars, Fermi Dirac (FD) statistics. Application of FD statistics to free electron gas inside conductor, equation of state of a degenerate Fermi gas, Stability of white dwarfs, Comparison of M.B, B.E and F.D statistics, relative occupation of energy levels.

UNIT- III

Statistical Basis of Entropy : Definition of entropy, change of entropy of a system, third law of thermodynamics. Additive nature of entropy, law of increase of entropy, reversible and irreversible processes and their examples, work done in a reversible process, Examples of

increase of entropy in some natural processes, entropy and disorder. Brief review of terms used in thermodynamics, Laws of Thermodynamics, Carnot's Heat Engine, Entropy changes in Carnot's cycle, Carnot's theorem, Thermodynamic temperature scale, Thermoelectric effect and its applications, change of entropy along a reversible path in P-V diagram, entropy of a perfect gas, equation of state of an ideal gas, Heat death of Universe.

UNIT- IV

Maxwell's Thermodynamic Relations : Perfect differentials in Thermodynamics, Derivation Maxwell Thermodynamic Relationships, Cooling produced by adiabatic expansion, adiabatic compression, adiabatic stretching of wires and thin films, change of internal energy with volume. Expression for Cp-Cv, variation of Cv with volume, Clapeyron's equation. Joule-Thomson effect and its thermodynamic treatment, Joule-Thomson effect for a Vander Waal's gas, Production of very low temperatures by adiabatic demagnetization, Concept of Negative Temperatures, Thermodynamic Potentials and Equilibrium of Thermodynamic Systems, Equation of state of an ideal gas, degrees of freedom, Law of equipartition of energy (no derivation) and its applications to specific heat of gases; mono-atomic and diatomic, Mean free path (Zeroth Order).

Reference Books:

1. Thermal Physics by S. Garg, R. Bansal and C. Ghosh, 1993, TataMcGraw-Hill.
2. A Treatise on Heat by MeghnadSaha, and B.N. Srivastava, 1969, Indian Press.
3. Thermodynamics by Enrico Fermi, 1956, Courier Dover Publications.
4. Heat and Thermodynamics by M.W.Zemasky and R. Dittman, 1981, McGrawHill

Bachelor of Science (Honours) Physics
Semester–III
Session 2022-23
Course Title: Mathematics-III
Course Code: BOPL-3333

Course outcomes

After the completion of this course, students should be able to

CO 1: Understand the concept of complex numbers and De Moivre's theorem

CO 2: Understand the basic concept of lines, parabola, hyperbola and ellipse.

CO 3: Understand and demonstrate the concept of cone, cylinder and sphere and understand of tangent plane and normal plane to the surfaces the concept

CO 4: Understand and demonstrate the concept of double and triple integrals.

Bachelor of Science (Honours) Physics
Semester–III
Session 2022-23
Course Title: Mathematics-III
Course Code: BOPL-3333

Examination Time: 3 Hours **Max.Marks:50**
Theory:40
CA:10

Instructions for the Paper Setters:

Eight questions of equal marks (8 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

UNIT –I

Complex numbers and their geometrical interpretation, De Moivre's theorem and its applications.

UNIT –II

Polar and Cartesian co-ordinates, Distance Formula, Section Formula of a line in different forms, Angle between two lines, Intersection of two lines, Standard equation of ellipse, parabola, hyperbola and their properties. .

UNIT –III

Sphere, Cone, Cylinder and simple properties of these surfaces, Equation of tangent and normal planes to above surfaces.

UNIT –IV

Double and Triple integrals, Evaluation of areas and volumes using double triple integrals, Change of order of integration in double integrals, Area in polar co-ordinates, Triple integrals in spherical and polar coordinates.

Reference Books:

1. Mathematics Textbook for class XI, NCERT , New Delhi, 2006 (Scope as in Chapters 6,11,12)

2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers , Delhi, 42th edition, 2012 (Scope as in chapters 3,7,19)

Bachelor of Science (Honours) Physics
(Semester–III)
Session: 2022-25
Course Title: Chemistry- III
(Physical Chemistry)
Course Code: BOPL-3084

Course outcomes

Students will be able to

CO1: acquire the knowledge of structure and intermolecular forces present between solids, liquids and gases.

CO2: Understand the concept of surface tension and interfacial tension

CO3: Understand the concept of reaction rates and determine the rate law from initial rate data

CO4: demonstrate an understanding of basic principles of colligative properties and understand the basic concepts of colloidal state of matter and applications of colloids.

Bachelor of Science (Honours) Physics
(Semester–III)
Session: 2022-25
Course Title: Chemistry -III
(Physical Chemistry)
Course Code: BOPL-3084

Examination Time: 3 Hours **Max. Marks: 50**
Theory: 40, CA: 10

Instructions for the Paper Setters:

Eight questions of equal marks (eight marks each) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Note: Students can use Non-Scientific calculators or logarithmic tables.

UNIT I

1. Solutions

Ideal and non–ideal solutions, methods of expressing concentrations of solutions, Dilute solution, colligative properties, Raoult's law, relative lowering of vapour pressure, molecular weight determination. Osmosis, law of osmotic pressure and its measurement, determination of molecular weight from osmotic pressure, elevation of boiling point and depression of freezing point.

UNIT-II

2. Surface Chemistry

Bulk phases and interfacial region, types of interfaces; Surface tension and interfacial tension. Thermodynamics of surfaces, plane interface, curved interface, Laplace and Kelvin equations, the contact angle, capillary rise and surface tension. Surface tension of solutions, Gibbs adsorption equation and its derivation from thermodynamic considerations. Surfactants, Surface films on liquids. Criteria for spreading in liquid-liquid systems. (Wetting as contact angle and capitulary action Phenomenon solid liquid systems).

UNIT-III

3. Chemical Kinetics

Rate of reaction, rate constant and rate laws, the order of reaction, first, second and third and zero order reactions, half-lives; determination of reaction order. Temperature dependence of reaction rates, reaction mechanism, rate-determining step approximation, steady-state approximation. Catalysis, homogeneous catalysis, autocatalysis, oscillation reactions. Enzyme catalysis, heterogeneous catalysis.

UNIT-IV

4. Liquid State

Intermolecular forces, structure of liquids (a qualitative description). Structural differences between solids, liquids and gases. Liquid crystals: Difference between liquids crystal, solid

And liquid. Classification, structure of nematic and cholesteric phases. Thermography and seven segment cell.

5. Colloidal State

Definition of colloids, classification of colloids, Solids in liquids (Sol): kinetic, optical and electrical, properties, stability of colloids, protective action, Hardy Schulze law, gold number. Liquids in liquids (emulsions): Types of emulsions, preparation. Emulsifiers, General applications of colloids.

Book Recommended:

1. Physical Chemistry by P.W. Atkins, 8th Ed., Oxford University Press, 2006 (Indian Print).
2. Physical Chemistry by T. Engel and P. Reid, 1st ed., Pearson Education,2006.
3. Physical Chemistry by Castellan, 3rd Ed., Addison Wisley/ Narosa, 1985 (Indian Print)

INTERDICIPLINARY COURSE ID-I

Bachelor of Science (Honours) Physics

Semester–III

Session- 2022-23

Course Title: Python Programming **Course Code: BOPM-3135**

Course Outcome

After passing the course the students will be able to:

CO1: Comprehend the use of various programming constructs like data types, operators, string processing and control structures.

CO2: Identify the flow of control in various control statement.

CO3: Implement various built-in and user defined function, packages and modules to solve basic problems in Physics.

CO4: Comprehend file manipulation using various built-in functions.

CO5: Comprehend visualization of data and result through graphics.

Bachelor of Science (Honours) Physics
Semester–III
Session- 2022-23

Course Title: Python Programming **Course Code: BOPM-3135**
Examination Time:(3+3) Hours **Max. Marks:50**
Theory: 25, Practical:15
CA:10

Instructions for the Paper Setters:
Eight questions of equal marks (10 marks each), (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from Section.

UNIT I

Introduction to python and Setting up the Python development Environment, Basic syntax, interactive shell, editing, saving, and running a script, Concept of data types, Declaring and using Numeric data types: int, float, complex Lists and Tuples and their basic operations, Python console Input / Output. Arithmetic operators and expressions, Conditions, Comparison operators, Logical Operators, Is and In operators.

UNIT II

String Handling, Unicode strings, Strings Manipulation: - compare strings, concatenation of strings, slicing strings in python, converting strings to numbers and vice versa. Dictionaries Control statements: if-else, Nested If-Else, Loops (for, while) Loop manipulation using pass, continue, break and else.

Matrix operations using NumPy array (Multiplication. Addition, matrix multiplication, inverse, determinant, adjoint, Eigenvalues, etc).

UNIT III

Built in function and modules in python, user defined functions, passing parameters, arguments and return values; formal vs actual arguments, Lamda function in python, Recursion, organizing python codes using functions, modules and external packages.

Case study of Projectile Motion.

UNIT IV

SciPy: Integration, differentiation and interpolation.

Files: manipulating files and directories, OS and Sys modules; text files: reading/writing text and numbers from/to a file; creating and reading a formatted file (csv or tab separated) understanding read functions, read(), readline() and readlines() Understanding write functions, write() and writelines() Manipulating file pointer using seek. Introduction to graphics. **Plotting graphs and objects.**

References / Textbooks:

1. Mark Lutz, Learning Python, O'Reilly Media, 2013.
2. David Beazley, Python cookbook, O'Reilly Media, 2013.
3. David Beazley, Python Essential Reference, Addison-Wesley Professional, 2009.
4. John Zelle, Python programming: An Introduction to Computer Science, Franklin, Beedle & Associates Inc, 2004.
5. Alex Mortelli, Python in a Nutshell, O'Reilly Media, 2006.

Note: The latest editions of the books should be followed.

Course Outcomes: Physics Lab-III

Semester III

(SESSION 2022-23)

Course No. BOPP-3396

CO1: After the completion of this course students will be able to use spectrometer along with prism, doubly refractive prism, diffraction grating to find various optical parameters.

CO2: Students will be able to find resolving power of grating and telescope

CO3: At the end of this course students will be able to use polarimeter and hence will be able to measure specific rotation by using polarimeter.

CO4. Students will be able to demonstrate the verification of laws of probability distribution, conversion of electrical energy to heat and concept of thermal conductivity.

BACHELOR OF SCIENCE (HONOURS) PHYSICS (SESSION 2022-23)
SEMESTER-III

COURSE CODE: BOPP-3396

PHYSICS LAB-III

Maximum Marks: 50 (External 40 + Internal 10) **Examination Time: 3 Hours**
Pass Marks: 35% **Total Teaching hours: 90**

Instructions to Practical Examiner

Question paper is to be set on the spot jointly by the external and internal examiners. Two copies of the same to be submitted for the record to COE office, Kanya Maha Vidyalaya, Jalandhar

General Guidelines for Practical Examination

I. The distribution of marks is as follows:

i) One experiment 20 Marks

ii) Brief Theory 6 Marks

iii) Viva–Voce 7 Marks

iv) Record (Practical file) 7Marks

II. There will be one sessions of 3 hours duration. The paper will have one session and will consist of 8 experiments out of which an examinee will mark 6 experiments and one of these is to be allotted by the external examiner.

III. Number of candidates in a group for practical examination should not exceed 20.

IV. In a single group no experiment be allotted to more than three examinee in any group.

List of experiments-

1. To determine refractive index of glass and liquid using spectrometer.
2. To determine the Cauchy's constants.
3. To study the refractive index of a doubly refracting prism.
4. To set up Newton's rings to determine wavelength of sodium light.
5. To determine the wavelength by using plane diffraction grating (Use Hg source)
6. To determine dispersive power of plane diffraction grating.
7. To determine resolving power of a telescope.
8. To determine resolving power of a grating.
9. To study the rotation of plane of polarization by using polarimeter.
10. To determine the specific rotation of sugar using Laurent's half shade polarimeter
11. Verify laws of probability distribution by throwing of similar coins.
12. To determine the heating efficiency of an electric kettle with varying voltage.
13. To find the coefficient of Thermal Conductivity of a bad conductor by Lee's method.

Reference Books:

1 Practical Physics, C.L. Arora, S. Chand & Co.

BACHELOR OF SCIENCE (HONOURS) PHYSICS

(SEMESTER-III)

SESSION: 2022-25

COURSE CODE: BOPP-3086

COURSE TITLE: CHEMISTRY LAB-III

Course outcomes

Students will be able to

CO1: understand the technique of crystallisation

CO2: compare the viscosity and surface tension of different liquids and solutions

CO3: determine the rate of the reactions

CO4: efficiently use of calorimeter in various experiments

BACHELOR OF SCIENCE (HONOURS) PHYSICS

(SEMESTER-III)

SESSION: 2022-25

COURSE CODE: BOPP-3086

COURSE TITLE: CHEMISTRY LAB-III

Examination Time: 3 Hours Max. Marks: 50

Practical: 40, CA: 10

Instruction for practical examiner: Question paper is to be set on the spot jointly by the Internal and External Examiners. Two copies of the same should be submitted for the record to COE Office, Kanya Maha Vidyalaya, Jalandhar.

Crystallisation:

Concept of indication of crystallization. Phthalic acid from hot water (using fluted filter paper and stemless funnel) Acetanilide from boiling water, Naphthalene from Ethanol, Benzoic acid from water

Physical Chemistry

1. To determine the specific reaction rate of hydrolysis of ethyl acetate catalyzed by Hydrogen ions at room temperature.
2. To study the effect of acid strength on hydrolysis of an ester.

Viscosity, Surface Tension (Pure Liquids)

3. To study the viscosity and surface tension of glycerine solution in water.
4. To determine the solubility of benzoic acid at different temperatures and to determine Hof the dissolution process.
5. To determine the enthalpy of neutralization of a weak acid/weak base versus strong base/strong acid and determine the enthalpy of ionization of the weak acid/weak base.
6. To determine the enthalpy of dissolution of solid calcium chloride and calculate the lattice energy of calcium chloride from its enthalpy data using Born Haber cycle.

Books Recommended:

1. Experimental Organic Chemistry, Vol. I and II, P.R. Singh, D.S. Gupta and K.S. Bajpai, Tata McGraw Hill.
2. Laboratory Manual in Organic Chemistry, R.K. Bansal, Wiley Eastern.
3. Vogel's Textbook of Practical Organic Chemistry, B.S. Furniss, A.J. Hannaford, V. Rogers, P.W.G. Smith and A.R. Tatchell, ELBS.
4. Experiments in General Chemistry, C.N.R. Rao and U.C. Aggarwal, East-West Press.
5. Experiments in Physical Chemistry, R.C. Das and B. Behra, Tata McGraw Hill.
6. Advanced Practical Physical Chemistry, J.B. Yadav, Goel Publishing House.
7. Advanced Experimental Chemistry, Vol. I, Physical, J.N. Guru and R. Kapoor, S. Chand and Co.
8. Selected Experiments in Physical Chemistry, N.G. Mukherjee, J.N. Ghosh and Sons.
9. Experiments Physical Chemistry, J.C. Ghosh, Bharati Bhavan.

BACHELOR OF SCIENCE (HONOURS) PHYSICS (SESSION 2021-22)
SEMESTER-III
Course Title: Environmental Studies (Compulsory)

Course Code: AECE-3221

(THEORY)

Time: 3 Hours. Max. Marks: 100 **Theory: 60**
Field Report:20
CA: 20

Instructions for the Paper Setter:
The question paper should carry 60 marks. The structure of the question paper being:
Part-A, Short answer pattern – 20 marks
Attempt any five questions out of seven. Each question carries 4 marks. Answer to each question should not exceed 2 pages
Part-B, Essay type with inbuilt choice – 40 marks
Attempt any five questions out of eight. Each question carries 8 marks. Answer to each question should not exceed 5 pages.

UNIT 1

The multidisciplinary nature of environmental studies,Definition, scope and importance, Need for public awareness

UNIT 2

Natural Resources: Renewable and non-renewable resources:Natural resources and associated problems.
(a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
(b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
(c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
(d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer pesticide problems, water logging, salinity, case studies.
(e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
(f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
• Role of an individual in conservation of natural resources.
• Equitable use of resources for sustainable lifestyles.

UNIT 3

Ecosystems
• Concept of an ecosystem
• Structure and function of an ecosystem
• Producers, consumers and decomposers
• Energy flow in the ecosystem
• Ecological succession
• Food chains, food webs and ecological pyramids
• Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem,

Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

UNIT 4

Biodiversity and its conservation

• Introduction – Definition: genetic, species and ecosystem diversity
• Biogeographical classification of India
• Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values
• Biodiversity at global, national and local levels
• India as a mega-diversity nation
• Hot-spots of biodiversity
• Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts
• Endangered and endemic species of India
• Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

UNIT 5

Environmental Pollution

Definition

• Causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution,

Thermal pollution, Nuclear pollution

• Solid waste management: Causes, effects and control measures of urban and industrial wastes.
• Role of an individual in prevention of pollution
• Pollution case studies
• Disaster management: floods, earthquake, cyclone and landslides

UNIT 6

Social Issues and the Environment

• From unsustainable to sustainable development
• Urban problems and related to energy
• Water conservation, rain water harvesting, watershed management
• Resettlement and rehabilitation of people; its problems and concerns. Case studies.
• Environmental ethics: Issues and possible solutions
• Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
• Wasteland reclamation
• Consumerism and waste products
• Environmental Protection Act, 1986
• Air (Prevention and Control of Pollution) Act, 1981
• Water (Prevention and control of Pollution) Act, 1974
• Wildlife Protection Act
• Forest Conservation Act
 Issues involved in enforcement of environmental legislation
 Public awareness

UNIT 7

Human Population and the Environment

• Population growth, variation among nations
• Population explosion – Family Welfare Programmes
• Environment and human health
• Human Rights
• Value Education
• HIV / AIDS

• Women and Child Welfare
• Role of Information Technology in Environment and Human Health
• Case Studies

UNIT 8

Field Work
• Visit to a local area to document environmental assets river/forest/grassland/hill/mountain
• Visit to a local polluted site – Urban / Rural / Industrial / Agricultural
• Study of common plants, insects, birds
• Study of simple ecosystems-pond, river, hill slopes, etc

References:

1. Bharucha, E. 2005. Textbook of Environmental Studies, Universities Press, Hyderabad.
2. Down to Earth, Centre for Science and Environment, New Delhi.
3. Heywood, V.H. &Waston, R.T. 1995. Global Biodiversity Assessment, Cambridge House, Delhi.
4. Joseph, K. &Nagendran, R. 2004. Essentials of Environmental Studies, Pearson Education (Singapore) Pte. Ltd., Delhi.
5. Kaushik, A. & Kaushik, C.P. 2004. Perspective in Environmental Studies, New Age International (P) Ltd, New Delhi.
6. Rajagopalan, R. 2011. Environmental Studies from Crisis to Cure. Oxford University Press, New Delhi.
7. Sharma, J. P., Sharma. N.K. & Yadav, N.S. 2005. Comprehensive Environmental Studies, Laxmi Publications, New Delhi.
8. Sharma, P. D. 2009. Ecology and Environment, Rastogi Publications, Meerut.
9. State of India's Environment 2018 by Centre for Sciences and Environment, New Delhi
10. Subramanian, V. 2002. A Text Book in Environmental Sciences, Narosa Publishing House, New Delhi

PERSONALITY DEVELOPMENT

Course Title: Personality Development
Nature of course: Audit Course (Value added)
Course duration: 30 hours
Course intended for: Semester III students of Under Graduate Program
Course credits: 2 (For Credit based Continuous Evaluation Grading System)
Course Code: SECP-3512

PURPOSE

To enhance holistic development of students and improve their employability skills.

INSTRUCTIONAL OBJECTIVES

- To re-engineer attitude and understand its influence on behaviour.
- To develop inter-personal skills and be an effective goal-oriented team player.
- To develop communication and problem solving skills.
- To develop professionals with idealistic, practical and moral values.

LEARNING OUTCOMES

- On completion of the course, students will be able to hone their personality by
- Realisation of the importance and incorporation of positive thinking and attitude in life
- Enhacement of self confidence and analysis of self capabilities
- Learning the different communication skills for self expression
- Effective use of time to combat stress and increase in productivity
- Enhancing personality by physical grooming and fitness
- Understanding the role of design principles and appropriateness of apparel
- Incorporating social etiquettes in daily life and conduct
- Excelling in decision making and leadership qualities

CURRICULUM

Course credits-2 **Total Contact Hours-30**

MODULE	TITLE	HOURS
1.	**Positive Thinking & Attitude**	2
2.	**Self Analysis & Self Confidence**	2
3.	**Communication Skills**	10
	• **Basic Communication Skills** • **Body Language** • **Interview Skills** • **Résumé Writing** • **Group Discussion** • **Telephone and E-mail etiquette** • **Public Speaking**	
4.	**Time Management**	2
5.	**Stress and Conflict Management**	2

6.	**Physical Fitness and Personal Grooming**	**2**
7.	**Appropriateness of Apparel**	**2**
8.	**Social Etiquette**	**2**
9.	**Decision Making process & Problem Solving Skills** • **Leadership Skills** • **Goal Setting** • **Motivation**	**5**
10.	**Closure**	**1**

EXAMINATION

1. Total marks of the course will be 25 (Final Examination: 20 Marks; Internal Assessment: 5Marks)
2. The pattern of the final examination will be multiple choice questions. 25 multiple choice type questions will be set. The student shall attempt 20 questions. Each question will carry 1 mark (20 X 1 = 20). Total time allotted will be 1 hour.
3. Internal Assessment will consist of Attendance: 2 Marks, Internal: 3 Marks.(Total Internal Assessment:5 Marks)

SYLLABUS

MODULE 1: Positive Thinking & Attitude

- Factors Influencing Attitude
- Essentials to develop Positive Attitude
- Challenges & lessons from Attitude

MODULE 2: Self Analysis & Self Confidence

- Who am I
- Importance of Self Confidence
- SWOT Analysis

MODULE 3: Communication Skills

(i) Basic Communication Skills

- Speaking skills
- Listening skills
- Presentation skills

(ii) Body Language

- Forms of Non-Verbal Communication
- Interpreting body language clues
- Effective use of body language

(iii) Interview Skills

- Type of Interviews
- Ensuring success in job interviews
- Appropriate use of Non-verbal Communication

(iv) Résumé Writing

- Features
- Different types of résumé for Different posts

(v) Group Discussion

- Difference between Group discussion and debate
- Importance of Group Discussion
- Group Decision
- Ensuring success in group discussions

(vi) Telephone & E-mail Etiquette

- Telephone etiquette
- E-mail etiquette

(vii) Public Speaking

- Introductory speech
- Informative speech

- Persuasive speech
- Extempore session

MODULE 4: Time Management

- Importance of time management
- Values & beliefs
- Goals and benchmarks – The ladders of success
- Managing projects and commitments
- Prioritizing your To-do's
- Getting the results you need

MODULE 5: Stress & Conflict Management

- Introduction to stress
- Types of stressors
- Small changes and large rewards
- Stress prevention
- Overcoming unhealthy worry
- Stress at home and workplace
- Dealing with frustration and anger
- Stress reducing exercises
- Understanding conflicts
- Violent and Non-violent conflicts
- Source of conflict
- Structural and cultural violence

MODULE 6: Physical Fitness and Personal Grooming

- Fitness and exercise
- Balanced & healthy diet
- Skin care & Hair care
- Make-up skills

MODULE 7: Appropriateness of Apparel

- Apparel & Personality
- Psycho-social aspects of apparel
- Style-tips for smart dressing & effective use of design elements

MODULE 8: Social Etiquette

- Civic Sense
- Workplace skills
- Meeting and greeting people
- Table Setting and table manners

MODULE 9: Decision Making Process and Problem Solving Skills

- Anatomy of a decision
- How to use problem solving steps and problem solving tools
- How to distinguish root causes from symptoms to identify right solution for right problems

- How to improve problem solving and decision making by identifying individual problem solving styles
- The creative process for making decisions
- Tools to improve creativity
- Implementing the decision – Wrap up

(i) Leadership Skills

- Handling peer pressure and bullies
- Team work
- Decision making
- Taking initiatives

(ii) Goal Setting

- Wish list
- SMART goals
- Blueprint for success
- Short-term, Long-term, Life-term Goals

(iii) Motivation

- Factors of motivation
- Self talk
- Intrinsic & extrinsic motivators

Books Recommended

1. Rossi, P. (2011). *Everyday Etiquette: How to navigate 101 common and uncommon social situations*. St Martins Pr.
2. Pietrzak, T.,& Fraum, M. (2005). *Building career success skills*. ASTD Press.
3. Treffinger, D.J., Isaksen, S.G., & Brian, K. (2005). *Creative problem solving: An Introduction*.
4. Carr, A. (2004). *Positive Psychology: The science of happiness and human strengths*. Burnner-Routlrdge.
5. Oberg, B.C. (1994). *Speech craft: An Introduction to public speaking*. Meriwether Publishing.

SEMESTER IV

BACHELOR OF SCIENCE (HONOURS) PHYSICS (SESSION 2022-23)

SEMESTER-IV

COURSE CODE: BOPL-4391

Course Outcomes: Mechanics -II

After passing this course, students will be able to:

After passing this course, students will be able to:

CO1: understand the relative motion in inertial and non-inertial frames of reference. They will learn Galilean transformations and invariance of physical quantities. They will know about various fictitious forces which arise due to translational and rotational motion of frames.

CO2: understand the development of special theory of relativity by studying Michelson Morley Experiment and Lorentz Transformations. They will understand the consequences of relativity when objects move at a very high speed which is comparable to speed of light.

CO 3: to solve various problems related to relativistic dynamics. They will learn about relativistic mass, energy, momentum and force.

CO 4: to understand the concept of space-time intervals and Minkowski space. They will understand the time dilation, length contraction via geometrical interpretation of Lorentz transformations. They will learn the effects of gravity on light and space-time curvature.

BACHELOR OF SCIENCE (HONOURS) PHYSICS (SESSION 2022-23)
SEMESTER-IV

COURSE CODE: BOPL-4391

MECHANICS-II

Maximum Marks: 75 (External 60 + Internal 15) **Examination Time: 3 Hours**
Pass Marks: 21 **Total Teaching hours: 60**

Instructions for the Paper Setters:

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section. **All questions carry 12 marks.**

Note: Students can use Non-Scientific calculators or logarithmic tables.

UNIT–I

Frames of References: Inertial and non-inertial frames of reference, Galilean transformation, Galilean Invariance of space and time intervals; Fictitious forces in non-inertial frames due to translation and rotation, Effect of rotation of earth on 'g', Effects of centrifugal and Coriolis forces produced as a result of earth's rotation. Foucault's pendulum and its equation of motion.

UNIT–II

Special Theory of Relativity: Concept of ether, Michelson Morley Experiment, Explanation of the Null Result Postulates of Special Theory of Relativity, Lorentz transformation equations, Length contraction, Time dilation, Experimental evidence in support of time dilation, Twin paradox, Relativity of simultaneity, Relativistic formula for the composition of velocities, Relativistic Doppler effect (longitudinal and transverse) and its confirmation.

UNIT–III

Relativistic Dynamics: Variation of mass with velocity : Relativity of mass, Increase in mass of a body in an inelastic collision, mass energy equivalence, Kinetic energy at low speeds, Relation between momentum and energy, Transformation equations for momentum and energy, Particles with zero mass, Force in relativistic mechanics, Lorentz transformations for force

UNIT–IV

Structure of Spacetime and Introduction to General theory of relativity: Concept of Minkowski space: world line and world point, spacetime intervals: Time like interval, Spacelike interval, Light like interval, Geometrical Interpretation of Lorentz Transformations, Geometrical representation of simultaneity, length contraction and time dilation, Principle of Equivalence, gravitational and inertial mass, gravitational mass of photons, gravitational red

shift, Precession of the perihelion of Mercury.

Reference Books:

1) Mechanics : Berkeley Physics Course Vol-I, C. Kittel, W.D. Knight, M.A. Ruderman, C.A. Helmholtz and B.J. Moyer- Tata McGraw Hill Publishing Company Ltd., New Delhi.
2) The Special Theory of Relativity, S. Banerji & A. Banerji (Prentice Hall India).
3) Introduction of to Special Relativity: R. Resnick Wiley Eastern India Pvt. Ltd.
4) The Feymann Lectures Physics: R.P. Feymann, R.B. Leighton and M. Sands, Vol. I & II- Narosa Publishing House, New Delhi.
5)"Special Relativity" A.P. French, N.W. Norton and Company Inc. , New York
6)Classical Mechanics , J C Upadhyaya, Himalaya Publishing House

BACHELOR OF SCIENCE (HONOURS) PHYSICS (SESSION 2022-23)
SEMESTER-IV

Course Outcomes: Atomic Spectroscopy
Course No. BOPL-4392

After passing this programme the students will be able to:

CO1: understand fine and hyperfine spectrum of hydrogen atom and the concept of spin and magnetic moment of an electron

CO2: understand spectra of alkali atoms and Zeeman effect

CO3: demonstrate understanding of exchange symmetry of wave function, different coupling schemes and spectra of atoms with more than one electron.

CO4: Students will understand concept of X rays spectra including origin, production and characterization

BACHELOR OF SCIENCE (HONOURS) PHYSICS (SESSION 2022-23)
SEMESTER-IV

ATOMIC SPECTROSCOPY
COURSE CODE: BOPL-4392

Maximum Marks: 75 (External 60 + Internal 15) **Examination Time: 3 Hours**
Pass Marks: 21 **Total Teaching hours: 60**

Instructions for the Paper Setters:

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section. All questions carry 12 marks.

Note: Students can use Non-Scientific calculators or logarithmic tables.

Unit-I

Introduction to Atomic Spectra: Observation of spectra, Types of spectra, Units in spectroscopy, Bohr's Theory and Hydrogen spectrum, Explanation of Spectral series, Energy level Diagram, Ritz combination Rule, Continuum at series limit, Franck-Hertz Experiment. quantum numbers, The Spinning electron and the vector model, Stern Gerlach Experiment, Total Quantum number, Term values, Magnetic moment (Orbital, Spin and Total)

Unit-II

Spectra of Atoms with One valance electron: Electron Spin orbit interaction, Fine structure of Hydrogen atom, The normal order of fine structure doublets of Hydrogen, Energy level and different series of alkali spectra, Doublet structure in alkali Spectra (Fine Structure), Selection rules for doublets, Intensity rules for fine structure doublets. Zeeman Effect and its experimental setup, Classical theory of Normal Zeeman effect, Quantum theory of Normal and anomalous Zeeman effect, Selection and Intensity rules of Zeeman effect

Unit-III

Spectra of Atoms with two valance electrons: Exchange symmetry of wave function, Pauli's Exclusion principle, electronic configuration and atomic states, shells, sub shells in atoms, Two valence electron atoms: LS and JJ coupling schemes and resulting spectral terms, optical spectra for two electron system (Helium), spectra of alkaline earth atoms.

Unit-IV

X-rays Spectra: Production of X-rays, Origin of X-rays from electromagnetic theory, X-ray diffraction, Bragg's law, Laue Spots, Bragg's spectrometer, Reflection and refraction of X-rays, X-ray scattering, Continuous X-ray spectrum, Characteristics absorption and emission Spectra, comparison of optical and X-ray Spectra, Moseley's law, Applications of Moseley's law.

Text and Reference Books:

1. Introduction to Atomic Spectra by H. E. White
2. Atomic Spectra and Atomic structure by Gerhard Herzberg
3. Concepts of Modern Physics by Arthur Beiser
4. Elements of Spectroscopy by Gupta, Kumar and Sharma

Bachelor of Science (Honours) Physics
Semester–IV
Session 2022-23
Course Title: Mathematics-IV
Course Code: BOPL-4333

Course outcomes

After the completion of this course, students should be able to

CO 1: Understand the concept of matrices, determinants and State and prove Cayley Hamilton theorem. Solve system of linear equations and obtain Eigen values, Eigen vectors and Characteristic polynomial.

CO 2: Understand the concept of system of linear equations and condition for consistency.

CO 3: Understand the concept of Vector Spaces, Linear Independence and Dependence, Basis and Dimension and linear transformation and its matrix representation.

CO4: Demonstrate the concept of infinite series with various tests.

Bachelor of Science (Honours) Physics
Semester–IV
Session 2022-23
Course Title: Mathematics-IV
Course Code: BOPL-4333

Examination Time: 3 Hours
Maximum Marks: 50

Theory: 40
CA :10

Instructions for the Paper Setters:
Eight questions of equal marks (8 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

UNIT –I

Matrices, Determinants and their properties, algebra of matrices, Eigen values and Eigen vectors, Unitary, Hermitian and Orthogonal matrices and their properties, Cayley-Hamilton theorem and its applications.

UNIT –II

Elementary operations on matrices, Rank of a matrix, Row Rank, Column rank and their equivalence, System of linear equations and conditions for consistency, Quadratic forms

UNIT-III

Vector spaces, vector subspaces, linear spans, linear dependence and independence, basis and dimension, Linear transformation, Representation of linear transformation by matrices.

UNIT –IV

Infinite Series, Series of positive terms, alternate series, Behaviour of infinite series, Cauchy's convergence criterion, D' Alembert Ratio Test, Cauchy's root test, Rabbes test ,Gauss test, Cauchy's Integral test, Absolute and conditional convergence (Tests without Proof)

Reference Books:

1.B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, Delhi, 42nd edition, 2012 (Scope as in chapters 2, 9)

2.S. Narayan, P.K Mittal, A textbook of Matrices, S.Chand Publications, New Delhi, 11th edition, 2005 (Scope as in chapters 4, 5)

B.Sc. (Hons.) Physics (Semester-IV)

COURSE CODE: BOPL-4084
CHEMISTRY-IV

Session 2022-23

(Molecular Spectroscopy)

Students will be able to

CO1:learn about the Principle and applications of ultraviolet and Woodward Fisher Rule

CO2: understand the infra-red spectroscopy in organic structure determination

CO3:explain common terms in NMR spectroscopy such as chemical shift, coupling constant, and anisotropic effect, spin spin splitting, shielding constant and their affect on the spectra of the compound.

CO4:study thevarious measurement techniques in NMR spectroscopy.

CO5:understand the various cleavages and rearrangements in Mass spectroscopy.

CO6:factors affecting cleavage patterns in Mass spectroscopy.

CO7: interpret the spectrum of unknown compounds on the basis of NMR and Mass spectroscopy.

CO8:understand the various applications of NMR and Mass spectroscopy.

CO9:use NMR and Mass spectroscopy data in elucidating the chemical structure of a compound.

CO10:solve the numerical problems based on use NMR and Mass spectroscopy.

BACHELOR OF SCIENCE (HONOURS) PHYSICS (SESSION 2022-23)
SEMESTER-IV
COURSE CODE: BOPL-4084
CHEMISTRY-IV
(Molecular Spectroscopy)

Maximum Marks: 50 (External 40 + Internal 10) **Examination Time: 3 Hours**
Total Teaching hours: 60

Instructions for the Paper Setters:

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

Note: Students can use Non-Scientific calculators or logarithmic tables.

UNIT – I

1. Energy and Electromagnetic Spectrum

Introduction, electromagnetic spectrum and Units, Regions of the spectrum, Basic features of different spectrometers, Statement of Born-Oppenheimer approximation, Degree of freedom, Frank Condon Principle, Fluorescence and Phosphorescence.

II. Ultraviolet and Visible Spectroscopy The energy of electronic excitation, Measurement techniques, Beer-Lambert Law, Molar extinction coefficient. Different types of transition noticed in UV spectrum of organic functional groups and their relative energies. Chromophore, Auxochromes, Absorption and intensity shifts, Transition probability. Factors affecting λ_{max}, Effect of steric hindrance to coplanarity, Solvent effects.

UNIT – II

III. Infrared Spectroscopy Vibrational energy levels, Selection rules, Force constant, Fundamental vibration frequencies, Factors influencing Vibrational Frequencies (Vibrational Coupling, Hydrogen Bonding, Electronic effect, Bond Angles, Field Effect) of different functional groups. Sampling techniques.

IV. Applications of UV and IR Spectroscopy Applications of UV spectroscopy, Woodward Fieser rules for calculating λ_{max} of conjugated polyenes and α,ß - unsaturated carbonyl compounds. Applications of IR spectroscopy, Absorption of Common functional Groups, Interpretation of simple IR spectra, Finger print regions. Simple numerical

problems based on UV and IR spectroscopy.

UNIT-III

V. Proton Magnetic Resonance spectroscopy (^{1}H NMR) The Nuclear spin, Larmor frequency, the NMR isotopes, Population of nuclear spin level, Spin and Spin lattice relaxation. Measurement techniques (CW & FT method), Solvent used. Chemical shift, Reference compounds, Shielding constant, Range of typical chemical Shifts, Simple application of chemical shifts, Anisotropic effect. Spin spin splitting, Coupling constant.

VI. Applications of NMR spectroscopy NMR spectra with various examples such as ethyl bromide, ethanol, acetaldehyde, 1,1,2-tribromoethane, ethyl acetate, toluene, o-, m-, p- anisidine, o-, m-, p- nitrophenols, acetophenone. Simple numerical of structure elucidation of NMR spectroscopic data.

UNIT- IV

VII. Mass Spectrometery

Basic Principles. Elementary theory. Molecular ions, isotope ions, Fragment ions of odd and even electron types, Nitrogen rule, Factors affecting cleavage patterns, Simple cleavage, Cleavages at a hetero atom, Multicentre fragmentations, Rearrangements, Diels – Alder fragmentation, Mc Lafferty rearrangement.

VIII. Applications of Mass Spectroscopy

IX. Cleavage associated with common functional groups , Aldehydes, Ketones, Cyclic and Acyclic Esters, Alcohols, Olefins, Aromatic compounds, Amines, Interpretation of the spectrum of unknown simple molecules.

Books Recommended:

1. Organic Spectroscopy By W. Kemp; Publisher- Palgrave, New York
2. D.H. Williams and I. Fleming. Spectroscopic Methods in Organic Chemistry.
3. Spectrometric Identification of Organic Compounds - R.M. Silverstein & F. X. Webster; Publisher: John Willey and Sons, Inc.
4. Introductory Problems in Spectroscopy- By R.C. Banks, E.R. Matjeha and G. Mercer; Publisher : The Benzamine / Cummings Publishing Company Inc.
5. Introduction to Spectroscopy – D. L. Pavia, G. M .Lampman, and G. S. Kriz Publisher: Brooks / Cole, a part of cengage learning

Bachelor of Science (Honours) Physics
Semester–IV
Session- 2022-23
Course Title: Numerical Methods and Error Analysis

Course Code:BOPL-4335

Course Outcomes:

On completion of this course a student will be able to:

CO 1. Understand various kinds of errors and uncertainties experimental measurements and results. They will learn to estimate the errors in mathematical calculations

CO 2: Solve polynomial and transcendental equations numerically with the iterative methods. They will also learn to solve set of linear simultaneous equations by direct and iterative methods

CO 3: Interpolate the data from a set of experimental observations with equal and unequal intervals. They will also learn to fit the given set of data points with an appropriate function

CO 4: Solve integration and differentiation numerically by using various methods. They will learn to solve linear differential equations by iterative methods

Bachelor of Science (Honours) Physics
Semester–IV
Session- 2022-23
Course Title: Numerical Methods and Error Analysis

Course Code: BOPL-4335

Examination Time: 3Hours **Max. Marks: 50**

Theory: 40

CA : 10

Instructions for the Paper Setters:

Eight questions of equal marks (10 marks each) are to be set, two in each of the four Sections (AD). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section. The students can use only Non-Programmable& Non Storage Type Calculator and statistical tables.

The question paper must contain 30% of the article/ theory from the syllabus.

Unit-I
Introduction to Accuracy, precision and uncertainty (error) in measurements, types of errors, methods of using uncertainties in experimental results, Significant Figures and Roundoff of numerical values, Propagation of errors.

Unit II

Solution of non-linear equations: Iterative Methods, Bisection method, Regula-Falsi Method, Newton Raphson Method, Secant Method, Rate of convergence of these methods. Solution of linear system of equation: Direct methods: Gauss elimination, Gauss Jordan, LU Decomposition Methods, Iterative Methods: Jacobi's Method, Gauss Seidel Method.

Unit III

Interpolation with equal intervals: Interpolation, Errors in polynomial interpolation, Newton's formula for forward and backward interpolation, Interpolation with unequal intervals: Divided differences, Newton's divided difference interpolation formula, Lagrange's interpolation formula, Linear and Non-Linear Curve fitting: Least square curve fitting**,** polynomial curve fitting, Exponential curve fitting

Unit IV

Numerical differentiation, Method based on interpolation. Numerical Integration, Trapezoidal rule, Simpson's rule, Weddle rule, Numerical solution of ordinary differential equations, Initial value problem, Taylor's method, Euler's methods, Runge-Kutta Method

Books

1. S.S. Sastry: Introductory Methods of Numerical Analysis, 2003 (3rd Edition), Prentice Hall of India.

2. A. Maritava Gupta and Subash Ch. Bose: Introduction to Numerical Analysis

3. Numerical Mathematical Analysis by James Scarborough (Oxford and IBH),1966.
4. Elementary Numerical Analysis by S.D. Conte (McGraw-Hill),1965

5. Fundamentals of Numerical Methods and Statistical Techniques, Lakhanpal Publishers, 2013

BACHELOR OF SCIENCE (HONOURS) PHYSICS (SESSION 2022-23)
SEMESTER-IV

PHYSICS LAB-IV

Course No. BOPP-4396

COURSE OUTCOMES: After completion of this course student will be able

CO1: to measure an accessible (Horizontal and vertical) and inaccessible height using sextant.

CO2: to demonstrate adiabatic expansion, thermo emf, Stefen's constant and thermal expansion measurements.

CO3: to find e/m of an electron, ionisation potential, and characteristics of solar cell.

CO4: understand spectrum of Iodine and Hydrogen.

BACHELOR OF SCIENCE (HONOURS) PHYSICS (SESSION 2022-23)
SEMESTER-IV

COURSE CODE: BOPP-4396

PHYSICS LAB-IV

Maximum Marks: 50 (External 40 + Internal 10) **Examination Time: 3 Hours**
Pass Marks: 35% **Total Teaching hours: 90**

General Guidelines for Practical Examination

I. The distribution of marks is as follows:

i) One experiment 20 Marks **ii) Brief Theory 6 Marks**

iii) Viva–Voce 7 Marks **iv) Record (Practical file) 7 Marks**

II. There will be one sessions of 3 hours duration. The paper will have one session and will consist of 8 experiments out of which an examinee will mark 6 experiments and one of these is to be allotted by the external examiner.

III. Number of candidates in a group for practical examination should not exceed 12.

IV. In a single group no experiment be allotted to more than three examinee in any group.

1. To measure an accessible horizontal distance using sextant.
2. To measure an accessible vertical height using sextant.
3. To measure inaccessible height by using sextant.
4. To study adiabatic expansion of gas and hence to calculate value of γ.
5. To determine Stefan's constant using Boltzmann's Law.
6. To plot a calibration curve of a given thermocouple (copper constantan) using a potentiometer.
7. To measure thermal expansion of crystal using interference fringes.
8. To measure the thermos-e.m.f. as a function of temperature of the hot junction.
9. To determine charge to mass ratio (e/m) of an electron by short solenoid method.
10. To determine the value of e/m for the electron by long solenoid method.
11. To find ionization potential of mercury
12. To study the absorption spectrum of iodine vapours and hence to calculate the value of vibrational energies and force constant for its excited states.
13. To determine the discharge spectrum of hydrogen gas using hydrogen gas discharge tube and determine the value of Rydberg's constant with the help of grating spectrometer.
14. To study characteristics of solar cell.

Reference Books :

1. Practical Physics, C.L. Arora, S. Chand & Co.
2. Practical Physics by S P Singh Pragati Parkashan Meerut.

BACHELOR OF SCIENCE (HONOURS) PHYSICS

(SEMESTER-IV)

SESSION: 2022-25

COURSE CODE: BOPP-4087

COURSE TITLE: CHEMISTRY LAB-IV

Students will be able to

CO1: know the principle and mechanism of Conductometric titrations and polarimetric experiments

CO2: determine the heat of of neutralization and Heat of solution Calorimetrically .

CO3: know the principle and working of Abbe's Refractometer

CO4: determine the composition of unknown mixture of two liquids by refractive index measurements.

BACHELOR OF SCIENCE (HONOURS) PHYSICS

(SEMESTER-IV)

SESSION: 2022-25

COURSE CODE: BOPP-4087

COURSE TITLE: CHEMISTRY LAB-IV

Examination Time: 3 Hours Max. Marks: 50

Practical: 40, CA: 10

Instruction for practical examiner: Question paper is to be set on the spot jointly by the Internal and External Examiners. Two copies of the same should be submitted for the record to COE Office, Kanya Maha Vidyalaya, Jalandhar.

1. Refractometry: Determine refractive index of a given liquid as a criterion for its purity. (Benzene i.e. commercial) benzene + A.R. acetone).

2. Polarimetry: Determine the %age composition of an optically active solution.

3. Calorimetry:
   a) Determination of Heat of neutralization
      (i) Strong acid-strong base
      (ii) Weak acid-strong base.
   b) Determination of Heat of solution of KCl, NH_4Cl, KNO_3

4. Conductometry:
   a) Determination of cell constant.
   b) Determination of specific and equivalent conductance of electrolyte (NaCl and HCl).
   c) Precipitation titration of Na_2SO_4 vs. $BaCl_2$.
   d) Neutralization titrations NaOH vs. HCl and NaOH vs. CH_3COOH.

5. Determination of adsorption isotherm of oxalic acid on charcoal

Books Recommended:

1) Experiments in General Chemistry, C.N.R. Rao and U.C. Aggarwal, East-West Press.
2) Experiments in Physical Chemistry, R.C. Das and B. Behra, Tata McGraw Hill.
3) Advanced Practical Physical Chemistry, J.B. Yadav, Goel Publishing House.
4) Advanced Experimental Chemistry, Vol. I, Physical, J.N. Guru and R. Kapoor, S. Chand and Co.
5) Selected Experiments in Physical Chemistry, N.G. Mukherjee, J.N. Ghosh and Sons.
6) Experiments Physical Chemistry, J.C. Ghosh, Bharati Bhavan.

BACHELOR OF SCIENCE (HONOURS) PHYSICS (SESSION 2022-23)
SEMESTER-IV

SOCIAL OUTREACH PROGRAMME

AUDIT COURSE (Value Based)

Course Title: Social Outreach Programme

Course Duration: 30 hours

Course intended for: Semester IV students of undergraduate degree programmes of all streams.

Course Credits: 2

Course Code: SECS- 4522

Course Description:-

The Social outreach programme proposes to equip the students for community upliftment work. It will strive to prepare citizens who will make a marked difference in the society. The students will be provided with numerous opportunities to build their knowledge and skills on the fundamental values of social fairness and compassion.

The programme will focus on integrating academic work with community services. It will equip the students to learn to connect knowledge gained in classroom with real life situation by getting hands on experience through community services. It will also foster the development of civic responsibility. The students will get an opportunity to

- Engage in social service.
- Reflect upon larger issues that affect communities through readings and discussions.
- Integrate academic learning and community engagement through practical field work.
- Develop awareness, knowledge and skills for working with diverse groups in the society.

Expectations:-

The students are expected to be actively engaged in working on any of the projects listed below as volunteers. Evaluation will be based on consistency, commitment and results achieved in areas taken up.

List of Projects under Social Outreach Programmes :

- Working as Motivators under the Swatch Bharat Campaign of the Government,
- Literacy drive : (i). Teaching in the Charitable School Adopted by the College
  (ii). Work in projects undertaken by Rotary Club of Jalandhar .
  for inducting students in child labour Schools.
- Enroll as NSS Volunteers for various projects (Cleanliness, Women health awareness)
- Counseling camps in villages
- Tree plantation (i) Maintaining the trees in the park adopted by the college .
  in Vikas Puri, Jalandhar
  (ii)Enroll for projects undertaken by JCI Jalandhar City
- Enroll in the Gandhian Studies Centre as student Volunteer for surveys in villages.
- Women Empowerment Programmes in collaboration with JCI Jalandhar Grace
- Generating awareness on voting among the youth.
- Drug Abuse (Generate awareness among the school children)
- Environment Awareness(Reduce Pollution)
- Old Age Homes/Orphanages
- Operating the Empathy Corner outside the college gate.
- Disaster Management/Relief Work

Evaluation /Assessment:

In the beginning of the semester the students after enrolling for one of the Projects offered will be given deadlines for the project.

- Students will be responsible for getting their hours of service recorded with the faculty and also map the progress of their subjects (children, old people, saplings etc.) .
- The respective departments will monitor the involvement of their students
- The students will submit a report of the project taken up by them.
- There will be no written examination, The students will be given grade on the basis of evaluation of the projects by an evaluation committee, comprising of the Dean of the respective streams, Head and two teachers of the concerned department.

SEMESTER V

BACHELOR OF SCIENCE (HONOURS) PHYSICS

SEMESTER–V

SESSION 2022-23

CONDENSED MATTER PHYSICS – I

Course No. BOPL- 5391

Course Outcomes: CONDENSED MATTER PHYSICS – I

After passing this course, students will be able to:

CO 1. Understand basics about crystal structures in solids, various types of crystal structure, unit cells and symmetry operations.

CO 2. Student will also understand the experimental methods to determine crystal structures, reciprocal lattice, Brillouin zones and form factor.

CO 3. Student will understand the concept of free electron model and its applications in explaining concepts of electric conductance.

CO 4. Build concept about Kronig Penny model and its application to band theory to differentiate insulators, semiconductors and conductors, Hall effect

BACHELOR OF SCIENCE (HONOURS) PHYSICS (**SESSION 2022-23**)
SEMESTER- V
COURSE CODE: BOPL- 5391

CONDENSED MATTER PHYSICS – I

Maximum Marks: 75 (External 60 + Internal 15) **Examination Time: 3 Hours**
Pass Marks: 35% **Total Teaching hours: 60**

Instructions for the Paper Setters:

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section. **Each question carries 12 marks.**

Note: Students can use scientific calculators or logarithmic tables.

Unit – I

Crystal structure, Symmetry operations for a two dimensional crystal, Two dimensional Bravais lattices, Three dimensional Bravais lattices, Basic primitive cells, Crystal planes and Miller indices, Diamond and NaCl structure.

Unit – II

Crystal Diffraction: Bragg's law, Experimental methods for crystal structure studies, Laue equations, Reciprocal lattices of SC, BCC and FCC, Brag's law in reciprocal lattice, Brillouin zones and its derivation in two dimensions, atomic from factor and Structure factor.

Unit – III

Free Electron Theory: Drude-Lorentz theory, the electrical conductivity and Ohm's Law, the thermal conductivity of metals. Wiedemann Frenz law, Sommerfeld model, the Fermi-Dirac distribution, density of electronic states, Fermi energy for one and three dimensions, average kinetic energy

Unit – IV

Band Theory: Formation of energy bands, Bloch theorem, Kronig - Penney model of an infinite one dimensional crystal, band structures, effective mass, classification of insulators, semiconductors and metals. P and N type of semiconductors, conductivity of semiconductors, mobility, P and N type of semiconductors, conductivity of semiconductors, Fermi levels in P and N type of semiconductors, Hall effect, Hall coefficient.

Books Suggested :

1. Introduction to Solid State Physics by C. Kittel (Wiley Eastern)
2. Elements of Modern Physics by S.H. Patil (TMGH, 1985).
3. Solid State Physics by Puri and Babbar.

BACHELOR OF SCIENCE (HONOURS) PHYSICS
SEMESTER– VI
SESSION 2022-23

QUANTUM MECHANICS

Course No. BOPL- 5392

Course Outcomes: Quantum Mechanics

Course Outcomes- After completing this course a student will be able to

CO1: understand about wavefunction and time dependent and time independent Schrodinger's wave equations.

CO2: understand various quantum operators, eigen functions, eigen values, expectation values and Gaussian wave functions.

CO3: apply Schrodinger's wave equation for step potential, rectangular potential, potential well and oscillating potential.

CO4: apply Schrodinger's wave equation in spherical coordinates to three dimensional problems like hydrogen atom and harmonic oscillator.

BACHELOR OF SCIENCE (HONOURS) PHYSICS (**SESSION 2022-23**)
SEMESTER– VI

COURSE CODE: BOPL- 5392

QUANTUM MECHANICS

Maximum Marks: 75 (External 60 + Internal 15) **Examination Time: 3 Hours**
Pass Marks: 35% **Total Teaching hours: 60**

Instructions for the Paper Setters:

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section. Each question carries 12 marks.

Note: Students can use scientific calculators or logarithmic tables.

UNIT-I

The Schrodinger Wave equation: Classical versus quantum mechanics, the wave function, matter waves, characteristics of the Schrodinger equation, one dimensional time dependent Schrodinger equation for free particle, particle under a potential V(x), time independent and time dependent part of one dimensional wave equation, three dimensional Schrodinger equation, time dependent and time independent 3D Schrodinger wave equation, physical interpretation of wave function, normalization of wave function, stationary state, conservation of probability, probability current density, conditions of admissibility of the wave function.

UNIT–II

Operator formalism in Quantum mechanics: Operators, operator algebra, commutators, linear operators, vector operators, Laplacian operator, Null operator, inverse operator, singular and non singular operator, Hermitian operator, Adjoint or Hermitian conjugate of an operator, Parity operator, Identity operator, Unitary operator, operators corresponding to different dynamical variables, angular momentum operator, operator for total energy, eigen functions and eigen values, well behaved and admissible solutions, simultaneous eigen functions and commutator algebra, commutator for position and momentum, commutator for energy and time, scalar product of states, properties of scalar product, norm of a state, expansion of arbitrary function in terms of eigen functions, completeness relation, linearly independent and dependent wave functions, Expectation value of dynamical quantities, Gaussian wave packet, Motion of wave packet or Ehrenfest Theorem, properties of Gaussian wave packet, Schwarz inequality, exact statement and proof of uncertainty principle for wave packets, Fundamental postulates of quantum mechanics.

UNIT–III

Application of Schrodinger wave equation to 1D problems: Boundary conditions at the surface of a finite potential, boundary conditions at the surface of infinite potential, Fundamental postulates of wave mechanics, Schrodinger equation for a free particle and equation of a particle subject to forces. A single step potential, one dimensional rectangular potential barrier, Quantum mechanical tunnelling effect, Application to barrier penetration α decay, One dimensional square well potential free states. Bound states, particle in one dimensional box, one dimensional square well potential of infinite depth, one dimensional square well of finite depth, linear harmonic oscillator, energy of oscillator, classical and quantum mechanical treatment, and eigen values, significance of zero point energy, uncertainty relation, and wave function, application of linear harmonic oscillator, Physical significance of quantum numbers, parity, transition between states.

UNIT–IV

Application of Schrodinger equation to three dimensional problems: Free particle in three dimensional rectangular box, wave function and degeneracy, three dimensional harmonic oscillator (Cartesian coordinates), particle in spherical symmetric potential, solution of θ, φ, R equations, spherical harmonics, Hydrogen atom, wave function of H atom, solution of θ, φ, R equations,, complete wave function, radial probability density, energy values of H atom, degeneracy, polar graphs of probability distribution function, selection rules, forbidden and allowed transitions, the rigid rotator, free axis, wave equation for rigid rotator, eigen function and eigen values, rigid rotator in fixed plane, Three dimensional harmonic oscillator.

Books Suggested

1. Quantum mechanics by Powell and Crasemann (Narosa Addison Wesley)
2. Quantum Mechanics by E. Merzbacher (Wiley)
3. Quantum mechanics by Mathews and Venketsan (Tata Mc GrawHill)
4. Perspectives of Quantum Mechanics by S. P Kulia (New Central Book Agency)
5. Quantum Mechanics Concepts and Applications by Nouredine Zettili (JohnWiley and Sons.)
6. Modern Physics by A. K. Sikri (Pardeep Publications)

BACHELOR OF SCIENCE (HONOURS) PHYSICS
SEMESTER–V

SESSION 2022-23

NUCLEAR PHYSICS

Course No. BOPL- 5393

Course Outcomes: NUCLEAR PHYSICS

After passing this course, students will be able to:

CO 1. Understand basic properties of nucleus and nuclear forces and various hypothesis of nucleus constituents

CO 2. Understand about radioactivity, theories of alpha, beta and gamma decay, neutrino hypothesis.

CO 3. Understand concepts and types about nuclear reactions, reactions cross section, fission and fusion

CO 4. Understand nuclear models (Liquid drop, Fermi gas model and Shell model) and their failures and successes.

BACHELOR OF SCIENCE (HONOURS) PHYSICS
(SESSION 2022-23)

SEMESTER- V
COURSE CODE: BOPL- 5393

NUCLEAR PHYSICS

Maximum Marks: 75 (External 60 + Internal 15) **Examination Time: 3 Hours**
Pass Marks: 35% **Total Teaching hours: 60**

Instructions for the Paper Setters:

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section. **All questions carry 12 marks.**

Note: Students can use scientific calculators or logarithmic tables.

UNIT–I

Nuclear Properties: Constituents of nucleus, classification of nuclei, Intrinsic properties of nucleus: nuclear charge, size, mass, density, angular momentum, magnetic dipole moment and electric quadruple moment of the nucleus, Wave mechanical properties of nucleus; statistics and parity, mass defect, packing fraction, binding energy and its variation with mass number, properties of nuclear forces, meson theory of nuclear forces. Proton-electron hypothesis, its failure, proton-neutron hypothesis.

UNIT–Il

Radioactive Decays: Radioactivity and decay laws, units of radioactivity, radioactive decay series, successive disintegration, radioactive equilibrium, modes of radioactive decay, Alpha decay: barrier penetration as applied to alpha decay, Gamow's theory of alpha decay, its application to Geiger Nuttal law. Beta decays: β-, β+ and electron capture decays, nature of Beta particle spectrum, Neutrino hypothesis, Fermi's theory, angular momentum and parity selection rules, Difference between neutrino and antineutrino, Detection of neutrino, non-conservation of parity in beta decay and its experimental verification. Gamma decay: Gamma emission, internal conversion, internal pair conversion, Auger electron, Radioisotopes and their applications, radioactive dating.

UNIT–Ill

Nuclear Reactions: Types of nuclear reactions, conservation laws, energetics of nuclear reactions, examples of nuclear reactions, Q-value and its physical significance, threshold energy for exoergic and endoergic reactions, Nuclear fission, neutron reactions, chain reactions, Nuclear reactor, reactor criticality, moderators, Nuclear fusion (Qualitative only), reaction cross section, microscopic and macroscopic cross-section.

UNIT–IV

Nuclear Models: Liquid drop model: similarities and differences between nucleus and liquid

drop, semi-empirical mass formula, Applications of semiempirical mass formula: stability of nuclei against beta and alpha decay, condition for most stable isobar, stability against spontaneous fission, failure of the liquid drop model. Nuclear stability curve, The Fermi gas model, experimental evidence for nuclear magic numbers, development of Shell Model, energy level scheme, predictions of the Shell model: angular momenta, parity and magnetic moment of nuclear ground states, electric quadrupole moments and nuclear isomerism. Limitations of Shell model.

Reference Books:

1. Basic Ideas and Concepts in Nuclear Physics by K. Hyde
2. Introduction to Nuclear Physics : H.A. Enge
3. Nuclear Physics : I. Kaplan (Addison Wesley)
4. Nuclei and Particles by E. Segre5. Nuclear and Particle Physics: Kulwant S. Thind, Manmohan Singh, Vijay Kumar, Leif Gerward

BACHELOR OF SCIENCE (HONOURS) PHYSICS
SEMESTER– V
SESSION 2022-23
ELECTRONICS

Course No. BOPL- 5394

Course Outcomes: Electronics

Course Outcomes- After completing this course a student will be able to

CO1: understand, concept of voltage and current sources, working of a p-n junction diode, Zener diode, and their use in basic gates, photonic devices, rectification and voltage regulation.

CO2: understand the characteristics, biasing and working of BJT and FETs.

CO3: able to understand h-parameters, amplifiers using BJT & FETs and types of feedbacks and practical example of negative feedback (emitter follower). understand LC and RC oscillators and their comparison.

CO4: able to understand basics of digital electronics.

BACHELOR OF SCIENCE (HONOURS) PHYSICS (**SESSION 2022-23**)
SEMESTER– V

COURSE CODE: BOPL- 5394

ELECTRONICS

Maximum Marks: 75 (External 60 + Internal 15) **Examination Time: 3 Hours**
Pass Marks: 35% **Total Teaching hours: 60**

Instructions for the Paper Setters:

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section. **All questions carry 12 marks.**

Note: Students can use scientific calculators or logarithmic tables.

UNIT–I

Concepts of current and voltage sources, Intrinsic and Extrinsic semiconductors, Fermi level, Charge carriers in semiconductors, p-n junction, p-n junction fabrication techniques, Depletion region, Biasing of diode, V-I characteristics, Voltage-current equation for p-n junction, Ideal diode, Static and Dynamic resistance of a Junction Diode, Transition and diffusion capacitance, Avalanche breakdown and Zener breakdown, Introduction to Zener diode and voltage regulation, Tunnel Diode, Rectification: half wave rectifier, Full wave rectifiers (Centre tapped and bridge rectifiers), Efficiency, Ripple factor, Qualitative ideas of filter circuits (L-filter, Shunt capacitor filter, LC and π filters), Photonic devices (solar cell, photodiode and LED).

UNIT–II

Junction transistor : Transistor fabrication techniques, Structure and working, relation between different currents in transistors, Sign conventions, Amplifying action, Different configurations of a transistor and their comparison, CB and CE characteristics, Accurate expressions for collector current, Transistor load line analysis, Thermal runaway and heat sink, Transistor biasing and stabilization of operating point, Fixed bias, Base bias with emitter feedback, Collector to base bias, Voltage divider biasing circuit. Structure and characteristics of JFET, FET biasing: self-bias and voltage divider bias, Comparison of BJT and FET.

UNIT–III

Transistor as an amplifier, Working of CB and CE amplifier, Coupled Amplifier: RC-coupled amplifier and its frequency response. Concept of hybrid parameters, Amplifier analysis using h- parameters, Equivalent circuits, Determination of current gain, voltage gain, Power gain, Input resistance, output resistance, overall voltage gain, FET amplifier (common source configuration and common drain configuration) and its voltage gain, Feedback in amplifiers, Different types, Voltage gain, Advantage of negative feed back, Emitter follower as negative feed back circuit. Barkausen criterion of sustained oscillations, LC oscillator (tuned collector, tuned base Hartley), RC oscillators, phase shift and Weinbridge.

UNIT–IV

Operational Amplifiers (Black Box approach): Characteristics of an Ideal and practical Op-Amp (IC 741), Open-loop and Closed-loop Gain. Frequency Response. CMRR. Slew Rate and concept of Virtual ground, Applications of Op-Amps: (1) Inverting and non-inverting amplifiers, (2) Adder, (3) Subtractor, (4) Differentiator, (5) Integrator, (6) Log amplifier, (7) Zero crossing detector. Introduction to CRO: Block Diagram of CRO, Electron Gun, Deflection System and Time Base, Deflection Sensitivity, Applications of CRO: (1) Study of Waveform, (2) Measurement of Voltage, Current, Frequency, and Phase Difference.

Books Suggested:

1. Electronc Devices and Circuits-J. Milkman and C. C. Halkias(Tata McgrawHill)
2. Basic Electronics and Linear Circuits by N.N. Bhargave, D.C. Kulshreshtha andS.C. Gupta.
3. Foundations of Electronics by D. Chatophadhyay, P.C. Rakshit, B. Saha and N.N.Purkit.
4. Basic Electronics by D.C. Tayal (Himalaya Pub.)
5. Principles of Electronics by V.K. Mehta & Rohit Mehta (S. Chand Publishers)
6. OP-Amps and Linear Integrated Circuit, R. A. Gayakwad, 4th edition, 2000, Prentice Hall

BACHELOR OF SCIENCE (HONOURS) PHYSICS (SESSION 2022-23)
SEMESTER-V

COURSE CODE: BOPP-5397

PHYSICS LAB-V

Course Outcomes : Physics Lab Sem V

CO 1. Students will be able to characterize p-n junction, zener diode, and their use as rectifier, filters, clipping element and to find energy gap.

CO 2. Student will be able to use CRO for AC voltage and frequency.

CO 3. Students will be able to characterize Common base and common emitter transistors and their use as amplifier.

CO 4. Students will be able to use diodes as basic gates.

BACHELOR OF SCIENCE (HONOURS) PHYSICS (SESSION 2022-23)
SEMESTER-V

COURSE CODE: BOPP-5395

PHYSICS LAB-V

Maximum Marks: 50 (External 40 + Internal 10) **Examination Time: 3 Hours**
Pass Marks: 35% **Total Teaching hours: 90**

General Guidelines for Practical Examination

I. The distribution of marks is as follows:

i) One experiment 20 Marks **ii) Brief Theory 6 Marks**

iii) Viva–Voce 7 Marks **iv) Record (Practical file) 7 Marks**

II. There will be one sessions of 3 hours duration. The paper will have one session and will consist of 8 experiments out of which an examinee will mark 6 experiments and one of these is to be allotted by the external examiner.

III. Number of candidates in a group for practical examination should not exceed 12.

IV. In a single group no experiment be allotted to more than three examinee in any group.

LIST OF EXPERIMENTS-

1. Measurement of reverse saturation current in p-n-junction diode at various temperatures and to find the approximate value of energy gap.
2. To measure (a) AC Voltage, and (b) Frequency of a periodic waveforms using CRO
3. Study the variable DC power supply using CRO and obtain the graph between DC voltmeter and CRO measurements.
4. To draw forward and reverse bias characteristics of a p-n junction diode.
5. To study diode as a clipping element.
6. To measure the efficiency and ripple factors for (a) halfwave (b) full wave and (c) bridge rectifier circuits.
7. To study the reduction in the ripple in the rectified output with RC, LC and л filters.
8. To draw the characteristics of a Zener diode.
9. To study the stabilization of output voltage of a power supply with Zener diode.
10. To study characteristics of Common Base transistor. and to find input resistance, output resistance, voltage gain and current gain.
11. To study characteristics of Common Emitter transistor. and to find h-parameters.
12. To draw output and mutual characteristics of an FET (Experiments) and determine its parameters.
13. To study Hartley oscillator.
14. To study the gain of an amplifier at different frequencies and to find Band width.
15. To study the response of RC circuit to various input voltage (square, sine and triangular).

Reference Books:

1. Practical Physics by CL Arora S. Chand Publications
2. Practical Physics by S P Singh Pragati Parkashan Meerut.

BACHELOR OF SCIENCE (HONOURS) PHYSICS (SESSION 2022-23)
SEMESTER-V

Seminar and Assignment

Course No. BOPS-5396

Maximum Marks: 50 (External 40 + Internal 10) **Periods: 8 Periods/week**

Pass Marks: 35%

Course Title: JOB READINESS COURSE

Nature of Course: Audit Course (Value -added)

Course Duration: 30 hours

Course intended for: Semester V students of undergraduate degree programmes of - BCA, B.Sc.(IT), B.Sc.(Biotech),B.Sc(Hons.)Maths, B.Sc(Hons.)Physics, BA(Hons.) English, B.Com(Pass), B.Com(Hons.) and BBA.

Course Credits: 2 **Course Code: SECJ-5551**

Objectives of the Course:

It is a specialised programme structured to prepare the students ready and adaptable for their professional career. The students will be able to set goals for themselves with the exposure provided to them during the course. The main purpose of the course is to enhance their life skills, increase their capacities for adapting to professional environment and teaming up. They will learn the importance and art of synergising with others and working in teams. It will help them to realize their potential and set high but realistic goals.

Learning Outcomes:

On successful completion of this course, students will be able to:

- Build confidence and have positive attitude
- Have an overview and exposure of job markets to realize their potential
- Get inputs on critical thinking and leadership qualities
- Comprehend how speaking skills can help them excelling in job interviews
- Acquire knowledge of team work
- Share their ideas in the group and improve their listening skills
- Learn skills of self-introduction to represent themselves and to write a well drafted resume

CURRICULUM

Course Code: SECJ-5551 Course Credits: 02 Contact Hours: 30

MODULE	TITLE	HOURS
I	Goal Setting and Ambition	2 Hours
II	Positive Attitude and Self Confidence	2 Hours

III	Career Options and Job Markets	2 Hours
IV	Resume Building	4 Hours
V	Presentation Skills	4 Hours
VI	Public Speaking	4 Hours
VII	E-Mail Etiquette and Telephonic Conversation	2 Hours
VIII	Organizational Structure and Corporate Jargons	2 Hours
IX	Personal Interviews	4 Hours
X	Final Assessment, Feedback and Closure	4 Hours

EXAMINATION

- **Total Marks:** 25 (Exam: 20 and Internal Assessment: 5)
- **Final Exam:** Multiple Choice Quiz and/or practice/mock tests - Marks – 20; Time: 1 to 2 hours depending upon the batch size of 10-20 participants
- **Internal Assessment:** 5 (Assessment: 3; Attendance:2)
    - Comparative assessment questions (medium length) in the beginning and at closure of the programme. Marks: 3; Time: 0.5 hour each at the beginning and end.
- **Total marks:** 25 converted to grade for final result
- **Grading system:**

90.1% -100% marks: O grade
80.1% - 90% marks: A+ grade
70.1% - 80% marks: A grade
60.1% - 70% marks: B+ grade
50.1% -60% marks: B grade
45%- 50 % marks: C grade
35%-44.9% marks: P grade
Below 35% marks: F grade
Absent: Ab

SEMESTER VI

BACHELOR OF SCIENCE (HONOURS) PHYSICS
SEMESTER– VI
SESSION 2022-23

RADIATION AND PARTICLE PHYSICS

Course No. BOPL- 6391

Course Outcomes: Particle Physics

After successfully completing this course a student will be able to:

CO1: understand about elementary particles, different types of interactions and quark model.

CO2: understand interaction of radiation and charged particles with matter.

CO3: understand theory and working of various particle accelerators, linear and cyclic and phase stability conditions.

CO4: understand theory and working of various types of nuclear detectors like gas filled, semiconductor, solid state track detectors and nucleus emulsions.

BACHELOR OF SCIENCE (HONOURS) PHYSICS (**SESSION 2022-23**)
SEMESTER– VI

COURSE CODE: BOPL- 6391

Radiation and Particle Physics

Maximum Marks: 75 (External 60 + Internal 15) **Examination Time: 3 Hours**
Pass Marks: 35% **Total Teaching hours: 60**

Instructions for the Paper Setters:

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

Note: Students can use scientific calculators or logarithmic tables.

UNIT-I

Elementary Particles and their Properties- Historical introduction, particles and antiparticles, classification of particles, Properties of different baryons, Hyperons, Leptons and Mesons like life time, mass, spin parity and conservation law. Observation of Strange particles production and decay, Introduction to quarks and their types, Quark contents of baryons and mesons, Discovery of cosmic rays: hard and soft components, Primary and secondary cosmic Rays, cosmic ray showers, effect of altitude and earth's magnetic field on the cosmic ray trajectories, east-west symmetry.

UINT-II

Interaction of Radiation and Charged Particles with Matter: Types of interactions, electromagnetic, weak, strong interactions, gravitational interactions, Basic resonance particles. Stopping power of heavy charged particle, derivation of Bethe-Bloch formula, range of particle, Bragg curve, range straggling, Geiger Nuttal's law, Energy loss of electrons and positrons, Positrons annihilation in condensed media, interaction of gamma rays with matter: photoelectric effect, Compton scattering, pair production.

UNIT-III

Accelerators - Accelerators, linear accelerators, Cockcroft-Walton accelerator, Van de Graff accelerator, cyclic accelerators, Cyclotron, Betatron, Synchro-cyclotron, focusing, Phase stability, electron synchrotron, CERN Super Proton Synchrotron (SPS), Larger Hadron collider (LHC), Tevatron.

UNIT-IV

Nuclear Radiation Detection - Gas-filled detectors, Proportional and Geiger-Muller counters, Scintillation detectors, Semiconductor detectors, Cherenkov effect, Electromagnetic and hadronic calorimeter, solid state nuclear track detectors, bubble chambers, spark counter, nuclear emulsions.

Books:

1. Introduction to Elementary Particles by D. Griffth (Wiley-VCH)
2. Introduction to High Energy Physics by D.H. Perkins (Cambridge University Press)
3. Elementary Particles by I.S. Hughes (Cambridge University Press)

BACHELOR OF SCIENCE (HONOURS) PHYSICS
SEMESTER– VI
SESSION 2022-23

CONDENSED MATTER PHYSICS – II

Course No. BOPL- 6392

Course Outcomes: Condensed Matter Physics – II

After completing this course student will be able to

CO1: understand the concept of phonons, and role of lattice vibrations in specific heat of solids.

CO2: understand the basic concepts related to super conductivity.

CO3: understand the concept of dielectric polarisation types and frequency dependence.

CO4: understand the basics about nanomaterials and some characterisation techniques.

BACHELOR OF SCIENCE (HONOURS) PHYSICS (**SESSION 2022-23**)
SEMESTER– VI

COURSE CODE: BOPL- 6392

CONDENSED MATTER PHYSICS – II

Maximum Marks: 75 (External 60 + Internal 15) **Examination Time: 3 Hours**
Pass Marks: 35% **Total Teaching hours: 60**

Instructions for the Paper Setters:

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

Note: Students can use scientific calculators or logarithmic tables.

UNIT –I

Lattice vibrations, One Dimensional Monoatomic Lattice, Dispersion relation, phonons, phonon momentum during elastic and inelastic scattering, Inelastic scattering of photons by phonons, Specific heat of solids, Classical Model of specific heat of solids (Dulong and Petit's Law), Einstein and Debye Models of Specific Heat of Solids. T^3 law.

UNIT – II

Superconductivity, Comparison of electrical, magnetic and thermodynamical properties of superconductors and normal conductors. Persistent Currents, Effect of magnetic field on super conductor, Meisner effect, Types of Super Conductors, London's equation and penetration depth, Thermodynamics of Superconductors, BCS theory (formation of cooper pairs), ground state and energy gap. High Temperature Superconductors.

UNIT – III

Polar and Non Polar Molecules, Dielectric Polarization, Electric displacement vector and dielectric constant, Local Electric Field, Clausius Mosotti equation,. Different contribution to polarization: dipolar, electronic and ionic polarizabilities, frequency dependence Ferroelectric crystals: Classifications and their general properties

UNIT – IV

Basic ideas of materials at nanoscale, Difference from bulk material properties, Nanoparticles, Applications of nanotechnology in various fields. (Qualitative only) Characterization techniques: X-Ray Diffraction. Optical Microscopy. Scanning Electron Microscopy. Transmission Electron Microscopy. Atomic Force Microscopy. Scanning Tunneling Microscopy.

Books Suggested :

1. Introduction to Solid State Physics by C. Kittel (WileyEastern)
2. Elements of Modern Physics by S.H. Patil (TMGH,1985).
3. Solid State Physics by Puri and Babbar.
4. K. P. Jain Physics of Semiconductor Nanostructures. New Delhi: Narosa Publishing House, 1997.
5. Solid State Physics: J.P. Srivastva-Prentice Hall, 2007.
6. Introduction to nanoscience and Nanotechnology: K.K. Chattopadhyay and A.N. Banerjee- PHI Learning Pvt. Ltd. 2009

BACHELOR OF SCIENCE (HONOURS) PHYSICS
SEMESTER–VI
SESSION 2022-23

MOLECULAR SPECTROSCOPY AND LASER

Course No. BOPL- 6393

Course Outcomes: MOLECULAR SPECTROSCOPY AND LASER

After passing this course, students will be able to:

CO 1: understand the basics of microwave and infrared spectroscopy and their applications.

CO 2: understand the Raman and electronic spectroscopy, applications and comparison.

CO3: understand the basics of principle and theory of working of LASERs.

CO 4: understand different types of LASER and basics of Q Switching and holography.

BACHELOR OF SCIENCE (HONOURS) PHYSICS (**SESSION 2022-23**)

SEMESTER- VI

COURSE CODE: BOPL- 6393

MOLECULAR SPECTROSCOPY AND LASER

Maximum Marks: 75 (External 60 + Internal 15) **Examination Time: 3 Hours**
Pass Marks: 35% **Total Teaching hours: 60**
Instructions for the Paper Setters:

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

Note: Students can use scientific calculators or logarithmic tables.

UNIT–I

Microwave and Infra-Red Spectroscopy

Types of molecules, Types of molecular spectra, Born Oppenheimer approximation, rotation of molecules, origin of rotational spectra, rotational spectra of diatomic molecules as a rigid rotator, Thermal distribution of rotational energy levels, Effect of isotopic substitution, diatomic molecule as non-rigid rotator, technique and instrumentation of microwave spectroscopy, The vibrating diatomic molecule: Energy of a diatomic molecule, simple harmonic oscillator, isotopic effect, anharmonic oscillator, Outline of technique and instrumentation, Applications of Infrared spectroscopy.

UNIT–II

Raman and Electronic Spectroscopy:

Nature of the Raman spectra, characteristic properties of Raman lines, Experimental arrangement for Raman spectra, Quantum and classical theories of Raman Effect, Pure rotational Raman spectra, Rule of mutual exclusion, applications of Raman and infra-red spectroscopy, Electronic spectra: Salient features of molecular electronic spectra, origin of electronic spectra, Electronic spectra of diatomic molecule, Outline of technique and instrumentation of electronic spectroscopy,

UNIT–III

Laser Fundamentals:

Concept of laser, unique properties of lasers, Absorption and spontaneous emission, Einstein coefficients and their relations, light amplification Concept of stimulated emission and population inversion, components of laser and lasing action, three and four level lasing techniques, Principal pumping schemes, Fauchber Ledenberg formula, Threshold and Schawlow Townes condition,

UNIT–IV

Laser Systems: Types of lasers, Ruby and Nd: YAG lasers, He-Ne and CO_2 and dye lasers construction and their working, laser beam characteristics. Applications of lasers, Q switching Holography: The underlying principle, applications of Holography

Text Reference Books:

1. Fundamentals of Molecular Spectroscopy: C.B. Banwell-Tata McGraw Hill,1986.
2. Spectroscopy Vol. I, II & III: Walker &Straughen
3. Introduction to Molecular Spectroscopy: G.M. Barrow-Tokyo McGraw Hill,1962.
4. Spectra of Diatomic Molecules: Herzberg-New York,1944.
5. Molecular Spectroscopy: Jeanne LMcHale.
6. Atomic and molecular spectra: laser by Rajkumar
7. Laser Fundamentals by W.T. Silfvast (Foundation Books), New Delhi, 1996
8.Laser and Non-Liner Optics by B.B. Laud (New Age Pub.) 2002
9.Laser, Svelto by (Plenum Pres) 3rd edition, New York

BACHELOR OF SCIENCE (HONOURS) PHYSICS

SEMESTER–VI

(Session-2022-23)

DIGITAL ELECTRONICS AND APPLICATIONS

Course No. BOPL- 6394

Course Outcomes: DIGITAL ELECTRONICS AND APPLICATIONS

After passing this course, students will be able to:

CO 1: understand the basics of ICs, binary to digital and digital to binary conversions, different number systems, addition and subtraction in binary system.

CO 2: understand different gates, Boolean laws, K maps.

CO3: understand the basics of gates as adders, subtractor, comparator, multiplexer, demultiplexer, encoder, decoder and flip-flops.

CO 4: understand IC 555: multivibrators, registers, Counters, Semiconductor Memories.

BACHELOR OF SCIENCE (HONOURS) PHYSICS
SEMESTER–VI
SESSION 2022-23

DIGITAL ELECTRONICS AND APPLICATIONS

Course No. BOPL- 6394

Maximum Marks: 75 (External 60 + Internal 15) **Examination Time: 3 Hours**
Pass Marks: 35% **Total Teaching hours: 60**
Instructions for the Paper Setters:

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section. Each question carry 12 marks.

Note: Students can use scientific calculators or logarithmic tables.

UNIT–I

Integrated Circuits (Qualitative treatment only): Distinction between analog and digital signal, Applications and advantages of digital signals, Advantages and drawbacks of ICs, Classification of ICs, Digital circuit, Binary number system, Decimal to binary conversion, Binary to decimal conversion, Octal number system, Hexa decimal number system, Binary coded decimal code (BCD code), Binary Addition, Binary Subtraction using 2's Complement, A/D Conversion (successive approximation), BCD addition.

UNIT–II

Digital Circuits and Boolean algebra: Definition, symbols and truth table of AND, OR and NOT Gates (realization using Diodes and Transistor); NAND and NOR Gates as Universal Gates; XOR and XNOR Gates and application as Parity Checkers; De Morgan's Theorems; Boolean Laws; Simplification of Logic Circuit using Boolean Algebra; Fundamental Products, Conversion of a Truth table into Equivalent Logic Circuit by (1) Sum of Products Method and (2) Karnaugh Map (up to 4 variables)

UNIT–III

Arithmetic and Logic circuits: half adder, full adder, half subtractor, full subtractor, comparator, multiplexer, demultiplexer, encoder, decoder, **Flip-flop:** Introduction to sequential circuits; flip flops, RS flip-flop, Clocked RS flip-flop, D flip-flop, Latches, level triggered & edge triggered flip-flops, positive and negative edge triggering, limitations of JK flip-flop, race-around condition. Applications of flip flops.

UNIT–IV

Timers: IC 555: block diagram and applications: Astable multivibrator and Monostable multivibrator. Shift registers: Serial-in-Serial-out, Serial-in-Parallel-out, Parallel-in-Serial-out and Parallel in-Parallel-out Shift Registers (only up to 4 bits), Counters (4 bits): Ring Counter, Asynchronous counters, Decade Counter. Synchronous Counter. **Semiconductor Memories:** Introduction, Memory organization, Classification and characteristics of memories. Read/write memory, ROM, RAM, EPROM, EEPROM, Basic idea of static dynamic memory,

Reference Books:

1. A. P. Malvino,and D. P. Leach, Digital Principles and Applications. New Delhi: Tata
2. McGraw Hill, 1986.
3. A. P. Malvino, Digital Computer Electronics. New Delhi: Tata McGraw Hill, 1986.
4. W. H. Gothmann, Digital Electronics. New Delhi: Prentice Hall, 1980.
5. J. Millman,and H. Taub, Pulse, Digital and Switching Waveforms. New Delhi: Tata
6. McGraw Hill, 1992.
7. A. Mottershead, Electronic Devices and Circuits. New Delhi: Prentice Hall, 1977.
8. R. S. Gaonkar, Microprocessor Architecture, Programming and Applications with 8085. New Delhi: Prentice Hall, 2002.

BACHELOR OF SCIENCE (HONOURS) PHYSICS (SESSION 2022-23)
SEMESTER-VI

PHYSICS LAB-VI

Course No. BOPP-6395

COURSE OUTCOMES

After completing this lab student will be able to:

CO1: use GM counter as detector

CO2: Characterise Thermistor, diode, LDR and to find magnetic parameters using CRO.

CO3: understand Hall effect and Boltzmann's coefficient, photo electric effect

CO4: To use OP-Amps as inverting and non inverting amplifiers and its application in zero cross detector and comparator.

BACHELOR OF SCIENCE (HONOURS) PHYSICS (SESSION 2022-23)
SEMESTER-VI

PHYSICS LAB-VI

Course code: BOPP- 6395

Maximum Marks: 50 (External 40 + Internal 10) **Examination Time: 3 Hours**
Pass Marks: 35% **Total Teaching hours: 90**
General Guidelines for Practical Examination

I. The distribution of marks is as follows:

i) One experiment 20 Marks **ii) Brief Theory 6 Marks**

iii) Viva–Voce 7 Marks **iv) Record (Practical file) 7 Marks**

II. There will be one sessions of 3 hours duration. The paper will have one session and will consist of 8 experiments out of which an examinee will mark 6 experiments and one of these is to be allotted by the external examiner.

III. Number of candidates in a group for practical examination should not exceed 12.

IV. In a single group no experiment be allotted to more than three examinee in any group.

LIST OF EXPERIMENTS-

1. To draw the plateau of a GM counter and find its dead time.
2. Study of counting statistics using background radiation using GM counter.
3. To study the absorption of beta particles in aluminium using GM counter and determine the absorption coefficient of beta particles from it.
4. To study the characteristics of a thermistor and find its parameters.
5. To trace the B-H curves for different materials using CRO and find the magnetic parameters from these.
6. To determine the wavelength of laser light using a plane diffraction grating.
7. To determine the Boltzmann constant using V-I characteristics of PN junction diode.
8. To determine the Hall coefficient of a semiconductor sample.
9. To study characteristics of light dependant resistor (LDR).
10. To measure the intensity using LDR in laser diffraction patterns of single and double slit.
11. To study photoelectric current vs intensity of light and cathode voltage using photocell.
12. To study photoelectric current vs wavelength of light using photocell and hence find Plank's constant.
13. To study an inverting and non-inverting amplifier using Op-amp (741) for a given dc voltage.
14. To study the zero-crossing detector and comparator.

Reference Books:

1. Practical Physics by CL Arora S. Chand Publications
2. Practical Physics by S P Singh Pragati Parkashan Meerut.

BACHELOR OF SCIENCE (HONOURS) PHYSICS (SESSION 2022-23)
SEMESTER-VI

PHYSICS LAB-VII

Course No. BOPP-6396

COURSE OUTCOMES

After completing this lab student will be able to

CO1: understand logic gates and their truth tables

CO2: understand 2-bit comparator, adders, subtractors, parity generator and checker.

CO3: understand shift register, flip flops

CO4: understand A/D, D/A converters and counters.

BACHELOR OF SCIENCE (HONOURS) PHYSICS (SESSION 2022-23)
SEMESTER-VI

COURSE CODE: BOPP-6396

PHYSICS LAB-VII

Maximum Marks: 50 (External 40 + Internal 10) **Examination Time: 3 Hours**
Pass Marks: 35% **Total Teaching hours: 90**

General Guidelines for Practical Examination

I. The distribution of marks is as follows:

i) One experiment 20 Marks **ii) Brief Theory 6 Marks**

iii) Viva–Voce 7 Marks **iv) Record (Practical file) 7 Marks**

II. There will be one sessions of 3 hours duration. The paper will have one session and will consist of 8 experiments out of which an examinee will mark 6 experiments and one of these is to be allotted by the external examiner.

III. Number of candidates in a group for practical examination should not exceed 12.

IV. In a single group no experiment be allotted to more than three examinees in any group.

LIST OF EXPERIMENTS-

1. Study of logic gates using universal gates.
2. To verify and design AND, OR, NOT and XOR gates using NAND gates.
3. To form a half adder and a full adder using NAND gates and verify their truth tables.
4. To form a 2-bit comparator using NAND gates.
5. To study Half Adder, Full Adder and 4-bit binary Adder.
6. To study Half Subtractor, Full Subtractor, Adder-Subtractor using Full Adder I.C.
7. To study Parity generator and checker.
8. To study truth table of shift register.
9. To study the truth table of flip flop.
10. To study encoder, decoder circuit.
11. To study D/A and A/D convertors.
12. To build different Flip-flop Circuits using elementary gates (RS, Clocked RS, D type, and JK Flip Flop).
13. To build Flip-Flop (RS, Clocked RS, D-type and JK) circuits using NAND gates.
14. To study a 4-bit Counter using D-type/JK Flip-Flop ICs and study timing diagram.

Reference Books:

1. Digital Electronics Circuit and System by V.K. Puri (TMH, New Delhi).
2. Digital Design by M. Morris Mano (PHI, New Delhi).