B. Sc. PHYSICS
SYLLABUS - 2014

SCHOOLS OF EXCELLENCE
with
CHOICE BASED CREDIT SYSTEM (CBCS)

SCHOOL OF PHYSICAL SCIENCES
St. JOSEPH'S COLLEGE (Autonomous)
Accredited at 'A' Grade (3rd Cycle) by NAAC
College with Potential for Excellence by UGC
TIRUCHIRAPPALLI - 620 002, INDIA

SCHOOLS OF EXCELLENCE WITH
CHOICE BASED CREDIT SYSTEM (CBCS)

POST GRADUATE COURSES

St. Joseph's College (Autonomous), a pioneer in higher education in India, strives to work towards the academic excellence. In this regard, it has initiated the implementation of five "Schools of Excellence" from this academic year 2014 – 15, to standup to the challenges of the 21st century.

Each School integrates related disciplines under one roof. The school system allows the enhanced academic mobility and enriched employability of the students. At the same time this system preserves the identity, autonomy and uniqueness of every department and reinforces their efforts to be student centric in curriculum designing and skill imparting. These five schools will work concertedly to achieve and accomplish the following objectives.

- Optimal utilization of resources both human and material for the academic flexibility leading to excellence.
- Students experience or enjoy their choice of courses and credits for their horizontal mobility.
- The existing curricular structure as specified by TANSCHE and other higher educational institutions facilitate the Credit-Transfer Across the Disciplines (CTAD) - a uniqueness of the choice based credit system.
- Human excellence in specialized areas
- Thrust in internship and / or projects as a lead towards research and
- The **multi-discipline** nature of the newly evolved structure (School System) caters to the needs of stake-holders, especially the employers.

What is Credit system?

Weightage to a course is given in relation to the hours assigned for the course. Generally one hour per week has one credit. For viability and conformity to the guidelines credits are awarded irrespective of the teaching hours. The following Table shows the correlation between credits and hours.

However, there could be some flexibility because of practical, field visits, tutorials and nature of project work.

For UG courses, a student must earn a minimum of 150 credits as mentioned in the table below. The total number of minimum courses offered by a department are given in the course pattern.

SUMMARY OF HOURS AND CREDITS
UG COURSES - PHYSICS

Part	Semester	Specification	No. of Courses	Hours	Credits	Total Credits
I	I-IV	**Languages** (Tamil/Hindi/French/Sanskrit)	4	16	12	**12**
II	I-IV	**General English**	4	20	12	**12**
III	I-VI	**Core** Theory Practicals Internship & Project Work Comprehensive Exam	17	90	69	
		Core Electives	3	12	11	
		Allied	4	24	18	
		Additional Core Courses for Extra Credits	-	-	-	**98**
IV	V-VI	**Skilled Based Electives** Between Schools (BS) Within School (WS)	1 1	2 2	2 2	**4**
	V	**Inter Departmental Courses (IDC)** - Soft Skills	1	2	2	**2**
	I-IV	**NMC** Communicative English Computer Literacy	1 1	0 2	5 2	**7**
	I-IV	**Environmental Studies**	1	2	2	**2**
		Value Education	4	8	8	**8**
V	I-V	**SHEPHERD & Gender Studies**	1	-	5	**5**
	I-V	**AICUF, Fine Arts, Nature Club, NCC & NSS**				
		TOTAL		180		150

Course Pattern

The Under Graduate degree course consists of Five vital components. They are as follows:

Part -I : Languages (Tamil / Hindi / French / Sanskrit)

Part-II : Genera English

Part-III : Core Course
(Theory, Practicals, Core Electives, Allied, Project, Internship and Comprehensive Examinations)

Part-IV : SBE, NMC, Value Education, Soft Skills & EVS

Part-V : SHEPHERD, AICUF, Finearts, Nature Club, NCC, NSS, etc.

Non-Major Courses (NMC)

There are three NMC's – Communicative English, Computer Literacy and Environmental Studies offered in the I, II & III Semesters respectively.

Value Education Courses:

There are four courses offered in the first four semesters for the First & Second UG students.

Non Major Elective / Skill Based Elective:

These courses are offered in two perspectives as electives "With-in School" (WS) and "Between School" (BS).

Subject Code Fixation

The following code system (11 characters) is adopted for Under Graduate courses:

14	UXX	X	X	XX	XX
↓	↓	↓	↓	↓	↓
Year of Revision	UG Code of the Dept	Semester of the Part	Specification	Subject Category	Running in that part
14	**UPH**	**1**	**3**	**2**	**1**

For Example :

I B.Sc. Physics, first semester Mechanics & Properties of Matter
The code of the paper is 14UPH130201.
Thus, the subject code is fixed for other subjects.

Subject Category

00 - Languages (Tamil / Hindi / French / Sanskrit)
01 - General English
02 - Core (Theory, Practicals, Comprehensive Exams, Internship & Project viva-voce)
03 - Core Electives
04 - Allied
05 - Additional core Courses for Extra Credits (If any)
06 - Skill Based Electives (BS) & (WS)
07 - Soft Skill
08 - NMC (Communicate English, Computer Literacy/SAP)
09 - EVS
10 - Value Education
11 - SHEPHERD & Gender Studies
12 - AICUF / Nature Club / Fine Arts / NCC / NSS /etc.

EXAMINATION

Continuous Internal Assessment (CIA):

UG - Distribution of CIA Marks	
Passing Minimum: 40 Marks	
Library Referencing	5
3 Components	35
Mid-Semester Test	30
End-Semester Test	30
CIA	**100**

MID-SEM & END – SEM TEST

Centralised – Conducted by the office of COE

1. Mid-Sem Test & End-Sem Test: (2 Hours each); will have Objective + Descriptive elements; with the existing question pattern PART-A; PART-B; and PART-C
2. CIA Component III for UG & PG will be of 15 marks and compulsorily objective multiple choice question type.
3. The CIA Component III must be conducted by the department / faculty concerned at a suitable computer centres.
4. The 10 marks of PART-A of Mid-Sem and End-Sem Tests will comprise only: OBJECTIVE MULTIPLE CHOICE QUESTIONS; TRUE / FALSE; and FILL-IN BLANKS.
5. The number of hours for the 5 marks allotted for Library Referencing/ work would be 30 hours per semester. The marks scored out of 5 will be given to all the courses (Courses) of the Semester.
6. English Composition once a fortnight will form one of the components for UG general English

SEMESTER EXAMINATION

Testing with Objective and Descriptive questions

Part-A: 30 Marks
Objective MCQs only

Answers are to be marked on OMR score-sheet. The OMR score-sheets will be supplied along with the Main Answer Book. 40 minutes after the start of the examination the OMR score-sheets will be collected

Part-B + C = 70 Marks
Descriptive
Part-B: 5 x 5 = 25 marks; inbuilt choice;
Part-C: 3 x 15 = 45 marks; 3 out of 5 questions, open choice.

The Accounts Paper of Commerce will have
Part-A: Objective = 25
Part-B: 25 x 3 = 75 marks.

Duration of Examination must be rational; proportional to teaching hours 90 minute-examination / 50 Marks for courses of 2/3 hours/week (all Part IV UG Courses) 3-hours examination for courses of 4-6 hours/week.

EVALUATION
Percentage Marks, Grades & Grade Points
UG (Passing minimum 40 Marks)

Qualitative Assessment	Grade Points	Grade	Mark Range %)
Exemplary	10	S	90 & above
Outstanding	9	A+	85-89.99
Excellent	8	A	80-84.99
Very Good	7	B	70-79.99
Good	6	C	60-69.99
Satisfactory	5	D	50-59.99
RA	4	E	40-49.99
	0	RA	< 40

CGPA - Calculation

Grade Point Average for a semester is calculated as indicated here under:

<u>Sum total of weighted Grade Points</u>
Sum of Gredits

Weighted Grade Points is *Grade point x Course Credits.* The final CGPA will only include: Core, Core Electives & IDCs.
A Pass in SHEPHERD will continue to be mandatory although the marks will not count for the calculation of the CGPA.

Continuous Internal Assessment (CIA):

Class	Mark Range (%)
Distinction	75 & above, first attempt
First	60 & above
Second	50 to 59.99
Third	40 to 49.99

Declaration of Result:

Mr./Ms. _____ has successfully completed the Under Grduate in _____ programme. The candidate's Cumulative Grade Point Average (CGPA) in Part – III is _____ and the class secured is _____ by completing the minimum of 150 credits.

The candidate has acquired _____ (if any) more credits from SHEPHERD / AICUF/ FINE ARTS / SPORTS & GAMES / NCC / NSS / NATURE CLUB, ETC. The candidate has also acquired _____ (if any) extra credits offered by the parent department courses.

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B. Sc. PHYSICS
Course Pattern - 2014 Set

Sem		Part	Code	Course	Hrs	Credits
I	I	Language	14UGT110001	Language - I: (Tamil / Hindi / French / Sanskrit)	4	3
	II	English	14UGE120101	General English – I	5	3
	III	Core	14UPH130201	Core1: Mechanics & Properties of Matter	5	5
			@	Physics Practical – I	3	-
			@	Basic Workshop Practice	3	-
				Library	2	-
		Allied	14UPH130401	Mathematics – I (Mandatory)	6	5
		NMC	14UCE140801	Communicative English	-	5
	IV	V. Edn	14UFC141001	Value Education - I: Essentials of Ethics, Yoga and Stress Management	2	2
				Total for Semester I	**30**	**23**
II	I	Language	14UGT210002	Language - II (Tamil / Hindi / French / Sanskrit)	4	3
	II	English	14UGE220102	General English – II	5	3
	III	Core	14UPH230202	Sound, Thermal & Statistical Physics	5	5
			14UPH230203	Physics practical-I	3	4
			14UPH230204	Basic Workshop Practice	3	4
		Allied	14UPH230402	Mathematics – II (Mandatory)	6	5
	IV	NMC	14UCE240802	Computer Literacy	2	2
		V. Edn	14UFC241002	Techniques of Social Analysis	2	2
				Total for Semester II	**30**	**28**
III	I	Language	14UGT310003	Language - III (Tamil / Hindi / French / Sanskrit)	4	3
	II	English	14UGE320103	General English – III	5	3
	III	Core	14UPH330205	Core 5: Mathematical Physics	6	6
			@	Physics Practical – II	3	-
		Allied	14UPH330403 A	Chemistry-I OR	4	3
			14UPH330403 B	Computer Science-I		
		Allied	@	Chemistry Practical / Computer Practical	2	-
		NMC	14UCE340901	Environmental Studies	2	2
	IV	V. Edn	14UFC341003 A	Professional Ethics I: Social Ethics OR	2	2
			14UFC341003 B	Professional Ethics I: Religious Doctrine		
				Library	2	-
				Total for Semester III	**30**	**19**

Sem		Part	Code	Course	Hrs	Credits
IV	I	Language	14UGT410004	Language - IV (Tamil / Hindi / French / Sanskrit)	4	3
	II	English	14UGE420104	General English – IV	5	3
	III	Core	14UPH430206	Electricity & Magnetism	5	4
			14UPH430207	Physics Practical-II	3	4
				Library	1	-
		Allied	14UPH430404 A	Chemistry-II OR	4	3
			14UPH430404 B	Comp. Science-II		
			14UPH430405 A	Allied: Chemistry Practical OR	2	2
			14UPH430405 B	Allied: Computer Practical		
		Core Elective	14UPH430301 A	(WS): Energy Physics OR	4	3
			14UPH430301 B	Material Science		
	IV	V. Edn	14UFC441004 A	Professional Ethics-II: Social Ethics OR	2	2
			14UFC441004 B	Professional Ethics-II: Religious Doctrine		
				Total for Semester IV	**30**	**24**
V	III	Core	14UPH530208	C Programming for physics	5	5
			14UPH530209	Atomic Solid State & Nuclear Physics	5	5
			14UPH530210	Analog Electronics	5	5
			14UPH530211	Physics Practical-III	6	3
		Core Elective	14UPH530302 A	(WD): Photography OR	4	3
			14UPH530302 B	Videography		
	IV	SBE	14UPH540601	(BS): Electrical Wiring	2	2
	IV	IDC	14USS540701	Soft Skills	2	2
				Library	1	-
				Total for Semester V	**30**	**25**
VI	III	Core	14UPH630212	Internship	-	2
			14UPH630213	Optics Spectroscopy & Laser	5	4
			14UPH630214	Quantum Mechanics & Relativity	5	4
			14UPH630215	Digital Electronics & Microprocessor	5	4
			14UPH630216	Physics Practical – IV	6	3
			14UPH630217	Comprehensive Examination	-	2
		Core Elec.	14UPH630303 A	(WD): Instrumentation OR	4	3
			14UPH630303 B	Communication system		
		Core Elec.	14UPH630304 A	(WD): Biomedical instrumentation OR	3	2
			14UPH630304 B	Astrophysics		
	IV	SBE	14UPH640602	(WS): Cell Phone Servicing	2	2
				Total for Semester VI	**30**	**26**
I-V	V		14UCW651101	SHEPHERD and Gender Studies		5
				All Semesters	**180**	**150**

* Code numbers according to the subject chosen

@ Practical examination in the following even semester.

nghJj j kpo;-I

Nehf;fq;fs;

1. r%f khwwr; rpeji dfi s cssl ffpa jw;fhy , yff;paq;fi s mwpKfk; nraj y;

2. GJfftpi j>rpWfi j>ci uei l Mfpa , yff;paqfspd;eak;ghuhl Lj y;

3. rejpggpi oapdwpvOj khz th;fi sg; gapWtpj jy;

gad;fs;

1. khz th;fs; r%f khwwrrpeji dfi s mwpe;Jnfhs;th;

2. rejpggpi ofi s elff;pvOJk; jpwd; ngWth;

3. Gjjpyff;paqfi sg; gi l fFk; jpwi dAk> jpwdha; T nraAk; jpwi dAk; ngWth;

myF-1: kfhftpp ghujpahh; ftpi j fs;

         ghujpjhrd; ftpi j fs;

         ci uei l - Kj y; %dW fl Li ufs;   (10 kz p Neuk)

myF-2: gl LfNfhl;i l ahh; ghl yfs;

         ghtyNuW ngUQrjj pudhh; ghl yfs;

         , yffz k;-typkpFk; , l qfs;   (12 kz p Neuk)

myF-3: GJfftpp j tbtqfs;

         , yffpatuyhW - %dwhk; ghfk;

         rpWfi j- Kj y; MW rpWfi j fs;   (10 kz p Neuk)

myF-4: GJfftpi j fs;

         ngz z paf; ftpi j fs;

         , yffpa tuyhW - ehdfhk; ghfk;

         , yffz k;- typkpfh , l qfs;(14 kz p Neuk)

myF-5: nkhopngahgGfftpi j fs;

         rpWfi j- 7 Kj y; 12 Kba css rpWfi j fs;

         ci uei l- 4Kj y; 6 Kba css fl Li ufs; (14 kz p Neuk)

ghl E}y;

1. nghJj j kpo; nra As; jpul L- jkpoha;Tj ;Ji w ntspaL-2014-2017

2. r%ftppay; Nehf;fpy; jkpo;, , yffpa tuyhW> jkpoha;Tj ;Ji w ntspaL> J}a tsdhh; fy;Y}hp> jpUrpuhggssp2> 2014

3. ci uei lf; Nfhi t - jkpoha;Tj ;Ji w ntspaL> 2014

4. rpWfi jj njhFgG

GENERAL ENGLISH-I

Objectives

To help students

* Use words and phrases related to self, home, friends and relatives in meaningful contexts.
* Use language to perform basic functions like describing, clarifying, suggesting, and giving directions.

Unit-1

01. Personal Details
02. Positive Qualities
03. Listening to Positive Qualities
04. Relating and Grading Qualities
05. My Ambition
06. Abilities and Skills
07. Self-Improvement Word Grid
08. What am I doing?
09. What was I doing?
10. Unscramble the Past Actions
11. What did I do yesterday?

Unit-2

12. Body Parts
13. Actions and Body Parts
14. Value of Life
15. Describing Self
16. Home Word Grid
17. Unscramble Building Types
18. Plural Form of Naming Words
19. Irregular Plural Forms
20. Plural Naming Words Practice
21. Whose Words?

Unit -3

22. Plural Forms of Action Words
23. Present Positive Actions
24. Present Negative Actions
25. Un/Countable Naming Words
26. Recognition of Vowel Sounds
27. Indefinite Articles

28. Un/Countable Practice
29. Listen and Match the Visual
30. Letter Spell - Check
31. Drafting Letter

Unit 4

32. Friendship Word Grid
33. Friends' Details
34. Guess the Favourites
35. Guess Your Friend
36. Friends as Guests
37. Introducing Friends
38. What are We Doing?
39. What is (s)he / are they Doing?
40. Yes / No Question
41. What was s/he doing?
42. Names and Actions
43. True Friendship
44. Know your Friends
45. Giving Advice/Suggestions
46. Discussion on Friendship
47. My Best Friend

Unit 5

48. Kinship Words
49. The Odd One Out
50. My Family Tree
51. Little Boy's Request
52. Occasions for Message
53. Words denoting Place
54. Words denoting Movement
55. Phrases for Giving Directions
56. Find the Destination
57. Giving Directions Practice
58. SMS Language
59. Converting SMS
60. Writing Short Messages
61. Sending SMS
62. The family debate
63. Family Today

Textbook

1. Joy, J.L. & Peter, F.M. (2014). *Let's Communicate*, New Delhi, Trinity Press.

Sem. I   Hours/Week: 5
14UPH130201   Credits: 5

MECHANICS AND PROPERTIES OF MATTER

Objectives

- To study and apply the knowledge of Gravitation at various situation.
- To understand the concepts of statics, hydrostatics, hydrodynamics and dynamics of charged bodies under various fields and the rigid body dynamics in terms of MI.
- To study the basics of Elasticity and its importance in beams, girders.
- To study the concepts of viscosity and surface tension and the various methods to determine the parameters experimentally.

Unit I : Statics   **(12 Hrs)**

Friction - Laws of Friction - coefficient of Friction-Equilibrium on a rough inclined plane - impulse- Collision - oblique impact of smooth spheres - Direct impact of two smooth spheres - loss of kinetic energy due to direct impact and oblique impact of two smooth spheres.

Unit II : Hydrostatics and Hydrodynamics   **(12 Hrs)**

Center of pressure - centre of pressure of a rectangular lamina and triangular lamina - Atmospheric pressure - Variation of atmospheric pressure with altitude - Equation of continuity - Energy of liquid -Euler's equation - Bernoulli's theorem -Applications.

Unit III : Dynamics of rigid bodies   **(12 Hrs)**

Moment of inertia - Radius of gyration - Theorems of M .I - M.I of circular disc, solid cylinder, hollow cylinder, solid sphere and hollow sphere - K.E of a rotating body - M.I of a diatomic molecule - Rotational energy state of a rigid diatomic molecule - centre of mass - conservation of linear momentum - Relation between Torque and angular momentum.

Unit IV : Gravitation and Elasticity   **(12 Hrs)**

Newton's law - Kepler's law - G by Boy's method - Gravitational field and potential - potential and field due to a spherical shell and solid sphere - Compound pendulum - Modulli of elasticity - work done in a strain - Rigidity modulus by static torsion (scale & telescope) Torsional oscillation of a body - Bending of beams - bending moment - cantilever - Y - Uniform and non- uniform bending.

Unit V : Viscosity and Surface Tension   **(12 Hrs)**

Critical velocity - Poiseullie's formula - coefficient of viscosity - h by variable pressure head - Terminal velocity and Stoke's formula - Stokes method - variation of viscosity with temperature and pressure - viscosity of gases - Rankine's method - Surface tension - work done - Angle of contact - Quincke's method -Drop weight method.

Books for study

1. R. Murugeshan, Mechanics and Mathematical Physics , S.Chand & Company Ltd., New Delhi (Third Revised Edition 2008).
2. R. Murugeshan, Properties of Matter, S.Chand & company Ltd, New Delhi (2010).

Unit	Book	Sections
I	1	14.1-14.5
	2	1.1-1.6
II	1	4.1-4.6, 4.8, 5.1-5.4
III	2	7.1-7.3, 7.5-7.7, 7.9, 7.10, 10.5, 10.6
	1	13.1, 13.3, 13.4, 13.5
IV	2	6.1-6.6, 6.10, 1.1, 1.2, 1.5, 1.11, 1.13-1.16, 1.21
V	2	2.1-2.3, 2.5, 2.7-2.10, 2.13, 2.14, 3.1, 3.3, 3.6, 3.13, 3.15, 3.17

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Sem. I   **Hours/Week: 6**
14UPH130401   **Credits: 5**

Allied:
Mathematics-I

Objectives

* To train the students in mastering the techniques of various branches of Mathematics.
* To motivate the students to apply the techniques in their respective major subjects.

Unit - I: Differential and Integral Calculus

Higher derivatives - Leibnitz's formula for the nth derivatives of a product (No proof) - Integration by parts. (Book 1 : Chapter 6 - Sec 6.1, pp: 266-281, Book 2 : Chapter 1 - Sec 12, pp: 68-72)

Unit - II: Reduction formula

Properties of definite integrals - Reduction formula for cosnx, sinnx, xneax, cosnx sinnx and tannx. (Book 2 : Chapter 1 - Sec 11, 13.1,13.3 - 13.6, pp: 61-67, 73-82)

Unit - III: Differential equations

First order differential equations - Variable separable - Homogenous equations - Non-homogenous equations - Linear equation - Bernoulli's equation. Second order differential equations - linear equation with constant co-efficients. (Book 3 : Differential equations - Chapter 2 - Sec 1-5, pp: 7-18, Chapter 3 - Sec 1-4, pp: 42-60)

Unit - IV: Algebra

Matrices - Rank of a matrix - Solving simultaneous linear equations in three unknowns using elementary operations method - Eigen values and Eigen vectors - Verification of Cayley's Hamilton theorem. (Book 1 : Chapter 3 - Sec 3.2 - 3.4, pp: 137 - 160).

Unit - V: Convergence of Series

Concept of limit of a sequence - limit of a function - Simple problems - Convergence, divergence and oscillation of a series - geometric series - tests of convergence and divergence, comparison, ratio and root tests (without proof). (Book 4 : Chapter 6 - Sec1-14)

Books for Study

1. Ancillary Mathematics, Vol-I, 2009 Edition, S. Narayanan, R. Hanumantha Rao, T.K. Manicavachagom Pillay and Kandaswamy.
2. Ancillary Mathematics, Vol-II, 2010 Edition, S. Narayanan, R. Hanumantha Rao, T.K. Manicavachagom Pillay and Kandaswamy.
3. Ancillary Maths, Book II, 1999 Edition, S. Narayanan and T.K. Manickavasagam pillai.
4. Higher Mathematics for Engineering and Science, Third Edition, The National Publishing Co., Madras, 1986, M.K.Venkataraman.

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nghJjjkpo;-II

Nehffqfs; :

1. rka eyyyz ff c z hi t tshjjy;
2. jkpof; fhggaqfspy; moFk> mwpTz hTk; CILk; gFjpfi sg; gbj;Jg; Ghpe;J nfhsSjy;
3. c i uei l f; fl Li u vOJk; jpwd; ngWjy;

gadfs; :

1. jkpi oj; jpUjj khfg; gbffTk> NgrTk> gpi oapdwp vOjTk; Njhrrp ngWjy;
2. , yffaqfspy; gbjj twi w Ki wahf thofi fapy; fi lggpbjjy;

myF: 1   **(12 kz p Neuk)**

rpyggjpfhuk; - kJi uf; fhz lk; (fhL fhz ; fhi j)
, yffpa tuyhW - i rtk; tsujj jkpo; Kjy; Guhz qfs; Kba.

myF : 2   **(12 kz p Neuk)**

kz pNkfi y - ghjjjuk; ngww fhi j
nghpaGuhz k; - nkagnghUsehadhh; Guhz k;

myF : 3   **(12 kz p Neuk)**

fkguhkhaz k; - fhl rpgglyk;
c i uei l - 7 Kjy; 9 Kba c ss fl Li ufs;
, yffz k; - vOjjpyffz k;

myF : 4   **(12 kz p Neuk)**

Fz qFb k] jhd; rhfpG ghl yfs;
rpwwpyffaqfs; - fypqfj;Jgguz p
c i uei l - 10 Kjy; 11 ti uapyhd fl Li ufs;

myF : 5   **(12 kz p Neuk)**

, ul rz pa ahjjppfk; kuz gglyk;
, yffpa tuyhW - jkp;, yffz E}yfs; Kjy; rpwwpyffaqfs; Kba.
, yffz k; - nrhyypyffz k;

ghl E}y;

1. nraAs; jpul L - jkpoha;Tj;Ji w ntspaL> 2014-2017.
2. r%ftpay; Nehffpy; jkp;, yffpa tuyhW> jkpoha;Tj;Ji w ntspaL> J}atsdhh; fy;Y}hp> jpUrrpuhggssp> 2014.
3. c i uei l fNfhi t> jkpoha;Tj;Ji w ntspaL> 2010.

GENERAL ENGLISH-II

Objectives

To help students

* Use words and phrases related to education, entertainment, career, and society in meaningful contexts.
* Use language to perform basic functions like comparing, debating, and storytelling.

Unit 1

01. Education Word Grid.
02. Reading Problems and Solutions.
03. Syllabification.
04. Forms for Expressing Quality.
05. Expressing Comparison.
06. Monosyllabic Comparison.
07. Di/polysyllabic Comparison.
08. The best monosyllablic Comparision
09. The best di/polysyllabic Comparision.
10. Practising Quality Words.

Unit 2

11. *Wh* Words
12. Yes/No Recollection
13. Unscramble *Wh* Questions
14. *Wh* Practice
15. Education and the Poor
16. Controlled Role play
17. Debate on Education
18. Education in the Future
19. Entertainment Word Grid
20. Classify Entertainment Wordlist
21. Guess the Missing Letter
22 Proverb-Visual Description
23. Supply *Wh* Words
24. Rearrange Questions
25. Information Gap Questions

Unit 3

26. Asking Quetions
27. More about Actions
28. More about Actions and Uses

Textbook

1. Joy, J.L. & Peter, F.M. (2014). *Let's Communicate*, New Delhi: Trinity Prss.

SOUND, THERMAL AND STATISTICAL PHYSICS

Objectives

• To study the nature and transmission of heat and the laws associated with them.
• To study the laws of thermodynamics and understand their applications.
• To acquire knowledge of Maxwell's thermo dynamical relations and their importance.
• To understand the concepts of statistical thermodynamics and its applications.

Unit I: SOUND

Wave motion - characteristics of wave motion - transverse, longitudinal wave motion - Newton's formula for velocity of sound - effect of temperature, pressure, density of the medium, humidity and wind - stationary waves - Helmholtz resonator, theory of resonator, vibrations in rods - Kundt's tube - Doppler effect -applications, Acoustics of buildings - Reverberation - Sabine formula for reverberation - Ultrasonics - production and detection of ultrasonic waves - applications of ultrasonic waves.

Unit II: TRANSMISSION OF HEAT

Coefficient of thermal conductivity- rectilinear flow of heat along a bar - Forbes method - Lee's method for bad conductors and liquids - convection and its applications - Black body - Stefan Boltzmann law - Wien's displacement law - Rayleigh - Jeans law - derivation and experimental verification of Stefan's law - Newton's law of cooling from Stefen's law - solar constant - temperature of the Sun - Angstrom's Pyroheliometer.

Unit III: THERMODYNAMICS I

Thermodynamic system - zeroth law of thermodynamics - internal energy - First law of thermodynamics - reversible and irreversible process - Carnot's ideal heat engine - Carnot's cycle - internal combustion engine - Otto and diesel engine - second law of thermodynamics - entropy - change in entropy during reversible and irreversible process - entropy and second law of thermodynamics - third law of thermodynamics

Unit IV: THERMODYNAMICS II

Thermodynamic variable - Statistical equilibrium - Maxwell's thermodynamic relations - applications - Joule Thomson cooling - temperature of inversion

- Clausius Claperon's latent heat equation - thermodynamic potential - T.dS equation - Joule Thomson porous plug experiment - Joule Thomson expansion - liquefaction of gases - liquefaction of hydrogen and Helium - adiabatic demagnetization - refrigerator.

Unit V: STATISTICAL THERMODYNAMICS

Statistical equilibrium - probability theorems in statistical thermodynamics - Maxwell Boltzmann distribution law - Maxwell - Boltzmann distribution in terms of temperature - ideal gas - quantum statistics - Phase space - FD distribution law - application to electron gas - BE distribution law - application to photon gas - radiation laws - comparison of the three statistics.

Book For Study

1. N. Subrahmanyam and Brijlal, Sound, Vikas publication House, 1994.
2. Brijlal and Subramanyam, Heat and thermodynamics, S.Chand and Co., 2007.

Unit	Book	Sections
I	1	Chapter 4; 4.1, 4.3, 4.4, 4.5 Chapter 5; 5.4, 5.5, 5.6, 5.7, 5.8, 5.9 Chapter 6; 6.1, 6.16, 6.17 Chapter 7; 7.12, 7.13 Chapter 8; 8.1, 8.2, 8.3, 8.6 Chapter 10; 10.14, 10.15, 10.16, 10.23, 10.24, 10.25, 10.27
II	2	Chapter15; 15.1, 15.2, 15.8-15.12, 15.22, 15.23 Chapter 8; 8.6, 8.12-8.15, 8.20-8.22, 8.26-8.28
III	2	Chapter 4; 4.1, 4.2, 4.6, 4.7, 4.20, 4.23, 4.24, 4.28, 4.31, 4.33 Chapter 5; 5.1-5.6, 5.15 Chapter 6; 6.15
IV	2	Chapter 6; 6.1-6.3, 6.424, 6.4.4, 6.4.7, 6.5, 6.9 Chapter 7; 7.5, 7.6, 7.10, 7.11, 7.16, 7.21 Chapter 2; 2.20, 2.21
V	2	Chapter 9; 9.1, 9.2, 9.3, 9.4, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 9.11, 9.12, 9.13

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PHYSICS PRACTICAL-I

Objectives

- To make observation and develop the computation skill.
- To understand various techniques and concepts in General Physics experiments
- To develop the skill in handling instruments.

ANY 20 EXPERIMENTS

1. Surface Tension - drop weight method.
2. Surface Tension - capillary rise method.
3. Viscosity - constant pressure head.
4. Viscosity - variable pressure head.
5. Viscosity - stokes method.
6. Young's modulus - cantilever / stretching.
7. Young's modulus - non uniform bending (pin and microscope).
8. Sonometer - frequency of the tuning fork - RD of solid.
9. Sonometer - AC frequency determination.
10. Spectrometer - refractive index of a solid prism.
11. Spectrometer - dispersive power of a prism.
12. Potentiometer - internal resistance.
13. Potentiometer - low range voltmeter.
14. P.O Box - temperature coefficient.
15. Carey Fosters bridge - R and r.
16. Convex lens - f, R and m.
17. Concave lens - f, R and m.
18. Field along the axis of a coil - deflection magnetometer.
19. M1/M2- Tan A Tan B simultaneously.
20. M1/M2 - vibration magnetometer.
21. Air wedge.
22. Newton's rings.
23. B.G. - Figure of merit.
24. B.G. comparison of EMF's and capacitance.
25. Resonators.
26. g - by fall plate.

27. Specific heat by cooling.
28. Specific heat capacity of solid by the method of mixture.

BASIC WORKSHOP PRACTICE
1. Paper Weight
2. Pen Stand
3. Wood Carving
4. Electroplating
5. Assembling the Extension card
6. Tube light assembling.

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Sem. II   **Hours/Week: 6**
14UPH230402   **Credits: 6**

Allied:
Mathematics-II

Objectives
* To train the students in master in the techniques of various branches of Mathematics
* To motivate the students to apply the techniques in their respective major subjects.

Unit - I: NUMERICAL METHODS
Solution of simultaneous linear equations - Gauss Elimination - Gauss Seidal Methods -Numerical Solutions to O.D.E - Solution by Taylor's Methods - Euler's Method - Runge-Kutta Method (4th Order)(Book 4 : Chapter 4 Section 4.2, Chapter 6 Section 6.2 and Chapter 11 - Section 11.6, 11.10, 11.14 and 11.16)

Unit - II: PARTIAL DIFFERENTIAL EQUATIONS
Derivation of p.d.e - By elimination of arbitrary functions - Different Integrals of p.d.e - Standard type of first order equations - Lagrange's equation (Book 2 : Chapter 6-Sec 1-6, pp: 252-273).

Unit - III: VECTORS
Gradient - divergence and curl - Gauss Divergence Theorem - Green Theorem - Stokes Theorem (No proofs of theorem, only simple applications) (Book 2 : Chapter 8 - Sec 1.17-1.20, 6, 8 and 9, pp: 335-350, 381-389, 393-407).

Unit - IV: TRIGONOMETRY
Expansion of Sinnq and Cosnq - Powers of Sines and Cosines of q interms of function of multiple of q - Hyperbolic functions - Inverse hyperbolic functions (Book 1 : Chapter 5 - Sec 5.1, 5.2 and 5.4, pp: 220-232, 242-256).

Unit - V: COMPLEX ANALYSIS
Analytic function - Cauchy Riemann equations (No derivation, only simple applications) - Residues - Evaluation of definite integrals (Integral over the unit circle only) (Book 3 : Chapter 1 - Sec 11, pp : 43-57, Chapter 5 - Sec 1-3, pp : 185-196).

Books for Study
1. Ancillary Mathematics, Vol-I, 2009 Edition, S. Narayanan, R. Hanumantha Rao, T.K. Manicavachagom Pillay and Kandaswamy.
2. Ancillary Mathematics, Vol-II, 2010 Edition, S. Narayanan, R. Hanumantha Rao, T.K. Manicavachagom Pillay and Kandaswamy.
3. Complex Analysis, 1997 Edition, S. Narayanan and T.K.Manickavasagam Pillai.
4. Numerical methods and Science and Engineering, M.K.Venkataraman.

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nghJ j j kpo;-III

Nehf;fq;fs; :

1. nrk,nkhoji;jkpor;nraAs;fshd gjpndz ;Nky; fz f;F> gjpndz ; fïb; fz f;Fg; ghl y;fis sg; gbj;Jg; nghUs; Ghpe;J nfhs;S k; jpwd; ngWj y;

2. gz i l , yf;fïaqfspy;mi ke;Jss r%ff;fUj;Jf;fi s c z hj;Jj y;

3. kuGf; ftpi j tbtq;fis s mwpar; nrajy;

4. ftpi j fspy;mz pfs;mi ke;Jss ghqi fg; Ghj y;

5. Gjpdk; topj w;fhyr;rKjhar; nïf;fy;fi sAk> mj w;fhd jhpfTfi sAk; Muha,e j wj y;

gadfs; :

1. nrk,nkhopahk;jkpo;nkhopapd;rpwg;gig mwpj y;

2. gz i l , yf;fïaqfs;cz hj;Jk;mwf;fUj;Jf;fi s mwpe;J khz th; xOf;f newapy; thoe;J r%fj;jij NkkgLj;J th;

3. khz th;Gjpdj;ij f; fwgjd;%yk;rKjhar;rpf;fy;fi s c z he;J mtw;wpwFj;jhpT fhz gh;

myF : 1   (16 kz p Neuk;)

nghUeuhwW Wggi l (KOi kAk;)

myF : 2   (10 kz p Neuk;)

FWenjhi f> ahggpyf;fz k; (ntz gh> Mrphpaggh)

myF : 3   (10 kz p Neuk;)

fypjnjhi f , yf;fïa tuyhW - |jkpo;nkhopapd;njhdi kAk;rpwgGk| Kjy;|rqfj;njhi f E}yfs| Kba. Gjpdk; - KOi kAk;

myF : 4   (12 kz p Neuk;)

gjpwwWggj;J> GwehD}W> mz papyf;fz k;

myF : 5   (12 kz p Neuk;)

jpUFws; - mwk;
ehybahh; - nghUI ghy;
, yf;fïa tuyhW - rqf , yf;fïaqfspd;jdjjdi kfs;Kjy;, uli lf; fhggpaqfs; Kba.

ghl E}yfs; :

1. nraAs; jpul> jkpoha;Tj;Jiw ntspaL (2014-2017)

2. r%ftpay; Nehff;fpy;jkpopyffïa tuyhW> jkpoha;Tj;Jiw ntspaL 2014

3. Gjpdk; (xtnthU fy;tpahz Lk; xtnthU Gjpdk;). nehej NrhW (2014-2015)

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GENERAL ENGLISH-III

Objectives:

* To enable the students to comprehend the local and global issues through the lessons.
* To enable the students to do the tasks centering on Skill Development and Grammar.
* To empower the students with interactive skills.

Tasks Designed for Each Unit	Skills Focused to be Developed for Each Unit	Hours Allotted
1. Pre-reading Task	Listening and Reading Skills through teacher-led reading practice	
2. Objectives	Listening and Reading Skills	2 Hours
3. Text	Listening and Reading Skills through teacher-led reading practice	
4. Glossary (Using Words and Phrases in Sentences)	Referring and Language Using Skills	2 Hours
5. Reading Comprehension	Reading, Speaking, and Writing Skills	1 Hour
6. Critical Analysis	Critical Thinking and Speaking Skills	2 Hours
7. Creative Task	Creative Thinking and Speaking Skills	2 Hours
8. General Writing Skills	Writing Skill	1 Hour
9. Activities on Grammar	Grammar Using and Writing Skills	2 Hours

UNIT I
* Suggestions to Develop Your Reading Habit   12 Hrs
   Grammar: Simple Present Tense

UNIT II
* The Secret of Success: An Anecdote   12 Hrs
   Grammar: Present Continuous Tense

UNIT III
* Hygiene   12 Hrs
   Grammar: Simple Past Tense

UNIT IV
* Dr. A.P.J. Abdul Kalam: A Short Biography   12 Hrs
   Grammar: Past Continuous Tense

UNIT V:
* "Golden Rule": A Poem   12 Hrs
   Grammar: Simple Future Tense & Future Continuous Tense

Textbook:

1. Jayraj, S. Joseph Arul *et al.* (2014). *Trend-Setter:* An Interactive General English Textbook for Under Graduate Students, New Delhi, Trinity.

MATHEMATICAL PHYSICS

Objectives

- To impart mathematical knowledge for the description of physical phenomena.
- To provide basic skills to learn and appreciate physics through mathematics.
- To understand the numerical methods.

UNIT I: FUNCTIONS OF SEVERAL VARIABLES   **(12Hrs)**

Total Differential of function - Differentiation of composite function-Higher order derivatives and differentials-Integration of total differentials-Change of variables-Double Integrals in Polar coordinates-Triple Integrals in Spherical Coordinates.

UNIT II: FIELD THEORY   **(12Hrs)**

Line, Surface and Volume Integrals-Differential Operators - Grad, Div and Curl - Physical significance. Vector Relations - Gauss Theorem - Stokes Theorem - Green's Theorem - Physical Interpretation - Applications.

UNIT III: SPECIAL FUNCTIONS   **(12Hrs)**

Definitions - simple properties of Gamma, Beta functions - series solutions of Legendre and Hermite differential equations - Orthogonality properties, Generating functions and Rodrigue's Formula (Expressions only).

UNIT IV: FOURIER SERIES AND FOURIER TRANSFORM   **(12Hrs)**

Dirichlet's Conditions - Definition of Fourier Series - Determination of Fourier Coefficients - Fourier series for odd and even functions - Applications (Half wave, Full wave, square wave, saw tooth and triangular wave) - Fourier Transform - Definition - Theorems -simple problems.

UNIT V: NUMERICAL METHODS   **(12Hrs)**

Transcendental Equation - Solving by Graphical Method - Newton Raphson method. Numerical Integration - Trapezoidal and Simpson's 1/3 rule- Numerical Method of solving differential equation - Euler's Method - Runge-Kutta IV order method - applications.

Book for Study

1. Demidowich, Problems in Mathematical Analysis, MIR publications, Moscow, 1976.

2. R. Murugeshan, Mechanics and Mathematical Physics, S.Chand, New Delhi, 3rd edition, 2008.
3. A.K Chandra, Mathematical Physics.
4. Sathiya Prakash, Mathematical Physics, S.Chand, New Delhi, 2nd edition, 2004.

Units	Books	Sections
I	1	Chapter vi–sections 4, 5, 7, 8, 10 Chapter vii–sections 2, 7
II	2	7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 7.9, 7.10, 7.11, 7.12
III	2	9.1, 9.2, 9.3, 9.4, 9.5, 9.6, 9.8, 9.11, 9.12
IV	3	Chapter iv Section 1–6
V	4	13.6(a), 13.4(a, b), 13.5(a, e)

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CHEMISTRY-I

Objectives

1. To learn the nomenclature and isomerism of organic compounds
2. To study the preparation and properties of alkanes
3. To understand the chemistry of hydrogen, halogens and metals
4. To understand the principles of chemical kinetics and phtotochemistry.

Unit - 1: Nomenclature and Isomerism   **(12 hrs)**

Nomenclature of straight chain and closed ring compounds-mono and poly-functional organic compounds. Hybridisation-sp, sp2 and sp3. Bond length, bond angle, dipole moment, inductive effect, mesomeric effect and hyperconjucation. Solubility- protonic and aprotic solvents. Isomerism-geometrical; and optical isomerism, optical activity, asymmetry, dissymmetry, elements of symmetry, R, S notations. Reactive intermediates- carbocation, carbanion and free radicals (generation, structure and stability).

Unit - 2: Hydrocarbons   **(12 hrs)**

General methods of preparation of alkanes, properties- mechanism of free radical halogention of alkanes, conformation analysis of ethane, n- butane and cyclohexane.

Methods of preparation of alkenes-stereochemistry of dehydrohalogenation (E1, E2, E1CB mechanism). Properties of alkenes- electrophilic and nucleophilic addition mechanisms.

Unit 3: Chemistry of Hydrogen, Halogen, Silicon and metals   (12hrs)
Occurrence, extraction and chemical properties of iron, cobalt, nickel and copper. Electrochemical theory of rusting. Position of hydrogen in periodic table, atomic hydrogen and isotopes of hydrogen. Preparation and structure of borozole, SiO_2, SiC and $SiCl4$. General characteristics of halogens-interhalogens.

Unit 4: Chemical Kinetics   (12 hrs)
Rate of reaction, order, molecularity, first order rate law and simple problems, half life period of first order equation, pseudo first order reaction, zero and second order reactions. Arrhenius and collision theories- assumption, derivation, demerits- experimental determination of order of reactions.

UNIT 5: Photochemistry   (12 hrs)
Difference between photochemical reactions and dark reactions. Laws of photochemistry-Einstein law of photochemical equivalence, quantum yield. Kinetics of Hydrogen-chlorine, Hydrogen-bromine and decomposition of HI. Fluorescence, phosphorescence and chemiluminescence.

Reference
1. Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry, (23rd edition), New Delhi, Shoban Lal Nagin Chand & Co.,(1993).
2. Bahl B.S. and Arun Bahl, Organic Chemistry, (12th edition), New Delhi, Sultan Chand & Co., (1997).
3. Puri B.R., Sharma L.R., Pathania M.S., Principles of Physical Chemistry, (23rd edition), New Delhi, Shoban Lal, Nagin Chand & Co., (1993).

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Sem. III	Hours/Week: 4
14UPH330403B	Credits: 3

Allied Computer Sciemce-I:
INTERNET AND DATABASE CONCEPTS

UNIT- I   (12)
Introduction to the Internet : Computers in Business - Networking - Internet - Email - Resource Sharing - Gopher - WWW - Usenet - Telnet - Bulletin Board Service - Wide Area Information Service.

UNIT - II   (12)
Introduction to HTML: Designing a home page - HTML document - Anchor tag - Hyperlinks - Head and Body sections: Header section - Title - Prologue - links - colourful pages - comments - Body Section: Heading - Horizontal ruler - Paragraph - Tabs - Images and pictures - Lists and their types - Nested lists - Table handling.

UNIT - III (12)
Frames - Frameset definition - Frame definition - Nested framesets. Forms and form elements.

UNIT - IV   (12)
Database System Applications - Database Systems versus File Systems - View of Data - Data Models - Database Languages - Database Users and Administrators - Transaction Management - Database System Structure - Application Architectures - History of Database Systems.

UNIT - V   (12)
SQL Statements: Data Retrieval: SELECT, Data Definition Languages: CREATE, ALTER, DROP, RENAME, and TRUNCATE, Data Manipulation Language: INSERT - UPDATE, DELETE - MERGE. Transactional Control: COMMIT, ROLLBACK, SAVEPOINT, and Data Control Language: GRANT, REVOKE, SELECT ORDER BY - SELECT GROUP BY.

BOOKS FOR STUDY
1. C. Xavier, "World Wide Web Design with HTML", Tata McGraw Hill, 2000.
2. Henry F. Korth Abraham Silberschatz , Database System Concepts, Fourth Edition McGraw Hill International Editions 2002.

BOOKS FOR REFERENCE
1. Wendy Willard, "Web Design - A beginners Guide", Tata McGraw Hill.
2. Thomas A. Powell, "The Complete Reference Web Design", Tata McGraw Hill.
3. C.J. Date, An Introduction to Database System , seventh edition, Pearson Education, New Delhi, 2002.

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nghJjjkp;IV

Nehf;fqfs; :
1. ehl fjjpd;Nehffk> mjd;Nghff> cjjpfs> ghjjpug;ghqF> c i uahly;
   Ki w> fwgi djjpwk;Nghdwtwipw ntspggLjjy;
2. Gjpa ehlfqfi sg;gpi lfFk;jpwid khz tufspi l Na c UthfFjy;

gadfs; :
1. ehl ftopmofpay;cz uTfi s tsujjy;
2. ehl fqfi sr;r%fg;gadghlbwF Vwg c UthfFjy;

myF : 1   **(12 kz p Neuk)**
kNdhdkz pak> ghaukj> mqfk; - 1> fsk;1 - 5 ti u.

myF : 2   **(12 kz p Neuk)**
kNdhdkz pak> mqfk; - 2> fsk;1 - 3 ti u.
c i uei l ehlfk; (Kjy;, uz L ehlfqfs)

myF : 3   **(12 kz p Neuk)**
kNdhdkz pak> mqfk; - 3> fsk;1 - 4 ti u.

myF : 4   **(12 kz p Neuk)**
kNdhdkz pak> mqfk; - 4> fsk;1 - 5 ti u.

myF : 5   **(12 kz p Neuk)**
kNdhdkz pak> mqfk; - 5> fsk;1 - 3 ti u.
c i uei l ehlfk; (3> 4Mk; ehl fqfs)

ghl E}yfs; :
1. Rej udhu> kNdhdkz pak> jkpoha;Tj;Ji w (gjpgG> J}a tsdhu; fyY}up>
   jpUrrpuhggss;p>2. (mqfk; : 3 fsk; : 4 eqfyhf)
2. mz z hki y.rp (njh.M.)> Nr., uhkhD [k; ehlfpfs> fhtah ntspap L>
   nrdi d

kjppgngz ; gfpu;T :
kNdhdkz pak; - 80
c i uei l ehlfk; - 20
c i uei l ehlfk; ghfk; - 3, y; fl;Li u tpdhtp y; kl;Lk;, l k; ngwy;
Ntz Lk;

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GENERAL ENGLISH-IV

Objectives:
* To enable the students to comprehend the local and global issues through the lessons.
* To enable the students to do the tasks centering on Skill Development and Grammar.
* To empower the students with interactive skills.

Tasks Designed for Each Unit	Skills Focused to be Developed for Each Unit	Hours Allotted
1. Pre-reading Task	Listening and Reading Skills through teacher-led reading practice	2 Hours
2. Objectives	Listening and Reading Skills	
3. Text	Listening and Reading Skills through teacher-led reading practice	
4. Glossary (Using Words and Phrases in Sentences)	Referring and Language Using Skills	2 Hours
5. Reading Comprehension	Reading, Speaking, and Writing Skills	1 Hour
6. Critical Analysis	Critical Thinking and Speaking Skills	2 Hours
7. Creative Task	Creative Thinking and Speaking Skills	2 Hours
8. General Writing Skills	Writing Skill	1 Hour
9. Activities on Grammar	Grammar Using and Writing Skills	2 Hours

UNIT-I: Women through the Eyes of Media   **12 Hrs**
Grammar: Present Perfect Tense

UNIT-II: Effects of Tobacco Smoking   **12 Hrs**
Grammar: Present Perfect Continuous Tense

UNIT-III: The Impact of Liquor Consumption on the Society   **12 Hrs**
Grammar: Past Perfect Tense

UNIT-IV: An Engineer Kills Self as Crow Sat on his Head:
                        A News Paper Report   **12 Hrs**
Grammar: Past Perfect Continuous Tense

UNIT-V: Traffic Rules   **12 Hrs**
Grammar: Future Perfect Tense & Future Perfect Continuous Tense

Text Book:
   Jayraj, S. Joseph Arul. et al. (2014). *Trend-Setter: An Interactive General English Textbook for Under Graduate Students*, New Delhi, Trinity.

ELECTRICITY AND MAGNETISM

Objectives

- To study Gauss theorem and its applications
- To study the principle of Magnetostatics, magnetic effects of electric current and their applications.
- To understand the working of potentiometer and its uses
- To understand the principle of electromagnetic induction and ac circuits and network theorem.

Unit - I: Electrostatics   (12 Hrs)

Point charge - Rest charge - charge distributions - coulomb's law - vector form - Principle of superposition - electric field strength - Electric field due to uniform line charge, charged ring at an axial point - Electric dipole - The concept of a solid angle - Gauss theorem and its differential form - Electric potential energy - Potential difference - Zero potential - Principle of superposition for potential - Potential due to a point charge- uniformly charged disc, spherical conductor - Poisson's and Laplace equations.

Unit - II: Magneto statics   (12 Hrs)

Definition of B - Lorentz force - magnetic field intensity H - magnetic shell - Hall effect - Cyclotron - Ampere's circuital theorem - applications - field at a point inside a long cylindrical wire - magnetic vector potential- magnetic susceptibility and relative permeability - classification of magnetic materials - Properties of magnetic materials - susceptibility determination (Gouy's and Quincke's method - Experimental determination of hysteresis loop.

Unit - III: Magnetic effects of current   (12 Hrs)

Biot and Savart law - field due to a straight wire - field on the axis of a circular coil - field due to a solenoid - Torque on a current loop in a uniform field - force on a current carrying conductor in a magnetic field - Theory of moving coil galvanometer - Applications of BG - Figure of merit - comparison of e.m.f of two cells and capacitances.

Unit - IV: Current Electricity   (12 Hrs)

Current and current density - equation of continuity - resistance - Ohm's law - combination of resistance star and Delta transformations - grouping of cells - Kirchoff's laws - Wheatstone Bridge - Carry - Foster's Bridge - Potentiometer - uses - Low resistance - Measurement of a very small e.m.f -

growth and decay of current in inductor - charge and discharge of a capacitor through a resistance - Measurement of high resistance by leakage method - Physics of the LC Oscillator.

Unit - V: Electro Magnetic Induction and A.C.circuits (12Hrs)

Faraday's laws - differential form - induced current and eddy currents - charge - self inductance - self inductance of a long straight solenoid - Rayleigh's method of self inductance - Mutual inductance - resistivity relation - coefficient of coupling - Determination of mutual inductance using B.G - Earth inductor - Measurement of horizontal, vertical component of B and angle of dip - Dynamo - D.C generator - D.C Motor.

Book for study

1. Sehgal - Chopra - Sehgal, Electricity and magnetism, Sultan Chand and Sons Ltd, New Delhi, 6th edition reprint, 2010.

Units	Books	Sections
I	1	3.8-3.11, 3.15, 4.2, 4.4, 4.5, 4.9, 4.17, 4.20, 4.21 5.3-5.7, 5.10, 5.14, 5.15, 5.22
II	1	13.19-13.21, 13.17, 13.23, 13.24, 13.29, 13.31, 13.33, 24.8, 24.9, 24.12, 24.13, 24.14
III	1 2	13.3, 13.5, 13.8, 13.9, 13.15, 14.4, 14.10, 9.10, 9.14, ------
IV	1	12.1, 12.3, 12.4, 12.6, 12.8, 12.10, 12.12-12.15, 12.17, 15.4, 15.9, 15.11.3, 15.11.6, 20.3 – 20.6.
V	1	19.3, 19.16-19.19, 19.22, 19.24-19.28, 19.32, 19.35-19.37, 19.39-19.41

Book for reference

1. K K Tewari, Electricity and magnetism, S. Chand & Co. Ltd., NewDelhi, Reprint 2003.

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PHYSICS PRACTICAL-II

Objectives

- To make observation and develop the computation skill.
- To understand various techniques and concepts in General Physics experiments
- To develop the skill in handling instruments.

ANY 16 EXPERIMENTS

1. Jollys bulb - pressure coefficient
2. K- Lees disc.
3. K- Forbes method.
4. y, n, s - Searles method.
5. n and M.I - torsional pendulum.
6. Compound pendulum.
7. Kater's pendulum
8. Kundts tube.
9. Frequency - Melde's apparatus.
10. Young's modulus - uniform bending (scale and telescope).
11. Young's modulus - Koenig's method.
12. n- static method.
13. h - Rankines method.
14. Spectrometer - i-d curve.
15. Spectrometer - i-i' curve.
16. Field along the axis of a coil - vibration magnetometer.
17. Potentiometer - ammeter calibration.
18. Potentiometer - R and P.
19. B.G. - comparison of mutual inductance.
20. B.G. - Resistance and figure of merit (condenser method).
21. Absolute M and H.
22. Junction diode and Zener diode characteristics.
23. Study of basic and universal gates (IC's).

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CHEMISTRY-II

Objectives

1. To learn the chemistry of carbohydrates and proteins
2. To study the theories of coordination compounds
3. To study the applications of industrially important compounds
4. To understand phase rule and its applications
5. To understand the principles and applications of electrochemistry.

Unit 1: Carbohydrates, Benzene and Heterocyclic compounds   **(12 hrs)**
Classification of carbohydrates -Properties and uses of glucose and fructose - mutarotation, interconversion of glucose and fructose. Amino acids - preparation and properties of glycine and alanine. Proteins - peptide linkage- primary, secondary and ternary structure of proteins. Chemistry of benzene- preparation, mechanism of electrophillic substitution reactions. Heterocyclic compounds - Preparation and properties of pyrrole and pyridine

Unit 2: Coordination Chemistry   **(12 hrs)**
Nomenclature and isomerism of coordination compounds. EAN rule, VB and Crystal field theories of octahedral, tetrahedral and square planar complexes. Chelation and its industrial applications. Magnetic studies - magnetic susceptibility, ferromagnetism and anti ferromagnetism.

Unit 3: Industrial Chemistry   **(12 hrs)**
Silicones-preparation, properties and uses. Glass -manufacture and types. Cement-composition, manufacture and setting of cement. Ceramics- composition, types and preparation. Noble gases- hydrides, clathrates, compounds of xenon. Solutions- concentration of solutions (normality, molality and molarity).

Unit 4: Phase Rule   **(12 hrs)**
Phase rule- phase diagram of H_2O, CO_2, S, Pb-Ag and Zn-Mg systems. Adsorption - Langmuir and Frendluich adsorption isotherms. Applications of adsorption, principles of chromatography (Paper, TLC and column).

Unit 5: Electrochemistry   **(12 hrs)**
Faradays laws of electrolysis, specific conductance, equivalent conductance, cell constant. Arrhenius theory, Oswald's dilution law and Kohlrausch law. Conduct metric titrations. Debye- Huckel theory of strong electrolytes

(assumption only). Solubility product. Nernst equation- applications of EMF measurements.

Reference

1. Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry, (23rd edition), New Delhi, Shoban Lal Nagin Chand & Co., (1993).
2. Bahl B.S. and Arun Bahl, Advanced Organic Chemistry, (12th edition), New Delhi, Sultan Chand & Co., (1997).
3. Puri B.R., Sharma L.R., Pathania M.S., Principles of Physical Chemistry, (23rd edition) New Delhi, Shoban Lal, Nagin Chand & Co., (1993).

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Sem. IV   **Hours/Week: 4**
14UPH430404B   **Credits: 3**

COMPUTER SCIENCE-II

Objective

* To enable the students to develop the knowledge on basic concepts of computer networks.

UNIT - I   (12)

Data Communication Fundamentals: Analog Signal Transmission - Digital Signal Transmission. Data Transmission: Serial and Parallel Transmission - Communication Modes - Transmission Modes - Transmission Media: Twisted Pair - Coaxial Cable - Optical Fibres - Unguided Transmission Media.

UNIT - II   (12)

Classification of Computer Networks: Classification by Geographical Spread - Topological Classification - Classification by Ownership - Circuit Switching - Message Switching - Packet Switching - Routing - Multiplexing and Concentration: Frequency Division Multiplexing - Time Division Multiplexing - Terminal Handling - Components of Computer Network.

UNIT - III(12)

Local Area Network - The Evolution of LAN - LAN Architecture - The OSI Model and LAN Access - LAN advantages and Services - Characteristics of LAN: The Server - Workstations - The Transmission Media for LAN - Communication Equipments -LAN Toplogies: Bus and Tree - Ring Topology - Star Topology .

UNIT - IV   (12)

Wireless LANs: Need for Wireless LANs - Advantages of Wireless LANs - Components of Wireless LAN: Mobile Clients - Special Units - Working of Wireless LANs - Transmission Media: Radio Wave Technologies - Narrowband Technology -Infrared Technology: Characteristics of Infrared Transmission - Direct Modulation - Operating Modes - Benefits and Drawbacks - Wireless LAN Types : Ad hoc Wireless LAN - Infrastructure Wireless LAN.

UNIT - V   (12)

Digital Cellular Radio: Global Systems for Mobile Communications - Cellular Digital Packet Data - Code Division Multiple Access - Bluetooth technology: The Evolution - Goals and Features - Bluetooth products - Network Architecture - Hardware and Software Architecture - Applications.

BOOK FOR STUDY

1. Rajesh, Eswarakumar, Balasubramanian, "Computer Networks, Fundamentals and Applications", Vikas Publishing House Pvt. Ltd., 2002.

BOOK FOR REFERENCE

1. William Stallings, " Data and Computer Communications", Prentice Hall of India, Seventh Edition, 2004.

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Sem. IV   **Hours/Week: 2**
14UPH430405A   **Credits: 2**

Allied:
CHEMISTRY PRACTICAL

Objectives

1. To understand the principles of titrimetric analysis
2. To understand the principles of organic qualitative analysis

I. Volumetric Analysis

1. Estimation of HCl (Std. oxalic acid ´ NaOH ´ HCl)
2. Estimation of NaOH (Std. Na_2CO_3 ´ HCl ´ NaOH)
3. Estimation of oxalic acid (Std. FAS ´ $KMnO_4$ ´ oxalic acid)
4. Estimation of FAS (Std. oxalic acid ´ $KMnO_4$ ´ FAS)
5. Estimation of $KMnO_4$ (Std. $K_2Cr_2O_7$ ´ FAS ´ $KMnO_4$)
6. Estimation of ascorbic acid (iodimetry)

7. Estimation of phenol / aniline (iodimetry)
8. Estimation of copper (iodimetry)
9. Estimation of zinc (EDTA titration)
10. Estimation of magnesium (EDTA titration)
11. Estimation of hardness of water (EDTA titration)

II. Organic Analysis

a. Identification of acidic, basic, phenolic and neutral organic substances.
a. Test for aliphatic and aromatic nature.
b. Test for saturation and unsaturation.
c. Detection of N, S and halogens.

Reference

1. J. N. Gurtu and Kapoor, Experimental Chemistry, S. Chand and Co, New Delhi 1987.
2. N. S. Gnanapragasam and G. Ramamurthy, Organic Chemistry - Lab Manual, S. Viswanathan & Co. Pvt. Ltd, Chennai 1998.

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Sem. IV   **Hours/Week: 2**
14UPH430405B   **Credits: 2**

Allied:
COMPUTER PRACTICAL

1. Simple web page with all the Text Formatting tags
2. Adding Images to WebPages
3. Creating Lists (Ordered and Unordered List)
4. Adding Links to Web Pages
5. Creating Tables using various attributes
6. Creating Frames
7. Designing forms using simple form elements
8. To implement Data Definition language Create, alter, drop, truncate
9. To implementation on DML, TCL and DRL
   (a) Insert, (b) Select, (c) Update, (d) Delete, (e) commit, (f) rollback, (g) save point, (i) Like'%', (j) Relational Operator

Small Projects in HTML

1. Creating Web blocks consists of personal details
2. Creating Website for the Department / College.

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Sem. IV   **Hours/Week: 4**
14UPH430301A   **Credits: 3**

Core Elective (WS):
ENERGY PHYSICS

Objectives

• To study the power potential of the Sun and its utility.
• To study the principle and performance of harnessing solar and other alternative energy sources.
• To understand the availability and practical usage of solar energy in various forms and other alternative energy sources.

Unit I: SOLAR ENERGY   (10 Hrs)

An overview of thermal application and solar radiation - energy alternatives - devices for thermal collection and storage - thermal applications - Water heating - Space heating - Power generation - instruments for measuring solar radiation and sun shine

Unit II: FLAT-PLATE COLLECTORS & SOLAR AIR HEATERS (10 Hrs)

Performance analysis - -Transmissivity of the cover system based on reflection - Refraction - Absorption - Transimissivity for diffuse radiation - Transmissivity - Absorptivity product -

Unit III: CONCENTRATING COLLECTORS AND THERMAL ENERGY STORAGE   (10 Hrs)

General characteristics - Definitions - Methods of classifications - Thermal energy storage - Sensible heat storage - Liquids - Solids - Latent heat storage - Thermal and chemical storage

Unit IV : PHOTO CONVERSION   (10 Hrs)

Photovoltaic conversion - Single crystal silicon cell - Principle and working of solar cells - Conversion efficiency - Single crystal silicon - Polycrystalline and amorphous silicon--Cadmium sulphide - Cadmium telluride - copper indium diselenide

Unit V : OTHER FORMS OF ENERGY   (10 Hrs)

Wind energy - Recent developments - Energy from biomass - Direct methods - Indirect methods ~ Wave energy - Vegetation for fuel - Bio-diesel - Plants for Bio-diesel- Physical and chemical properties of Bio-diesel.

Book For Study

1. P. Sukhatme, Solar energy (Second edition), Tata McGraw-Hill Publishing Co. Ltd. (New Delhi).

Book For Reference

1. G.D.Rai, Solar Energy Utilization, Khanna publishers (New Delhi).

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Sem. IV	**Hours/Week: 4**
14UPH430301B	**Credits: 3**

Core Elective-1 (WS):
MATERIAL SCIENCE

Objectives

- To understand the properties of the materials.
- To understand the control of the properties
- To acquire knowledge in nuclear materials.

Unit I: TECHNOLOGICAL PROPERTIES AND PHASE DIAGRAMS
(10 Hrs)

Classes of engineering materials - engineering requirements of materials - Level of structure - structure - property relationship in materials - selection of materials - weldabilty - machineability - formability - castability- phase diagrams - phase rule: unary phase diagrams - binary phase diagrams.

Unit II : PHASE TRANSFORMATION AND DEFORMATION   (10 Hrs)

Nucleation and Growth - solidification - Allotropic transformation- isothermal transformation - martensic transformation - phase transformation in alloy steels-nature of elastic deformation - electrometric deformation - an elastic deformation - plastic deformation - visco elastic deformation.

Unit III : CORROSION AND ITS PREVENTION   (10 Hrs)

Types of corrosion - direct - electrochemical - Galvani cells - mechanisms of electro chemical corrosion - contact corrosion - high temperature corrosion - Passivity - factors influencing corrosion rate - specific types of corrosions - control and prevention of corrosion.

Unit IV : MECHANICAL PROPERTIES AND TESTING   (10 Hrs)

Fundamental properties - fatigue - creep - testing techniques - tensile - compression - hardness - impact - fatigue - creep - stress - rupture - factors affecting mechanical properties. - grain size - heat treatment - atmosphere exposure - low temperature- high temperature

Unit V: MATERIALS FOR NUCLEAR AND SPACE APPLICATIONS
(10 Hrs)

Nuclear fuels - fuel cladding- moderators, control materials -coolants - shielding materials -Space programme - structural material and their properties - system requirements - extreme high temperature materials- materials for thermal protection - pressure vessels - lubrication.

Books for Study

1. S.K. Hayra Choudhury, Materials Science and Processes - 1991.
2. CM Sri Vastava, C & C.Srinivasan, Science of Engineering materials.

Unit	Chapter	Sections
I (Book 1)	1	1.1 – 1.6
	15	15.11 – 15.14
	16	16.10 – 16.12
II (Book 1)	11	11.1 – 11.4, 11.8, 11.10, 11.11
	9	9.2, 9.3, 9.12, 9.21
III (Book 1)	16	16.2 – 16.12
IV (Book 1)	8	8.3 – 8.16
V (Book 2)	17	17.6 – 17.11
	18	18.1 – 18.7

Book for Reference

1. V. Raghavan, Material Science and engineering, A first course, Prentice Hall Pvt.Ltd, New Delhi, 1989.
2. Dharmendra Kumar, SK Jain, AK Bhargava, Materials Science and Manufacturing Processes, Vikas Publishing.

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PROGRAMMING SKILL IN 'C'
FOR SOLVING PHYSICS PROBLEMS

Objectives

- To develop computer knowledge and to impart computing skill through C language.
- To apply C language to write simple programs for solving general, physics and physics related mathematics of specific nature.
- 3 hour teaching with 2 hour practical - any 10 problems outlined need to be completed during the practical class and the average mark out of 10 problems with 1 test is considered as assignment component for 25 marks and 10 marks respectively.

UNIT-I : DATA TYPES, OPERATORS AND EXPRESSIONS

Structure of C language - Lexical elements of C language: C character set - constants - keywords - delimeters - variables - data types and sizes - variable declaration - labels - expressions - statements. Operators and Expressions: Arithmetic operators and expressions - relational operators - logical and Boolean operators - assignment operators - data type conversion and mixed mode operations.

G	Temperature conversion from Centigrade to Fahrenheit, Kelvin scales	Assignment statements
P	Period of Oscillations of Simple pendulum inside a lift up-down	Do -
M	Computation of mathematical quantity for a given radius value	Do -

UNIT-II : I/O AND CONTROL STATEMENTS

Input / Output in C: input functions - output functions - formatted input / output. Control structures: Unconditional control - bidirectional conditional control - multi conditional control - loop control structures.

G	Cost of operating electrical devices	for structure
P	Young's and Rigidity Modulus	do- while structure
M	Solution to the general Quadratic equation Preparation of Multiplication Table Newton-Raphson method applied to Physics Problem	If – else structure for structure any loop structure

UNIT-III : FUNCTIONS AND FILES

C functions: Library functions - user defined functions - advantages of the functions - arguments - function declaration - recursive functions - storage class specifiers - scope of the variables - scope rules for identifiers.
Files: data types - with fopen(), modes in fopen(), with fclose() - random access.

G	Arranging a series of numbers into ascending / descending order	Use of function
P	Trapezoidal Rule applied to Physics Problem	Do -
M	To find the value of e up to n terms To find the function value f(x) with 3 boundary conditions To find the factorial of a given number	Do -

UNIT-IV: ARRAYS AND STRING

Arrays declaration - multidimensional array - array initialization - rules to initialize an array - strings/character arrays - rules.

G	Conversion of all small case letters in to capital letters	Use of strings
P	Field along the axis of the coil	Use of arrays
M	Matrix: Addition, Subtraction, Multiplication and Inverse of any order	Do -

UNIT-V : POINTERS, STRUCTURES AND UNIONS

Pointers: declaring a pointer variable - address operator - pointer arithmetic - pointers as function parameters - passing parameters by reference - pointers and arrays - dynamic storage allocation.
Structure: declaration and period operator - structure initialization - structure arrays - structure and function - structure and pointers - structure of pointer arrays - structure within structure - self referential structure
Union : Rules to use union

G	Construct of structure with Hour, Minute, Second as structure member - Convert to Military time	Use of Structure
P	Sum, Difference and Modulus of two complex numbers	Use of Structure
M	Sort n numbers in ascending order using Bubble Sort technique	Use of Pointers

BOOK FOR STUDY

1. Byron S. Gottfried, Schaum's Outlines: Programming with C, Tata McGraw Hill Pub. Co Ltd., New Delhi, 5/e, 2007.

Unit	Section
I	1.9, 2.1 – 2.4, 2.7 – 2.13, 3.1 – 3.4
II	4.1 - 4.9 , 6.1 – 6.11
III	3.6, 7.1 – 7.6, 12.1 – 12.5
IV	9.1 - 9.5
V	10.1 – 10.5, 11.1 – 11.7

Book for Reference

1. E.Balagurusamy, Programms in Ansi C

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ATOMIC, SOLID STATE AND NUCLEAR PHYSICS

Objectives
- To study atom models and their importance.
- To study crystal structure, bonding in crystals, specific heat and superconductivity.
- To study the structure and models of nucleus and also to study the process of radioactivity and its applications and also.
- To study the working of detectors, accelerators and cosmic rays.
- To study the aspects related to elementary particle and space physics.

UNIT - I: ATOMIC PHYSICS   (12 Hrs)

Sommerfeld's relativistic atom model - vector atom model - quantum numbers associated with the vector atom model - coupling schemes - Pauli exclusion principle - periodic classification of elements - magnetic dipole moment (due to orbital motion of the electron and due to spin) - Stern and Gerlach experiment - spin orbit coupling - Optical spectra - Zeeman effect - Lorentz classical theory of normal effect, shift, experiment - Larmor's theorem - quantum mechanical explanation of the normal and anomalous effect - Paschen Back effect - Stark effect.

UNIT - II: SOLID STATE PHYSICS   (12 Hrs)

Periodicity - Lattice, Basis, Unit cell, crystal structure - symmetry elements - 2D and 3D Bravais lattices - bonding in crystals - different types and their properties - band theory of solids - specific heat capacity: Einstein's theory and Debye's theory - Superconductivity - experimental facts - persistent current - Type I - Type II - Meissner effect - BCS theory - applications.

UNIT - III: NUCLEUS AND RADIOACITIVITY   (12 Hrs)

General properties - binding energy - nuclear stability - theories of nuclear composition - nuclear forces - models of nuclear structure - liquid drop model and shell model - Alpha particle spectra - Beta ray spectra - origin of the line and continuous spectrum - neutrino theory of beta decay - origin of gamma ray spectra - Nuclear isomerism- internal conversion - law of successive disintegration - radioactivity dating - Biological effect of nuclear radiations.

UNIT-IV: PARTICLE DETECTORS, ACCELERATORS AND COSMIC RAYS   (12 Hrs)

Particle detectors - interaction between energetic particles and matter - Wilson Cloud chamber - Geiger Muller Counter - nuclear emulsion technique - Particle accelerators - Cyclotron - Betatron - Synchrotron - electron synchrotron and proton synchrotron - Discovery - Cosmic Rays - latitude, azimuth, altitude and longitude effects - primary and secondary cosmic rays - showers - positron - mesons - Van Allen belts - origin of cosmic rays.

UNIT-V: ELEMENTARY PARTICLE PHYSICS AND SPACE PHYSICS (12 Hrs)

Properties of elementary particles (Lepton & Baryon) - exact conservation laws - energy linear momentum angular momentum - charge - Baryon & Lepton number - origin of these laws - fundamental interactions - approximate conservation laws - strangeness - parity - charge conjugation - time reversal - Quark model - unification of interaction - geography of the universe - Hubble's law.

BOOKS FOR STUDY
1. R. Murugeshan., Kiruthiga Sivapasath. Modern Physics, S. Chand & Co., Thirteenth Revised Multicoloured Edition, New Delhi, 2007.
2. H.S Mani and G.K. Mehta, Introduction to Modern Physics, EW Press, New Delhi, 1988.

Unit	Book	Sections
I	1	6.11 - 6.28
II	1	7.16-7.17, 41.1 - 41.6, 41.10 - 41.15, 42.1
III	1	27.3 - 27.11, 31.13 - 31.14, 31.19 - 31.27, 31.34 - 31.36
IV	1	29.1 - 29.2, 29.6 - 29.7, 29.11, 30.4, 30.6 - 30.8, 37.1 - 37.11
V	2	11.1 - 11.18, 12.1 - 12.3

BOOKS FOR REFERENCE
1. Arthur Beiser, Concepts of Physics, Tata McGraw - Hill - Sixth Edition, 2003.
2. Sehgal Chopra Sehgal - Modern Physics, Sultan Chand Sons, New Delhi, 2004.
3. Sanjiv and Puri, Modern Physics Concepts and Application, Narosa Publication, New Delhi - 2004.

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ANALOG ELECTRONICS

Objectives
- To understand the various techniques and concepts in Electronics
- To apply these techniques in practical circuits.
- To develop the skill in handling instruments.

Unit - I: Diode characteristics and applications

Constant voltage source - constant current source - Maximum power transfer theorem - Thevenine's theorem - procedure for finding Thevenin Equivalent circuit - PN junction theory - V-I characteristics of a PN junction diode - Half wave rectifier - Bridge rectifier - Efficiency - filters - Shunt capacitor filter - p filter - Zener diode - equivalent circuit - voltage regulator - LED - V-I characteristics - advantages - applications - photo diode - characteristics - applications.

Unit - II: Transistor characteristics and biasing techniques

Junction transistor structure - working of a transistor - transistor amplifying action - transistor characteristics - CB, CE, CC - comparison between the three configurations - basic CE amplifier circuit -selection of operating point - need for bias stabilization - requirements of a biasing circuit - fixed bias - voltage divider biasing circuit - h parameter equivalent circuits - Types of FET - JFET - working principle - symbol - comparison with bipolar transistor - output characteristics - shorted gate drain current, pinch off voltage and gate source cut off voltage - JFET parameters.

Unit - III: Single stage, multistage and power amplifiers

Single stage transistor amplifier - BJT, FET - analyzing an amplifier - graphical method - equivalent circuit method - gain of a multistage amplifier - RC and transformer coupling - frequency response curve of an RC coupled amplifier - analysis of two stage RC coupled amplifier - classification of amplifiers - single ended and power amplifier - push pull amplifier.

Unit - IV Feedback amplifiers and oscillators

Concept of feedback in amplifiers - types of feedback - voltage gain of feedback amplifier - advantages of negative feedback - amplifier circuits with negative feedback - classification of oscillators - positive feedback amplifier as an oscillator - LC oscillators - Hartley, Colpitts and RC oscillators - Phase shift and Wien's bridge - Crystal oscillators - Astable multivibrator.

Unit - V: Switching circuits & Integrated circuits

Clipping and clamping circuits - SCR: working - equivalent circuit - important terms - V-I characteristics - Integrated circuits - advantages and disadvantages - Operational amplifier - differential amplifier - basic circuit - operation - common mode and differential mode signals - voltage gains - CMRR- Schematic symbol of OP AMP - output voltage - OP-AMP with negative feedback - inverting amplifier - Non inverting amplifier - Voltage follower - summing amplifiers - Integrator and differentiator

Books for study

1. Bhargava N.N, Kulshreshtha D.C and S.C Gupta - Basic electronics and linear circuits, Tata McGraw Hill Publishing Company Limited, 2007.
2. V.K. Mehta and Rohit Mehta, Principles of Electronics, S. Chand & Co. Ltd, New Delhi, 2013.

Unit	Book	Sections
I	1	4.2, 4.3, 4.6.1, 4.6.2, 4.7.1, 4.7.2, 4.8.1,4.8.4
	2	1.9 – 1.14, 6.25 – 6.27, 7.2 -7.10
II	1	5.2,5.4, 5.5, 5.7,5.8, 5.10, 7.3 – 7.5, 7.6, 7.6.1, 7.6.4, 8.4.2
	2	19.1-19.4, 9.6,19.8 – 19.10, 19.13
III	1	8.2 – 8.4,9.2, 9.3.,9.3.2,9.4,9.5.1,9.7,10.5,10.8
IV	1	12.1,-12.5, 13.2,13.4,13.5, 3.5.3, 13.5.4, 13.6.2, 13.6.313.7, 13.8
V	2	18.18 – 18.23, 20.1 – 20.5, 25.1-25.5, 25.7, 25.8,25.6,25.17, 25.22 – 25.24, 25.26, 25.27,25.32, 25.34, 25.35,

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PHYSICS PRACTICAL-3

Objectives
- To make observation and develop the computation skill.
- To understand various techniques and concepts in General Physics experiments
- To develop the skill in handling instruments.

ANY 16 EXPERIMENTS

1. Stefan's constant.
2. Spectrometer - grating - normal incidence.
3. Spectrometer - grating - minimum deviation.
4. M - using coil carrying current - Cu voltammeter.
5. M - using coil carrying current - ammeter.
6. Earth inductor.
7. Fresnel's biprism.
8. B.G. - absolute M.
9. B.G. - absolute C.

10. Zener regulated power supply.
11. Clipping and clamping.
12. Conversion of galvanometer into an ammeter.
13. Conversion of galvanometer into voltmeter.
14. Transistor characteristics - CB mode.
15. Transistor characteristics - CE mode.
16. FET - characteristics.
17. Hartley oscillator.
18. Colpitts oscillator.
19. Study of transistor CE amplifier.
20. Study of FET amplifier.
21. Logic gates - by discrete components.
22. De Morgan's theorem and Boolean algebra.

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Sem. V   **Hours/Week: 4**
14UPH530302A   **Credits: 4**
Core Elective-2 (WD):
PHOTOGRAPHY

Objectives
- To acquire knowledge about parts and types of camera, sizes and types of films used.
- To get trained in taking still photograph, developing and printing.
- To understand the basic principles of enlarging and colour photography.
- To acquire knowledge about digital photography.

UNIT I: CAMERA
Basic parts of the camera, three important controls of the camera, types of camera-Box camera, simple miniature camera, Modern reflex camera-TLR and SLR cameras

UNIT II: FILMS-SIZES AND TYPES
Black and White films, types of film, Film sizes and negatives, interchangeable lenses.

UNIT III: EXPOSURE AND PICTORIAL COMPOSITION
Exposure for photographing in artificial light, depth of field, depth of focus, exposure for taking photographs of moving subjects -shutter speed for moving objects-panning-practical hints for exposing.

UNIT IV: DEVELOPING THE FILM
Basic principle in film developing-dish developing- tank developing-time and temperature control of developing.

UNIT V: PRINTING, ENLARGING, COLOUR AND DIGITAL PHOTOGRAPHY
Contact printing-enlarging, techniques and practical hints on enlarging - primary and complementary colour- colour films-camera for colour photography - digital photography - choosing a digital camera - digital manipulation.

Practical sessions
- Camera handling technique
- Developing process
- Printing techniques

BOOK FOR STUDY
Cyclostyled text (Department of Physics, St. Joseph's College (Autonomous))

BOOK FOR REFERENCE
1. O.P. Sharma, Practical photography.
2. Lee Forst - Hodder & Stoughton, Teach yourself Photography, U.K.

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Sem. V   **Hours/Week: 4**
14UPH530302B   **Credits: 4**
Core Elective-2 (WD):
VIDEOGRAPHY

Objectives
- To study the different types of video cameras.
- To understand the video editing softwares.
- To provide practical training in basic operations of camera and video editing.

Unit I : VIDEO CAMERA   (12 Hrs)
Principle of Television - Colour composite Video signal - Colour Television systems(PAL,SECAM,NTSC) - Video camera: Pick up Device - Optical section - Charge Couple Device-CCD - Electronic Shutter - Handling highlight - HAD sensor - Advantages/ limitation / resolution of CCD - Digital Signal processing in camera - Feature comparison in various Popular camera Models of Sony/Panasonic.

Unit II : VIDEO TECHNIQUE(12 Hrs)
Video camera ACCESSORIES: Zoom lens - View Finder - Microphone - Battery - AC adapter - Camera cable - Care and handling of the Equipment Functions and Controls of Video Camera: Power on/off - VTR on/off - Zoom control - Iris Control auto/ manual/ - Viewfinder - Earphone - Camera Connector - Video out Video recording - corrections applied to video

processing: Shading Corrections - Aperture Correction - Flare Correction - ABL - Gamma correction - Chrome gamma/colour correction

Unit III : VIDEO EDITING SOFTWARES(12 Hrs)
Software overview (Windows Movie Maker, Adobe premier, Pinnacle Video Studio, Ulead Video Studio, Magix Video Studio) - Video capture and record - edit - Title - Audio - Create video file and Disk (DVD and Blue Ray).

Unit IV : PRACTICAL - I: VIDEO SHOOTING   (12 Hrs)
Functions of Video Camera - Video Shooting (Indoor and Outdoor) - mini project.

Unit V : PRACTICAL - II : VIDEO EDITING(12 Hrs)
Functions of Ulead Video Studio - Video Editing - creating a MPEG video file and DVD - mini project.

BOOK FOR STUDY
Course material prepared by the Department.

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Sem. V   **Hours/Week: 2**
14UPH540601   **Credits: 2**

Skill Based Elective (BS):
ELECTRICAL WIRING

Objectives
- To study the different electric parameters and units used and also the different types of power generation.
- To understand the distribution symbols and electrical connections used in electrical wiring.
- To provide practical training in basic aspects of electrical wiring.

Unit I: ELECTRICITY GENERATION   (4 Hrs)
Fundamentals of electricity - Current, Volt, resistance - Ohm's law - Power - Kilowatt hour - Watt meter - Electrical measurements - Electric power generation by Thermal, hydro, atomic and nuclear methods - Battery - Generators - Study of Generator.

Unit II: ELECTRIC CIRCUITS AND DISTRIBUTION   (5 Hrs)
Symbols of electrical parameters - Importance Series, Parallel connections - Ac and DC - Conductors - Inductor, Conductors -Inductor, Capacitor and transformer - Distribution methods - single phase and three phase - Star and delta connections - Rules of electric connections - SWG -Motors - Study of motor and series and parallel circuits.

Unit III : ELECTRICAL WIRING -I   (5 Hrs)
Tools - Methods of Joining conductors - House wiring methods - Glit, wood casing, Tough - Rubber sheathed conduit or PVC pipe - concealed. Swithches - celling roze - lamp holders, sockets - Fuse base - Distribution box -Trip switches - Earth connection -Experimental study of house wiring.

Unit IV : ELECTRICAL WIRING - II   (5 Hrs)
Main board preparation - Distribution - Cut - out preparation - Switch board preparation - Power factor -IEE regulations - Safety precautions - Testing the insulation -Experimental study of main, distribution and switch boards.

Unit V : ELECTRICAL APPLIANCES   (5 Hrs)
Tungsten - filament bulb - tube light -mercury and sodium vapour lamp - emergency lamp - heater - iron box - table fan - ceiling fan - battery eliminator - electrical requirement to washing machine and refrigerator - procedure to rectify the electrical faults in electrical appliances.

BOOK FOR STUDY
Course material prepared by the Dept.

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Sem. V   **Hours/Week: 2**
14UPH540701   **Credits: 2**
IDC:
SOFT SKILLS

Objectives
This course is aimed at introducing the students to the nuances of developing the basic skills that required of an educated youth; and to train them to present the best of themselves as job seekers.

Module 1: Effective Communication & Resume Writing
Basics of communication - definition of communication, Barriers of Communication, Non-verbal Communication; Effective Communication - Johari Window, The Art of Listening, Conversation Techniques, Good manners and Etiquettes.

Module II: Resume Writing & Interview skills
Resume Writing: What is resume? Types of Resume - Chronological, Functional and Mixed Resume, Steps in preparation of Resume. Interview Skills: Common interview questions, Attitude, Body Language, The mock interviews, Phone interviews, Behavioral interviews.

Module III: Group Discussion

Group Discussion Basics, GD Topics for Practice, Points for GD Topics. Personal Effectiveness: Self Discovery; and Goal Setting

Module IV: Numerical Ability

Average, Percentage; Profit and Loss, Simple Interest, Compound Interest; Time and Work, Pipes and Cisterns; Time and Distance, Problems on Trains, Boats and Streams; and Calendar, Rations and Proportions.

Module V: Test of Reasoning

Verbal Reasoning: Series Completion, Analogy; Data Sufficiency, Assertion and Reasoning; and Logical Deduction. Non-Verbal Reasoning: Series; and Classification

References

1. Aggarwal, R.S. 2010. A Modern Approach to Verbal and Non Verbal Reasoning. S.Chand, New Delhi.
2. Covey, Stephen. 2004. 7 Habits of Highly effective people, Free Press. Egan, Gerard. (1994). The Skilled Helper (5th Ed). Pacific Grove, Brooks/Cole.
3. Khera, Shiv 2003. You Can Win. Macmillan Books , Revised Edition.
4. Murphy, Raymond. 1998. Essential English Grammar. 2nd ed., Cambridge University Press. Sankaran, K., & Kumar, M. Group Discussion and Public Speaking. M.I. Pub, Agra, 5th ed., Adams, Media.
5. Trishna's 2006. How to do well in GDs & Interviews, Trishna Knowledge Systems.
6. Yate, Martin. 2005. Hiring the Best: A Manager's Guide to Effective Interviewing and Recruiting.

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OPTICS, SPECTROSCOPY AND LASER

Objectives

- To understand the concepts of Dispersion of Light , interference, diffraction and polarization of light waves and their applications
- To study the principles of MW, IR, Raman and Resonance Spectroscopy and its applications.
- To understand the working principle of Lasers , and their applications
- *To study different types of optical fiber and its applications.*

UNIT-I: GEOMETRICAL OPTICS

Fermat's Principle - Dispersion of Light - Dispersive Power - Deviation without dispersion - Dispersion without deviation- Constant deviation Prism- Constant deviation spectroscope- Aberration- Spherical aberration- methods of minimizing spherical aberration - Chromatic aberration of a lens - Lateral chromatic aberration - Eyepiece- Huygen's eyepiece - Ramsden's eyepiece.- Fourier optics (Basic concept only).

UNIT-II : PHYSICAL OPTICS

Interference - Condition for sustained interference of light - Fresnel's Prism - colors of thin films due to transmission - Michelson Interferometer and its applications. Fresnel & Fraunhofer diffraction - Zone plate - construction - theory- Diffraction at straight edge -Plane transmission grating - theory - Determination of l of light using grating (Normal Incidence) - Polarization - double refraction -Nicol prism - Theory of Production of elliptically and circularly polarized light - Quarter wave plate - Half- wave Plate-Detection of plane , circularly and elliptically polarized light - Optical activity.

UNIT-III: MICROWAVE AND INFRARED SPECTROSCOPY

Theory of Microwave spectroscopy - diatomic molecule as a rigid rotator- Instrumentation. IR - Range of IR radiation - theory of IR absorption spectroscopy - theory of vibrational diatomic molecule as anharmonic oscillator - Instrumentation.

UNIT -IV: RAMAN AND RESONANCE SPECTROSCOPY

Raman spectroscopy: Principle - characteristics and properties of Raman lines - Difference between Raman and IR spectra - quantum theory - Perkin Elemer Raman spectrometer. Resonance Spectroscopy: ESR, NMR, NQR (Principle & Theory only).

UNIT - V: LASER AND FIBER OPTICS

Basic ideas of Lasers - stimulated emission and radiation - Population inversion - He- Ne Lasers - Semiconductor Lasers - Laser Raman Spectroscopy- Holography - Principle and method - applications -Optical fiber and its importance - Types of fibers-Propagation of light waves in optical fiber - acceptance angle and cone - Numerical aperture- modes of propagation- Applications.

BOOKS FOR STUDY

1. R. Murugesan, Kiruthiga sivaprasath, Optics and Spectroscopy, S.Chand & Company Ltd, 7th Revised Edition. 2010.
2. Gurdeep R. Agarwal and Sham K.Anand - Spectroscopy (atomic and molecular), Himalaya Publishing House, 2004.
3. Laser and fiber Optics, by the Department of Physics.

Unit	Book	Sections
I	1	17.1, 1.7,1.9,1.10 , 1.12, 1.13, 1.16 , 1.17 , 1.20 , 1.25 -1.27
II	1	2.1,2.3,2.5,2.11,2.12, 3.1,3.3,3.7,3.12,3.17,4.1,4.5,4.8,4.10,4.11-4.15
III	2	2.1 – 2.4, 2.10, 3.1, 3.2, 3.4, 3.5, 3.9
IV	2	4.1 - 4.6, 7.1 -7.3, 9.1 – 9.3, 10.1 – 10.6
V	3	Book by the Department

BOOKS FOR REFERENCE

1. S.L.Kakni, K.C. Bhandari, A text book of Optics, S.Chand and Sons, New Delhi, 2002.
2. N. Subramanyam, Brijal. A Text Book of Optics S.Chand and Company Ltd., New Delhi.
3. B.B.Laud Lasers and Non-Linear Optics.
4. H.S. Randhawa, Modern Molecular Spectroscopy, Macmillan India Ltd.

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Sem. VI   **Hours/Week: 5**
14UPH630214   **Credits: 5**

QUANTUM MECHANICS AND RELATIVITY

Objectives

- To understand the concepts of wave mechanics, dualistic nature of Nature.
- To understand the physical implications of wave functions, expectation value, linkage between classical and quantum physics.
- To apply the Schrödinger equation to 1D and 3D physical systems.
- To learn the 4D space and changes from our common sense.

UNIT - I: ORIGIN OF QUANTUM MECHANICS   (12 Hrs)

Introduction - expression for group velocity - experimental study of matter waves - Properties of wave functions. Phase velocity - wave velocity - group velocity- relation between group velocity and phase velocity. Heisenberg's Uncertainty principle - Mathematical proof of uncertainty principle for one dimensional wave packet - wave particle duality.

UNIT - II: GENERAL FORMALISM   (12 Hrs)

Basic postulates - derivation of time dependent Schrödinger's equation - Probability current density - Ehrenfest's theorem- Commutator algebra - form of wave function in terms of definite momentum - probability density - properties of energy eigen values.

UNIT-III: ONE DIMENSIONAL SCHROEDINGER PROBLEMS (12 Hrs)

Particle in a box - Infinite square well potential - potential step. The free particle - rectangular potential well- Finite square potential well. Barrier penetration problem. Linear harmonic Oscillator - Comparison of classical and quantum ideas.

UNIT-IV: SPHERICALLY SYMMETRIC POTENTIAL PROBLEMS(12 Hr)

Wave mechanical atom model - The hydrogen atom - normalized wave function of the Hydrogen atom - Expression for energy of the electron of the Hydrogen atom in the ground state - Significance of various quantum numbers - electron probability density -Orbital angular momentum - expression for eigen values of L2 and L - Rigid rotator.

UNIT - V: RELATIVITY   (12 Hrs)

Introduction - Frame of reference - Newtonian relativity - Galilean Transformation equations - The Ether hypothesis - The Michelson -Morley experiment - Special theory of relativity - The Lorentz Transformation equations - Length contraction - Time Dilation - relativity of simultaneity - addition of velocities - variation of mass with velocity - Mass Energy equivalence - Minkowski's Four dimensional Space-Time continuum.

BOOK FOR STUDY

1. R Murugesan & Kiruthiga Sivaprasath, Modern physics, S Chand & Co, New Delhi, Edition 2010.

Unit	Book	Sections
I	1	11.1- 11.4,11.6,11.9,12.8,2.1
II	1	11.7,12.1,11.8,12.2,12.6,14.4,15.5,15.6,15.7
III	1	11.10,11.11,11.13,12.3,12.4,12.9,14.1,16.5.
IV	1	11.5,11.14,13.1,13.2,13.3,13.4,14.5,11.15
V	1	1.1-1.15

BOOK FOR REFERENCE

1. H.S. Mani and G.K. Metha, Introduction to Modern physics, EWP, New Delhi, LSCE, 1988.

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Sem. VI   **Hours/Week: 5**
14UPH630215   **Credits: 5**

DIGITAL ELECTRONICS AND MICROPROCESSOR

Objectives

- To Study various number systems and to simplify Boolean expression using the methods of Boolean Algebra and Karnaugh map.
- To know the fixed function Combinational logical circuits and their implementation.
- To study the fundamentals and applications of sequential logical circuits.
- To study the fundamentals of architecture and instruction set of an 8-bit microprocessor.
- To write Assembly Language Programs for an 8-bit microprocessor INTEL - 8085.

UNIT I : NUMBER SYSTEMS, LOGIC GATES & BOOLEAN ALGEBRA AND K- MAPS

Number Systems and Logic Gates: Different Number Systems -Binary, Octal and Hexa-decimal. Conversion between the number systems. Different Digital codes - ASCII, BCD, Gray codes. Basic logic gates: AND, OR and NOT Gates. Realization using Diodes and Transistor. Universal gates - NAND, NOR - conversion into Basic gates, Special Gates - Ex-OR, Ex-NOR.

Boolean algebra and K-Maps:- Boolean Laws. De-Morgan's Theorems. Simplification of Logical expression using Boolean Algebra. Fundamental Products. Minterms and Maxterms. Implementation of a Truth Table into an Equivalent Logic Circuit by Boolean Algebra and Karnaugh Maps - 4 Variables.

UNIT II : COMBINATIONAL AND ARITHMETIC DIGITAL CIRCUITS AND SEMICONDUCTOR MEMORIES

Data processing circuits :- A basic study of TTL, CMOS and MOSFET - Classification and parameters. Basic Idea of Multiplexers 2:1, 4: 1, De-multiplexers 1:2, 1:4, Decoders, Encoders - decimal - to - BCD, Parity Generator and Checker - odd & even.

Arithmetic Circuits :- Binary Addition, Binary Subtraction using 2's Complement Method, Half Adders, Half subtractors, Full Adders and Full Subtractors.

Memories :- Read-only memories (ROM), PROM, EPROM and RAM.

UNIT III: SEQUENTIAL CIRCUITS

Sequential Circuits :- RS, D, JK and T Flip-Flops. Level Clocked and Edge Triggered Flip-Flops. Preset and Clear Operations. Race-around Conditions in JK Flip-Flops. Master-Slave JK Flip-Flop (As Building Block of Sequential Circuits). Counters : - Asynchronous and Synchronous Counters. Decade Counter, UP-DOWN Counters, Ring Counter.

Shift registers : - Serial-in-Serial-out, Serial-in-Parallel-out, Parallel-in-Serial-out, and Parallel-in-Parallel-out Shift Registers (only upto 4 bits).

UNIT IV: MICROPROCESSORS

Intel 8085 Microprocessor Architecture

Architecture of 8085. Block Diagram, different blocks, Buses, Registers, ALU, Memory- Stack Memory. Interfacing Devices, Timing and Control Circuitry, Pin-out Diagram. Timing States, Instruction Cycle , Interrupts and Interrupt Control, Input/Output. Machine Language. Assembly Language. Instruction Set and Format. Data Transfer, Arithmetic, Logical, Branching and Machine Control Operations. RIM and SIM.

Different Addressing Modes : Register, Implied, Immediate, Direct and Indirect. Memory Organization and Addressing, Memory Interfacing, Memory Map.

UNIT V : 8085 INSTRUCTION SET AND PROGRAMMING:

Microprocessor Programming :- Algorithm and Flowcharts. Simple programming Exercises : Addition - sum of two 8-bit data without carry, sum of two 8-bit data with carry, decimal addition, sum of a string of data, Subtraction of two 8-bit data, 8 bit Multiplication - using successive addition and 8 bit Division - using successive subtraction, Look-up-table, Masking of a data, block transfer.

BOOK FOR STUDY

1. Digital Electronics and Microprocessors - A Text Book - Dept of Physics

Suggested Books for Reference

1. Microprocessor Architecture, Programming, and Applications with the 8085 by Ramesh S. Gaonkar, (Prentice Hall, 2002).
2. Microprocessor Architecture, Programming, and Systems featuring the 8085 by William A. Routt, (Thomson Delmar Learning, 2006).
3. Digital principles and Applications by Donald P. Leach & Albert Paul Malvino, (Glencoe, 1995).
4. Digital Fundamentals, 3rd Edition by Thomas L. Floyd (Universal Book Stall, India, 1998).

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PHYSICS PRACTICALS-4

Objectives

- To make observation and develop the computation skill.
- To understand various techniques and concepts in General Physics experiments
- To develop the skill in handling instruments.

ANY 16 EXPERIMENTS

1. Monostable and bistable multivibrators.
2. Spectrometer - Cauchy's constant.
3. Spectrometer - small angle prism.
4. B.G. - L by Anderson's bridge.
5. B.G. - High resistance by leakage.
6. Potentiometer - EMF of a thermocouple.
7. Potentiometer - High range voltmeter.
8. Series and parallel resonance.
9. NAND and NOR as universal building blocks.
10. Adders and Subtractors.
11. Op-amp. - basic operations.
12. Astable multivibrator.
13. Simplification of Boolean expression using k-map and implementation.
14. Encoder and Decoder.
15. Binary adder and subtractor.
16. Multiplexer and Demultiplexer.
17. Flip Flops using IC gates.
18. Shift registers.
19. Counters.
20. Microprocessor - data transfer operations and exchange.
21. Microprocessor -Arithmetic operations 8-bit Addition, Subtraction (Binary and Decimal), 16-bit Addition only, Multiplication and Division.
22. Microprocessor - Interfacing - Switches.

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Core Elective-3 (WD):
INSTRUMENTATION

Objectives

- To learn the functional elements of measuring instruments.
- To learn the pressure and temperature measurements
- To learn the flow and acoustic measurements.

Unit-I: INSTRUMENTS AND THEIR STATIC PERFORMANCE CHARACTERISTICS

Functional elements of a measurement system - classification of instruments - standards and calibration - errors and uncertainties in performance parameters - types - propagation of uncertainties in compound quantities - static performance parameters - impedance loading and matching - specifications of instrument static characteristics

Unit-II: TRANSDUCERS

Analog transducers : Electromechanical, Potentiometric, Inductive - Electrodynamic - Electromagnetic - Eddy current - Variable inductance- Capacitive - Piezoelectric - resistance strain gauges - bonded resistance strain gauges - ionization transducer - optoelectric transducer.

Digital transducers: Frequency domain - electromagnetic frequency domain - opto electrical frequency domain - variable string transducers.

Unit-III: INTERMEDIATE, DISPLAY, MOTION AND FORCE MEASUREMENTS

Amplifiers: Mechanical - Hydraulic - Pneumatic - Optical - Electrical: AC,DC, carrier, chopper, amplifiers - CRO. Relative motion measuring devices: Electromechanical - Optical -Pneumatic types - seismic devices - Gyroscopic devices Force measuring devices: Balance - Hydraulic load cell - Pneumatic load cell - Elastic force devices.

Unit-IV: PRESSURE AND TEMPERATURE MEASUREMENTS

Pressure measurements: Manometers - Elastic types- characteristics - Mcleod gauge -Pirani gauge - Ionisation gauge - Knudsen gauge.

Temperature measurements: Non electrical methods - Electrical methods - radiation methods.

Unit-V: FLOW AND ACOUSTIC MEASUREMENTS

Flow measurements: Ultrasonic flow meter - hot wire anemometer - Laser Doppler anemometer.

Acoustical measurements: Characteristics of sound - sound pressure and power levels - loudness - Typical sound measuring systems - Microphones.

BOOK FOR STUDY

1. B.C. Nakra and K.K. Chaudhry, Instrumentation measurement and Analysis, Second Edition, Tata Mc Graw Hill, New Delhi, 2004.

UNIT	CHAPTER	SECTIONS
I	1	1.3, 1.4, 1.6
	2	2.1 – 2.6
II	4	4.1, 4.2, 4.3.1, 4.3.2
III	5	5.1, 5.2
	6	6.3
	7	7.1, 7.2, 7.3.2, 7.3.3
	8	8.1 – 8.5
IV	10	10.2.1, 10.2.2, 10.3, 10.4
	11	11.1, 11.4-11.6
V	12	12.1,12.6
	13	13.1-13.6

BOOK FOR REFERENCE

1. Albert D Helfrick and William D. Cooper, Modern electronic Instrumentation and Measurement Techniques, 3/e, PHI, New Delhi 1995.

2. MIT open course - Lecture and Animation series.

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Sem. VI   **Hours/Week: 4**
14UPH630303B   **Credits: 4**
Core Elective-3 (WD):
COMMUNICATION SYSTEMS

Objectives
- To learn the radio and television transmission systems.
- To learn the switched communication systems.
- To learn the radar and fibre optic communication systems.

UNIT I: RADIO TRANSMISSION SYSTEMS

Introduction - AM transmitters - FM transmitters - Tuned RF receivers - Superhet receiver - AM broadcast receivers - RF amplifier - FM receiver - Measurement of receiver performance - sensitivity, selectivity, adjacent channel selectivity - signal to noise ratio.

UNIT II: TELEVISION SYSTEMS

Television basics - TV camera systems -CCD Camera- Television transmitters - Monochrome TV receiver - Principle of a colour TV - PAL colour receiver - Television screens - CRT and LCD.

UNIT III: SWITCHED COMMUNICATION SYSTEMS

Basic system structure - Telephony - Telephone transmitter - Telephone receiver - Basic telephone set - Wireless communication systems - GPRS - Bluetooth - Cellphone.

UNIT IV: RADAR AND NAVIGATION SYSTEMS

Basic Radar system - Pulsed Radar system - Moving Target Indicator (MTI) - CW Doppler Radar - Frequency Modulated CW radar - Radio Navigational aids - Radio Direction Finding

UNIT V: FIBRE OPTIC COMMUNICATION SYSTEMS

Total internal reflection and basics of fibre optic system - Optical fibres - Types of optical fibres - Optical propagation theory (based on ray optics)- Fibre Attenuation - Fibre selection - Fibre materials Fibre fabrication - Cabling - Fibre connectors - Applications - Internet, Information superhighway, medicine - Fibre Optic Transmitters and receiver (Block diagram only).

BOOKS FOR STUDY

1. ANOKH SINGH, Principles of Communication Engineering,S. Chand and Company Ltd.I Edition, Reprint 2001.

2. JK FRANZ & VK JAIN, Optical Communications - Components and Systems, Narosa Publishing House Pvt. Ltd.I Edition, Reprint 2005.

UNIT	BOOK	SECTIONS
1	1	2.1,- ,2.3, 2.3.1, 2.4.1, 2.4.4, 2.5, 2.5.1
2	1	5.1, 5.2, 5.6, 6.1.1, 6.1.2, 6.2, 6.2.1, 6.6, 6.7, 6.7.1-6.7.5
3	1	12.2, 12.3, 12.3.1, 12.3.2, 12.4, 12.5.1-12.5.7, 12.6- 12.8
4	1	13.1, 13.2.1, 13.2.2, 13.3.1-13.3.4, 13.4.1-13.4.2, 13.5, 13.6, 13.7, 13.8.1
5	2	4, 4.1, 4.2, 4.3.1-4.3.3, 4.5.5, 4.6, 4.7.4

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Sem. VI   **Hours/Week: 3**
14UPH630304A   **Credits: 3**
Core Elective-4 (WD):
BIOMEDICAL INSTRUMENTATION

Objectives
- To study the function of various transducers and electrodes in Biomedical instrumentation.
- To understand the working principles of various instruments in Medicine.
- Updating the knowledge in ultrasonic and X-Ray measurements in Medicine.

UNIT - I: BIOELECTRIC POTENTIALS (10 Hrs)

Resting and action potentials - Propagation of action potentials - Bioelectric potentials: The electrocardiogram (ECG) - The electroencephalogram (EEG) - The Electromyogram (EMG) - Other Bioelectric potentials.

UNIT - II: BIOPOTENTIAL ELECTRODES (10 Hrs)

Electrode theory - Microelectrodes - Body surface electrodes - Needle electrodes- reference electrodes - pH electrode - Blood gas electrode - Specific ion electrode.

UNIT - III: CARDIOVASCULAR MEASUREMENTS (10 Hrs)

Electrocardiography - ECG amplifiers - Electrodes & leads - ECG Recorder principles - Measurement of Blood pressure: Indirect measurement - Measurement of Blood flow and cardiac output.

UNIT - IV: NERVOUS MEASUREMENTS (10 Hrs)

Anatomy - Neuronal communication - Neuronal Receptors - Measurements from the nervous system - Neuronal firing measurements - EMG measurements - Computerized Axial Tomography.

UNIT - V: ULTROSONIC AND X RAY MEASUREMENTS (10 Hrs)

Basic modes of transmission - Ultrasonic Imaging - Ultrasonic diagnosis - Ultrasonic transducers - Ophthalmic scans - Instrumentation for diagnosis - X rays - Special techniques.

BOOKS FOR STUDY

1. Biomedical Instrumentation and measurements by Leslie Cromwell, Fred. J. Weibell, Erich A. Pfeiffer, Prentice Hall India, Second Edition (Pearson Education).

Unit	Book	Sections
I	1	3.1- 3.3 ,3.3.1-3.3.4
II	1	Chapter 4 fully
III	1	6.1, 6.1.2-6.1.4, 6.2, 6.2.1, 6.3, 6.3.1-6.3.4
IV	1	8.1, 8.2, 8.2.1, 8.3, 8.3.1, 8.4.2, 10.1,10.2, 10.4, 10.7, 10.7.1-10.7.3,15.4.4
V	1	9.2.2, 9.2.3, 9.3, 9.3.4, 14.2, 14.2.1, 14.2.2, 14.3

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Core Elective-4 (WD): ASTROPHYSICS

Objective

- To impart an understanding of the great number of diverse phenomena in the Universe through Physics
- To understand the solar system
- To understand the life in universe.

UNIT - I: ELEMENTS OF SPACE DYNAMICS

Man's quest for space - the energy requirements - Rocket propulsion - suborbital flights - Artificial earth satellites - Lunar and planetary probes.

UNIT- II: THE HEART OF THE SOLAR SYSTEM

Vital statistics of the Sun - the solar photosphere - the Fraunhoffer lines - structure of solar atmosphere - the solar interior - Sunspots and solar activity - other features of the solar activity - Radio studies of the quiet Sun - Radio radiation of the disturbed Sun.

UNIT - III : SMALL BODIES IN THE SOLAR SYSTEM

Asteroids - Meteorites - Comets as members of the Solar system - Physical properties of comets - Origin and evolution of comets - Space studies of comets - Meteors - an inventory of satellites - the large satellites - Medium, small and tiny satellites - Planetary rings.

UNIT - IV : OUR HOME AND THE NEAREST NEIGHBOUR

EARTH: Gross properties - internal structure - the terrestrial atmosphere - the Earth's magnetic field - motions - Solar terrestrial relations - the Earth in space - atmospheric circulation in the troposphere. MOON: Some basic facts - telescopic studies - internal structure - surface features - Origin of the Moon - the lunar environment - Solar and Lunar eclipses.

UNIT - V: LIFE IN THE UNIVERSE

Nature of life on Earth - A survey of objects in the Solar System - Pre Mariner search for life on Mars - Post-Mariner search for life on Mars - Life outside the Solar system - the search for life in the Universe.

Book for Study

1. Astrophysics of the Solar System - KD Abhyankar, Universities Press India Pvt. Ltd. Hyderabad, 1999.

Unit	Section
I	3.1 – 3.6
II	4.1 – 4.10
III	9.1 – 9.11
IV	5.1 – 5.9, 6.1 – 6.6
V	11.1 – 11.7

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Sem. VI   **Hours/Week: 2**
14UPH640602   **Credits: 2**

Skill Based Elective (WS):
CELL PHONE SERVICING

Objectives
- To understand the fundamentals of cell phone
- To learn the chip level study and trouble shooting
- To acquire the practical knowledge.

Unit I : Fundamentals of CELL phone

Introduction to GSM/CDMA - Concepts of GSM/CDMA Cellular Technologies - Working of GSM - Information of Cell Sites & Base Station - Call Processing of a GSM - GPRS - Mobile Softwares (PC suite)

Unit II : Chip level study

I Chip Level Information of Mobile Phones (Tools & Components) - BGA - SMD - Air Gun - Soldering Station - Rework Station - Soldering lead - Soldering paste - De- Soldering wire - Identification of IC's - Assembling & Disassembling of mobile phones.

Unit III : Trouble shooting

Causes for various problems & Troubleshooting of Problems in a Mobile Phone - Network Problems - Display Problems - Sim Card Problems - Charging problems - Battery Problems - Software Unlocking - Software Flashing - IMEI information - Downloads of logos & Ring tones - Problems related to mobile phone hand sets - replacement of Various components ICS.

Unit IV : Practical 1

Disassembling the cell phone - Battery problems - display - Antenna problems - Network problems - Sim Card problems - SMD soldering.

Unit V : Practical 2

Software Unlocking - Software flashing - Downloads of logos - Downloads of Ring tones - Hand set problems - Replacement of modules (display, mic, speaker, antenna, amplifier, etc.).

BOOK FOR STUDY

Course material prepared by Prof B.K.

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