DWARAKA DOSS GOVERDHAN DOSS VAISHNAV COLLEGE
(Linguistic Minority Institution)
[AUTONOMOUS]
Accredited at 'A' Grade by NAAC

B. Sc. PHYSICS SYLLABUS
(Effective from 2015-2016 batch)

**"Gokulbagh" 833, Periyar E.V.R. Salai,
Arumbakkam, Chennai – 600106**

DWARAKA DOSS GOVERDHAN DOSS VAISHNAV COLLEGE
(Linguistic Minority Institution)
[AUTONOMOUS]

DEPARTMENT OF PHYSICS
BOARD OF STUDIES

Meeting on: 16-03-2015

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UNIVERSITY OF MADRAS

BACHELOR DEGREE COURSES: UNDER THE FACULTY OF SCIENCE (B.Sc.)

B.SC PHYSICS

CHOICE BASED CREDIT SYSTEM
(Effective from the academic year 2015 – 2016)

REGULATIONS

1. ELIGIBILITY FOR ADMISSION:

Candidates for admission to the first year of the Degree of Bachelor of Science courses shall be required to have passed the Higher Secondary Examinations (Academic or Vocational Stream) conducted by the Government of Tamil Nadu or an Examination accepted as equivalent thereof by the Syndicate of the University of Madras. Provided that candidates for admission into the specific main subject of study shall be Possess such other qualifying conditions as may be prescribed by the University as given in the **APPENDIX-A.**

2. ELIGIBILITY FOR THE AWARD OF DEGREE:

A candidate shall be eligible for the award of the Degree only if he /she has undergone the prescribed course of study in a College affiliated to the University for a period of not less than three academic years, passed the examinations all the Six-Semesters prescribed earning 140 Credits (in Parts-I, II, III, IV & V).

3. DURATION:

a) Each academic year shall be divided into two semesters. The first academic year shall comprise the first and second semesters, the second academic year the third and fourth semesters and the third academic year the fifth and sixth semester respectively.

b) The odd semesters shall consist of the period from June to November of each year and the even semesters from December to April of each year. There shall be not less than 90 working days for each semester.

4. COURSE OF STUDY:

The main Subject of Study for Bachelor Degree Courses shall consist of the following and shall be in accordance with **APPENDIX-B**

PART – I   TAMIL / OTHER LANGUAGES

PART – II   ENGLISH

PART – III   CORE SUBJECTS / ALLIED SUBJECTS / ELECTIVES

PART – IV

1.(a) Those who have not studied Tamil up to XII Std. and taken a Non-Tamil Language under Part-I shall take Tamil comprising of two course (level will be at 6th Standard).

(b) Those who have studies Tamil up to XII Std. and taken a Non-Tamil Language under Part-I shall take Advanced Tamil comprising of two courses.

(c) Others who do not come under a + b can choose non-major elective comprising of two courses.

2.   SKILL BASED SUBJECTS (ELECTIVE) - (SOFT SKILLS)

3.   ENVIRONMENTAL STUDIES

4.   VALUE EDUCATION

PART – V   EXTENSION ACTIVITIES

5. EXTENTION ACTIVITIES:

A candidate shall be awarded a maximum of 1 Credits for Complusory Extension Service.

All the Students shall have to enrol for NSS /NCC/ NSO (Sports & Games) Rotract/ Youth Red cross or any other service organizations in the college and shall have to put in Complusory minimum attendance of 40 hours which shall be duly certified by the Principal of the college before 31st March in a year. If a student LACKS 40 HOURS ATTENDANCE in the First year, he/she shall have to compensate the same during the subsequent years.

Students those who complete minimum attendance of 40 hours in One year will get HALF A CREDIT and those who complete the attendance of 80 or more hours in Two Years will ONE CREDIT.

Literacy and population Education Field Work shall be compulsory components in the above extension service activities.

6. SCHEME OF EXAMINATION:

Scheme of Examination shall be given in **APPENDIX - C**
Model Scheme

Course Component Name of the course	Inst. Hour	Credits	Exam Hrs	Max. Marks		
				Ext. mark	Int. mark	Total
PART-I Language				60	40	100
PART-II English				60	40	100
PART-III Core subject				60	40	100
Core Subject				60	40	100

Allied Subject				60	40	100
PART – IV 1.(a) Those who have not studied Tamil up to XII Std. and taken a Non-Tamil Language under Part-I shall take Tamil comprising of two course (level will be at 6th Standard). (b) Those who have studies Tamil up to XII Std. and taken a Non-Tamil Language under Part-I shall take Advanced Tamil comprising of two courses. (c) Others who do not come under a + b can choose non-major elective comprising of two courses.						
2*Skill based subjects(Elective) – (Soft Skill)						

7. REQUIREMENTS FOR PROCEEDING TO SUBSEQUENT SEMESTER:

 i. Candidates shall register their names for the First Semester Examination after the admission in UG Courses.

 ii. Candidates shall be permitted to proceed from the First Semester up to Final Semester irrespective of their failure in any of the Semester Examination subject to the condition that the candidates should register for all the arrear subject of earlier semesters along the current (subsequent) Semester Subjects.

 iii. Candidates shall be eligible to go to subsequent semester, only if they earn, sufficient attendance as prescribed there for by the Syndicate from time to time.

 Provided in case of a candidate earning less than 50% of attendance in any one of the Semesters due to any extraordinary circumstances such as medical grounds, such candidates who shall produce Medical Certificate issued by the Authorised Medical Attendant (AMA), duly certified by the Principal of the college, shall be permitted to proceed to the next semester and to complete the Course of study. Such Candidates shall have to repeat the missed Semester by rejoining after completion of Final Semester of the course, after paying the fee for the break of study as prescribed by the University from time to time.

8. PASSING MINIMUM:

A candidate shall be declared to have passed:
a)   There shall be no Passing Minimum for Internal.
b)   For External Examination, Passing Minimum shall be of 40%(Forty Percentage) of the maximum marks prescribed for the paper for each Paper/Practical/Project and Viva-voce.
c)   In the aggregate (External + Internal) the passing minimum shall be of 40% .
d)   He/She shall be declared to have passed the whole examination, if he/she passes in all the papers and practicals wherever prescribed / as per the scheme of examinations by earning 140 CREDITS in Parts-I, II, III, IV & V. He/she shall also fulfill the extension activities prescribed earning a minimum of 1 Credit to qualify for the Degree.

9. CLASSIFICATION OF SUCCESSFUL CANDIDATES:

PART- I TAMIL / OTHER LANGUAGES:

TAMIL/OTHER LANGUAGES: Successful candidates passing the Exami-nations for the Language and securing the marks (1) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the FIRST and SECOND class, respectively. All other successful candidates shall be declared to have passed the examination in the THIRD Class.

PART – II ENGLISH:

ENGLISH: Successful candidates passing the examinations for English and securing the marks (i) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the FIRST and SECOND Class, respectively. All other successful candidates shall be declared to have passed the examination in the THIRD class.

PART – III consisting of CORE SUBJECTS,   ALLIED SUBJECTS, ELECTIVES:

Successful candidates passing the examinations for Core Courses together and securing the marks (i) 60 percent and above (ii) 50 percent and above but below 60 percent in the aggregate of the marks prescribed for the Core courses together shall be declared to have passed the examination in the FIRST and SECOND Class respectively. All other successful candidates shall be declared to have passed the examinations in the Third Class.

PART – IV (consisting of sub items 1 (a), (b) & (c), 2, 3 and 4) as furnished in the Regulations 4 Part-IV supra.

PART – V EXTENTION ACTIVITIES:

Successful Candidate earning of 1 credit SHALL NOT BE taken into consideration for Classification/Ranking/ Distinction.

10. RANKING:

Candidates who pass all the examinations prescribed for the course in the FIRST APPEARANCE ITSELF ALONE are eligible for Ranking/ Distinction.

Provided in the case of Candidates who pass all the examinations prescribed for the Course with a break in the First Appearance due to the reasons as furnished in the Regulations. 7 (iii) supra are only eligible for classification.

ADDITIONAL ELIGIBILITY CONDITIONS FOR

ADMISSION TO THE FOLLOWING COURSE:

CANDIDATES FOR ADMISSION TO THE FOLLOWING COURSE SHALL HAVE PASSED THE QUALIFYING EXAMINATION WITH THE SUBJECTS NOTED AGAINST:

B.Sc PHYSICS : PHYSICS and MATHEMATICS

APPENDIX - B

COURSE OF STUDY

The Course of Study shall comprise the study of Part-I to Part-V Courses; .

PART - I   TAMIL/OTHER LANGUAGES comprise the study of:

Tamil or any one of the following Modern (Indian or Foreign) or classical languages at the optional candidate, according to the syllabi and text-books prescribed from time to time.

   (i) Modern (Indian) - Telugu, Kannada, Malayalam, Urdu & Hindi.

   (ii) Foreign   - Chinese, French, German, Italian, Japanese, & Russia

  (iii) Classical   - Sanskrit, Arabic & Persian.

AND

PART – II   ENGLISH according to the syllabi and text-books prescribed from time to time.

PART – III CORE COURSES Comprise the study of (A) Main Subjects; (B) Allied Subjects; (C) Electives;

(A) MAIN SUBJECTS:

B.Sc DEGREE COURSE IN PHYSICS

(B) ALLIED SUBJECTS:

Each candidate shall choose the Allied subjects prescribed in the Scheme of Examinations.

(C) ELECTIVES:

PART – IV
1.(a)   Those who have not studied Tamil up to XII Std. and taken a Non-Tamil Language under Part-I shall take Tamil comprising of two course (level will be at 6th Standard).

  (b)   Those who have studies Tamil up to XII Std. and taken a Non-Tamil Language under Part-I shall take Advanced Tamil comprising of two courses.

  (c)   Others who do not come under a + b can choose non-major elective comprising of two courses.

2.   SKILL BASED SUBJECTS (ELECTIVE) - (SOFT SKILLS)

3.   ENVIRONMENTAL STUDIES

4   VALUE EDUCATION

PART – V   EXTENSION ACTIVITIES

SYLLABUS FOR B.Sc. PHYSICS DEGREE COURSE
(According to Choice Based Credit System)

[Effective from the academic year 2015-2016 batch]

The Regulations and syllabi for the B.Sc. Physics Degree course for the I to VI semesters as per the format given by the Tamilnadu State Council for Higher Education [TANSCHE], Chennai, under Choice Based Credit System with the minimum of 120 credits for the UG Degree Courses to be offered in the affiliated colleges, is given in Annexure – I.

Accordingly Choice Based Credit System is offered for B.Sc. Physics Degree Course.

The distribution of available 30 hours per week among various papers is given in Annexure – I.

The Question Paper pattern is shown in Annexure – II

The Internal Evaluation Pattern is shown in Annexure – III.

The department takes utmost care to maintain high academic standards. The Syllabi of the University of Madras, various autonomous colleges and the model curricula of UGC were referred to and all possible updations and upgradations have been effected.

All papers are unitized to 5 units as per UGC Norms.

The proposed new syllabus is submitted herewith.

ANNEXURE – I

Distribution of Hours, Marks and Credits for B.Sc Physics Degree Course.

SEMESTER 1

S.No.	Course Components	Subjects	Inst. Hrs	Credits	Exam Hrs	Max. Marks		
						Ext. Marks	Int. Marks	Total
1	PART I	Language Paper I	6	3	3	60	40	100
2	PART II	English Paper I	6	3	3	60	40	100
3	PART III Core Courses	**Core Paper I** Mechanics and Properties of Matter	5	5	3	60	40	100
		Core Practical I	3	Practical examination at the end of Semester II				
4	Allied Subject I	Allied Mathematics 1	6	5	3	60	40	100
5	Part IV Non-Major Elective/	Basic Tamil	2	2	3	60	40	100
6	Soft Skill I		2	2	3	60	40	100
	Total		6	30		360	240	600

SEMESTER 2

S.No.	Course Components	Subjects	Inst. Hrs	Credits	Exam Hrs	Max. Marks		
						Ext. Marks	Int. Marks	Total
1	PART I	Language Paper II	6	3	3	60	40	100
2	PART II	English Paper II	6	3	3	60	40	100
3	PART III Core Courses	**Core Paper II** Thermal Physics and Acoustics	5	5	3	60	40	100
		Core Practical I	3	4	3	60	40	100
4	Allied Subject II	Allied Mathematics II	6	5	3	60	40	100
5	Part IV Non-Major Elective/	Basic Tamil	2	2	3	60	40	100
6	Soft Skill II		2	2	3	60	40	100
	Total		6	30		420	280	700

SEMESTER 3

S.No.	Course Components	Subjects	Inst. Hrs	Credits	Exam Hrs	Max. Marks		
						Ext. Marks	Int. Marks	Total
1	PART I	Language Paper III	6	3	3	60	40	100
2	PART II	English Paper III	6	3	3	60	40	100
3	PART III Core Courses	**Core Paper III** Optics	5	5	3	60	40	100
		Core Practical II	3			Practical examination at the end of Semester IV		
4	Allied Subject I	Allied Chemsitry I		5	3	60	40	100
5		Allied Chemistry Practicals		Practical examination at the end of Even Semester				
6	E V S		2	Examination at the end of Even Semester				
7	Soft Skill III		2	2	3	60	40	100
	Total			18		300	200	500

SEMESTER 4

S.No.	Course Components	Subjects	Inst. Hrs	Credits	Exam Hrs	Max. Marks		
						Ext. Marks	Int. Marks	Total
1	PART I	Language Paper IV	6	3	3	60	40	100
2	PART II	English Paper IV	6	3	3	60	40	100
3	PART III Core Courses	**Core Paper IV** Atomic Physics	5	5	3	60	40	100
		Core Practical II	3	4	3	60	40	100
4	Allied Subject II	Allied Chemistry II		5	3	60	40	100
5		Allied chemistry Practicals		5	3	60	40	100
6	E V S		2	2	3	60	40	100
7	Soft Skill IV		2	2	3	60	40	100
	Total			29		480	320	800

SEMESTER 5

S.No.	Course Components	Subjects	Inst. Hrs	Credits	Exam Hrs	Max. Marks		
						Ext. Marks	Int. Marks	Total
1	PART III Core Courses	**Core Paper V** Electricity and Electromagnetism	5	5	3	60	40	100
2		**Core Paper VI** Mathematical methods in Physics	5	5	3	60	40	100
3		**Core Paper VII** Solid State Physics	4	5	3	60	40	100
4		**Core Paper VIII** Basic Electronics	4	5	3	60	40	100
5		**Elective I** Applied Electronics	4	5	3	60	40	100
6		Core Practical III	3	Practical examination at the end of Semester VI				
7		Core Practical IV	3					
8		Core Practical V	2					
9		Value Education		2				100
	Total		30	27				600

SEMESTER 6

S.No.	Course Components	Subjects	Inst. Hrs	Credits	Exam Hrs	Max. Marks		
						Ext. Marks	Int. Marks	Total
1	PART III Core Courses	**Core Paper IX** Relativity and Quantum Mechanics	6	5	3	60	40	100
2		**Core Paper X** Nuclear and Particle Physics	6	5	3	60	40	100
3		**Elective II** Digital Electronics	5	5	3	60	40	100
4		**Elective III** Microprocessor Fundamentals	5	5	3	60	40	100
6		Core Practical III	3	4	3	60	40	100
7		Core Practical IV	3	4	3	60	40	100
8		Core Practical V	2	4	3	60	40	100
	Total		30	32		480	220	700

ALLIED PHYSICS

S.No.	Semester	Subjects	Inst. Hrs	Credits	Exam Hrs	Max. Marks		
						Ext. Marks	Int. Marks	Total
1	Odd Semester	Allied Physics I	5	5	3	60	40	100
2		Allied Practicals	3	Practical Examination at the end of Even semester				
3	Even Semester	Allied Physics II	5	5	3	60	40	100
4		Allied Physics Practicals	3	4	3	60	40	100

Number of Credits earned from Department of Physics by B.Sc Physics Students:

Semester	Paper		Marks			Credits
	Theory	Practical	Theory	Practical	Total	
I	1	-	100	-	100	5
II	1	1	100	100	200	9
III	1	-	100	-	100	5
IV	1	1	100	100	200	9
V	5	-	500	-	500	25
VI	4	3	400	300	700	32
I	Non Major		100	-	100	2
II	Non Major		100	-	100	2
IV	EVS		75	25	100	2
Total			1575	525	2100	91

Number of Credits earned from Department of Physics by B.Sc Maths /Chemistry students:

Semester	Paper		Marks			Credits
	Theory	Practical	Theory	Practical	Total	
Odd Semester	1	-	100	-	100	5
Even Semester	1	1	100	100	200	9
Total	2	1	200	100	300	14

ANNEXURE – II
Question Paper Pattern for B.Sc Physics Degree Course based on CBCS Pattern
(except non-major elective)

THEORY

Maximum Ext. Marks: 100
Duration: 3 hours

PART A (50 words)
To answer 10 questions
out of 12 questions (at least two questions from each unit)   10x2marks=20 marks
PART B (200 words)
To answer 5 questions
out of 7 question (at least one question from each unit)   5X7 marks=35 marks
PART C (500 words)
To answer 3 questions
out of 5 question (at least one question from each unit)   3X15marks=45 marks

Total   100 marks

Question paper pattern for non-major elective
THEORY

Maximum Ext. Marks: 100
Duration: 3 hours

PART A
To answer 10 questions
out of 12 questions (at least two questions from each unit)   10x2marks=20 marks
PART B
To answer 5 questions
out of 7 question (at least one question from each unit)   5X7 marks=35 marks
PART C
To answer 2 questions
out of 5 question (at least one question from each unit)   3X15marks=45 marks
Total   100 marks

PRACTICALS

Maximum Ext. Marks: 60
Duration: 3 hours

The external examiner will prepare a question paper on the spot with the help of the Question Bank supplied by the controller's office.

ANNEXURE – III

Pattern of Internal Evaluation for B.Sc Physics Degree Course
based on CBCS Pattern

THEORY

Maximum Int. Marks: 40

Best Two tests out of 3	15 marks
Attendance	5 marks
Assignment/Seminar	5 marks
Class Activity	

PRACTICAL

Maximum Int. Marks: 40

Attendance	5 marks
Practical Tests best 2 out of 3	30 marks
Record	5 marks

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Syllabus

Semester – I

Core Paper – 1

MECHANICS AND PROPERITIES OF MATTER
(Effective from 2015-2016 batch)

No. of crédits: 5

No. of hours allotted: 5/Week

Unit 1: Impulse and Impact

Impulse – impact – Laws of impact – direct impact and oblique impact between two smooth spheres – loss of kinetic energy – conservation of linear momentum –- motion of two interacting bodies – reduced mass- reduction of two body problem into single body problem.

Gravitation

Moment of inertia – Parallel axes theorem – moment of inertia of hollow sphere, solid cone - Compound pendulum – theory – equivalent simple pendulum – reversibility of centre of oscillation and suspension –determination of g and k– Newton's law of gravitation(statement) - Determination of G by Cavendish method - Kepler's law (statement).

Unit 2: Statics, hydrostatics

Centre of parallel forces – Centre of mass – Centre of gravity – Centre of gravity of uniform triangular lamina – Centre of gravity of uniform parallelogram lamina, solid and hollow hemisphere – Centre of pressure – vertical rectangular lamina – vertical triangular lamina – condition for equilibrium of a floating body

Hydrodynamics

Streamline and turbulent flow - equation of continuity of flow –Euler's equation of unidirectional flow – Torricelli's theorem – Bernoulli's theorem - applications – Venturimeter – Pitot's tube – atomizer pump – Bunsen burner

Unit 3: Elasticity

Hooke's law – stress – strain - modulus of elasticity - elastic constants – relation between elastic moduli - Poisson's ratio - expressions for Poisson's ratio in terms of elastic constants – work done in stretching a wire - work done in twisting a wire –

twisting couple on a cylinder– rigidity modulus - moment of inertia by static torsion method - by torsional pendulum method

Unit 4: Bending of beams

Cantilever – expression for bending moment – expression for depression – cantilever oscillations – expression for time period – experiment to find Young's modulus – Non uniform bending – experiment to determine Young's modulus by Koenig's method – Uniform bending – expression for elevation – experiment to determine Young's modulus using pin and microscope by non uniform method – experiment to determine Young's modulus by optic lever method – I-form girders

Unit 5: Fluid dynamics

Surface tension - definition – excess of pressure over curved surface – spherical drop – cylindrical drop – spherical bubble – cylindrical bubble - determination of surface tension by drop weight method – experiment to determine interfacial surface tension – surfactants – variation of surface tension with temperature – Jaegar's method.
Viscosity - definition – Coefficient of viscosity of liquid – critical velocity – Rate of flow of liquid in a capillary tube – Poiseuille's formula –experimental determination by capillary flow method – variation of viscosity of a liquid with temperature – Viscosity of gases – Rankines method – Application.

Books for Study

1. Mechanics – Part I and II by M.Narayanamoorthy, National Publishing Company.

2. Mechanics by D.S.Mathur, S.Chand & Co., 2nd Edition (2001).

3. Statistics, Hydrostatics and Hydrodynamics by M.Narayanamoorthy &

   N.Nagarathinam, National Publishing Company, Chennai (1989).

4. Properties of Matter by Brij Lal and N.Subramaniam, S. Chand & Co.,

   New Delhi (1994).

5. Elements of Properties of Matter by D.S.Mathur, S. Chand & Co., New Delhi (2001).

Books for Reference

1. General Properties of Matter by C.J. Smith, Orient Longman Publishers (1960).

2. Fundamentals of Physics by D. Halliday, R.Rensick and J. Walker, 6th edition, Wiley, New York

   (2001).

3. Mechanics and General Properties of Matter by P.K. Chakrabarthy, Books and Allied (P) Ltd

   (2001).

4. Fundamentals of General Properties of Matter by H.R.Gulati, S. Chand & Co., New Delhi (1982).

Semester – II

Core Paper – 2

THERMAL PHYSICS AND ACOUSTICS
(Effective from 2015-2016 batch)

No. of credits : 5

No. of hours allotted : 5/Week

Unit 1: Thermometry and Calorimetry

Platinum resistance thermometer – Calendar and Griffith's bridge – thermistor – specific heat capacity – specific heat capacity of solids – Dulong and Petit's law – specific heat capacity of liquid – method of mixtures –half time correction – specific heat capacity of gases – Meyers relation.

Low temperature physics
Joule-Kelvin effect – porous plug experiment - significance of Boyle temperature - temperature of inversion – liquefaction of gases – Linde's method of liquefying air.

Unit 2: Thermodynamics

Thermodynamic equilibrium – zeroth law of thermodynamics – first law of thermodynamics – Reversible and irreversible processes – second law of thermodynamics-Heat engine – Carnot's engine – Carnot's theorem – Internal combustion engines – petrol and diesel engines – thermodynamic scale of temperature(No derivation) - Entropy – entropy and available energy – temperature – entropy diagram for Carnot's cycle - III Law of thermodynamics – Nernst's heat theorem.

Unit 3: Conduction and Radiation

Prevost's theory of heat exchange – Kirchoff's Law - thermal conductivity – rectilinear flow of heat – thermal conductivity of a good conductor – Forbe's method – thermal conductivity of a bad conductor – Lee's disc method – radiation – blackbody radiation – Wien's law – Stefan's law – Rayleigh Jeans Law –Planck's law (no derivation), Newton's law of cooling from Stefan's law – Solar constant – Pyroheliometer – temperature of sun and other stellar objects.

Unit 4: Waves and Oscillations

Simple harmonic motion - combination of two SHMs in a straight line – at right angles – Lissajous's figures - uses – free, damped, forced oscillations and resonance – examples and application of resonance – laws of transverse vibration – determination of frequency of a tuning fork using sonometer – determination of a.c. frequency using sonometer – steel wire – brass wire.

Unit 5: Ultrasonics and Architectural acoustics

   Ultrasonics – production – piezo electric crystal method – magnetostriction method – diffraction of ultrasonics waves – ultrasonic interferometer – ultrasonic grating applications.
   Acoustics of buildings – reverberation – absorption coefficient – Sabine's formula – acoustics aspects of halls and auditoriums – intensity and loudness of sound – intensity level – decibel – noise pollution.

Books for study

1. Heat and Thermodynamics by D.S.Mathur, Sulthan Chand & Sons, New Delhi (1993).

2. Heat and Thermodynamics by Brijlal and N. Subramanyam, S.Chand & Co, New Delhi (2000).

3. Heat by Narayanamoorthy and KrishnaRao, Triveni Publishers, Madras (1969).

4. Text book of Sound by V.R.Khanna and R.S.Bedi, 1st edition, Kedharnaath Publish & Co, Meerut (1998).

5. Waves and Oscillations by Brijlal and N. Subramanyam, Vikas Publishing house, New Delhi (2001).

6. Text book of Sound by Ghosh, S.Chand & Co, New Delhi (1996).

Books for Reference

1. Heat and Thermodynamics by Zemansky, McGraw – Hill Book Co. Inc., New York.
2. Fundamentals of Physics by Resnick Halliday and Walker, 6th edition,, John Willey and Sons, Asia Pvt.Ltd., Singapore.
3. Fundamentals of Thermodynamics by Carroll M.Leonard, Prentice-Hall of India (P) Ltd., New Delhi (1965).
4. Heat and Thermodynamics by J.B.Rajam and C.L.Arora, 8th edition, S.Chand & Co. Ltd., New Delhi (1976).
5. Principles of Thermodynamics by Jin Sheng Hieh, 1st edition, McGraw – Hill Kogakusha Ltd., Tokyo (1975).
6. Thermodynamics by Warren Giedt, 1st edition, Van Nostrand Reinhold Company, New York (1971).

CORE PRACTICAL – I
(Practical Examination at the end of the Second semester)
(Any fifteen experiments)

No. of credits: 4
External: 60 marks.   **Record: 10 marks**   **Practical Exam: 50 marks**

1. Young's modulus – Non-uniform bending – Pin & microscope

2. Young's modulus – Uniform bending – Optic lever – scale and telescope

3. Rigidity modulus – Torsional pendulum (without identical masses)

4. Rigidity modulus and moment of inertia – Torsional pendulum (with identical masses)

5. Surface tension and interfacial surface tension – drop weight method

6. Coefficient of viscosity of liquid using graduated burette (radius of capillary tube by Mercury pellet method)

7. Comparison of viscosity of liquid by burette method – Hare's apparatus given

8. Sonometer – Verification of laws and frequency of tuning fork

9. Sonometer – Relative density of a solid and liquid

10. Specific heat capacity of a liquid – Newton's law of cooling

11. Specific heat capacity of liquid – Method of mixtures (Half-time correction)

12. Focal length, Power, R and refractive index of a long focus convex lens

13. Focal length, Power, R and refractive index of a concave lens

14. Spectrometer – refractive index of a liquid – hollow prism

15. P.O. Box – Temperature coefficient of resistance of a coil

Note: Use of Digital balance is permitted

The following procedure is to be followed for internal marks (40 marks)

Attendance: 5 marks
Practical test – best 2 out of 3: 30 marks
Record: 5 marks

Syllabus for Allied Physics
(For B.Sc. Mathematics and B.Sc. Chemistry students)

ALLIED PHYSICS PAPER – I
(Effective from 2015-2016 batch)

No. of credits: 5
No. of hours allotted: 5/week

Unit 1: Waves and Oscillations

Simple harmonic motion – composition of two simple harmonic motion at right angles (periods in the ratio 1:1) – Lissajou's figures – uses – laws of transverse vibrations of strings – determination of a.c frequency using sonometer (steel and brass wires) – ultrasonics – production – piezoelectric method – application of ultrasonics – reverberation – factors for good acoustics of hall and auditorium.

Unit 2: Properties of matter

Elasticity: Elastic constant – bending of beam – theory of non- uniform bending – determination of Young's modulus by non uniform bending – energy stored in a stretched wire – torsion of a wire – determination of rigidity modulus by torsional pendulum – static torsion.
Viscosity: streamline and turbulent motion – critical velocity – coefficient of viscosity – Poiseulie's formula – comparison of viscosities – burette method
Surface tension: definition – molecular theory of surface tension – excess of pressure inside a drop and bubble – drop weight method – interfacial surface tension.

Unit 3: Thermal Physics

Joule-Kelvin effect – Joule-Thomson porous plug experiment – theory – temperature of inversion – liquefaction of gases – Linde's process – adiabatic demagnetization – Curie's law – thermodynamic system – thermodynamic equilibrium – laws of thermodynamics – heat engine – Carnot's cycle-efficiency – entropy – change of entropy in reversible and irreversible process.

Unit 4: Electricity and Magnetism

Resistors – Ohm's law – series and parallel – potentiometer – principle – measurement of thermo emf using potentiometer – capacitor – energy of a charged capacitor – loss of energy due to sharing of charges – magnetic field due to a current carrying conductor – Biot Savart's law – field along the axis of the coil carrying current – peak, average and RMS values of ac current and voltage – power factor and current values in an ac circuit – switches and its types – fuses.

Unit 5: Geometrical optics

Refraction – laws of refraction – refractive index using a microscope – critical angle – air cell – refraction through a prism – angle of minimum deviation – dispersion through a prism – spectrum –

dispersive power – refraction at grazing incidence and grazing emergence in prisms – combination of two small angled prisms to produce dispersion without deviation and deviation without dispersion.

Books for study

1. Allied Physics by R. Murugesan, S.Chand & Co, New Delhi (2005).

2. Waves and Oscillations by Brijlal and N. Subramanyam, Vikas Publishing house, New Delhi (2001)

3. Properties of Matter by Brij Lal and N.Subramaniam, S. Chand & Co., New Delhi (1994).

4. Heat and Thermodynamics by J.B.Rajam and C.L.Arora, 8th edition, S.Chand & Co., New Delhi (1976).

5. Optics and Spectroscopy by R. Murugesan, S.Chand & Co, New Delhi (2005).

Books for Reference

1. Fundamentals of Physics by Resnick Halliday and Walker, 6th edition, John Willey and Sons, Asia Pvt.Ltd., Singapore.

2. Text book of Sound by V.R.Khanna and R.S.Bedi, 1st edition, Kedharnaath Publish & Co, Meerut (1998).
3. Electricity and Magnetism by N.S. Khare and S.S. Srivastava, 10th Edition, Atma Ram & Sons, New Delhi (1983).
4. Optics by D.R. Khanna and H.R. Gulati, S. Chand & Co. Ltd., New Delhi (1979).

ALLIED PHYSICS – PAPER II

No. of credits: 5
No. of hours allotted: 5/week

Unit 1: Physical Optics

Velocity of light – Michelson's method - Interference – interference in thin films - Colours of thin films – air wedge – determination of diameter of a thin wire by air wedge – test for optical flatness – Diffraction – bending of light vs. bending of sound - theory of transmission grating – normal incidence – experimental determination of wavelength using diffraction grating - polarization – polarization by double reflection – Brewster's law – optical activity.

Unit 2: Atomic Physics

Atom model – Bohr atom model – mass number – atomic number – nucleons- vector atom model – various quantum numbers – Pauli's exclusion principle – electronic configuration of elements and periodic classification of elements - Bohr magneton – Stark effect –Zeeman effect (Elementary ideas only) – ionization potential - Frank and Hertz experiment.

Unit 3: Nuclear Physics

Nuclear model – liquid drop model – magic numbers - shell model – nuclear energy – mass defect – binding energy – radioactivity – uses – half life – mean life - radio isotopes and its uses – controlled and uncontrolled chain reaction - nuclear fission – energy released in fission – chain reaction – critical reaction – critical size- atom bomb – nuclear reactor – breeder reactor – nuclear fusion - thermonuclear reactions – difference between fission and fusion.

Unit 4 : Elements of relativity

Frame of reference - postulates of special theory of relativity – Galilean transformation equations - Lorentz transformation equations – derivation – length contraction – time dilation – twin paradox - mass energy equivalence.

Unit 5: Electronics

Basic Electronics: pn junction diode - forward and reverse biasing - characteristic of diode – zener diode – characteristic of zener diode – voltage regulator – junction transistor – CE mode characteristics– LED – theory – Construction and working - uses.
Digital Electronics: OR, AND, NOT, NAND and NOR logic gates – universal building blocks – Boolean algebra – De Morgan's theorem – verification – elementary ideas of ICs.

Books for study

1. Allied Physics by R. Murugesan, S.Chand & Co, New Delhi (2005).

2. Allied Physics by K. Thangaraj and D. Jayaraman, Popular Book Depot, Chennai (2004).

3. Text book of Optics by Brijlal and N. Subramanyam, S.Chand & Co, New Delhi (2002).

4. Modern Physics by R. Murugesan, S.Chand & Co, New Delhi (2005)

5. Applied Electronics by A. Subramaniyam, 2nd Edition, National Publishing Co., Chennai (2001).

Books for Reference

1. Fundamentals of Physics by Resnick Halliday and Walker, 6th edition, , John Willey and Sons, Asia Pvt.Ltd., Singapore.

2. Optics by D.R. Khanna and H.R. Gulati, S. Chand & Co. Ltd., New Delhi (1979).

3. Concepts of Modern Physics by A.Beiser, Tata McGraw Hill Publication, New Delhi (1997).

4. Digital Fundamentals by Thomas L.Floyd, Universal Book Stall – New Delhi (1998).

5. Principles of electronics, V.K. Metha, S.Chand and company, 6th edition (2004).

ALLLIED PHYSICS – PRACTICALS

(Practical Examination at the end of even semester)

No. of credits: 4

External marks: 60 marks   **Record: 10 marks**   **Exam: 50 marks**

(Any 15 experiments)

1. Young's Modulus by Non-uniform bending using Pin and Microscope
2. Young's Modulus by Non-uniform bending using Optic lever – Scale and telescope
3. Rigidity modulus by Static torsion method
4. Rigidity modulus by torsional oscillations without mass
5. Surface tension and interfacial tension – Drop Weight method – Hare's apparatus given.
6. Comparison of viscosities of two liquids – Burette method
7. Specific heat Capacity of a liquid – Half time correction
8. Sonometer – Determination of a.c frequency
9. Newton's rings - Radius of curvature
10. Air wedge – Thickness of a wire
11. Spectrometer – Grating – Wavelength of Mercury lines – Normal Incidence
12. Potentiometer – low range Voltmeter Calibration
13. P.O. Box – Specific resistance of a coil
14. B.G. – Figure of merit
15. Construction of AND, OR, NOT gates – using diodes and transistor
16. Zener Diode – Study of Characteristics
17. NAND gate as a Universal logic gate
18. NOR gate as a Universal logic gate
19. Verification of De Morgan's Theorems.
20. Deflection magnetometer – Field along the axis of the coil – Determination of B_H.

Note: Use of digital balance is permitted

The following procedure is to be followed for internal marks (40 marks)

Attendance: 5 marks

Practical test – best 2 out of 3: 30 marks

Record: 5 marks

No. of credits: 2

No. of hours allotted: 2/week

1. PHYSICS IN EVERYDAY LIFE – I
(Effective from 2015-2016 batch)

Unit-1: Force- Newton's laws of motion- circular motion – centripetal force – centrifugal force.
Principle Behind
Centrifuge – washing machine.
Reason Behind
1) We weigh less in moon.
2) Long jump athletes run a little before they jump.
3) Iron nails, safety pins which have sharp edge poke easily, polished knife cut easily.
4) While jumping around in a bike with high speed, if the rider loses his control, why is he thrown outside?
5) Speed increases when we slide.

Unit-2: Energy – different forms of energy – Law of conservation of energy.
Principle Behind
Electric bulb-tube light-CFL bulbs.
Reason Behind
1) Electric bulb adds to global warming.
2) Electric bulbs are replaced by CFL.
3) TV flickers when cell phone nearby rings?
4) Why tube light do not give shadow unlike an electric bulb?
5) Why are LED arrays used for illuminating in these days instead of fluorescent tubes?

Unit-3: Boiling point – variation of boiling point with pressure – latent heat.
Principle Behind
Pressure cooker – microwave oven – milk boiler – fridge.
Reason Behind
1) Metal vessels must not be used in microwave oven.
2) Salt is used to melt ice on roads during winter.
3) Cooking in a pressure cooker saves fuels and time.
4) While glucose is dissolved in water, water becomes cold.
5) When detergents dissolve in water it gives out heat.

Unit-4: Light – reflection.
Principle Behind
Traffic sticker – laws of reflection – total internal reflection – refraction – constructive interference – destructive interference - diamonds glow.

Reason Behind
1) Why do stars twinkle?
2) Why do we get rainbow?
3) Deep swimming pools look swallow.
4) Peacock feathers, soap bubbles give beautiful colours.
5) We use black umbrellas to protect ourselves from sunlight.

Unit-5: Expansion due to heat – evaporation.
Principle Behind
Mud pot - cool drink straw- why do we sweat.
Why it is so?
1. Wet clothes that are spread out dry faster
2. Hot milk kept in big bowl cool faster
3. Why are we not able to open our closed wooden door easily during rainy season
4. Why do rails have links in between
5. Why does glass bottle with hot water breaks when we suddenly pour cold water on it.

Books for Study
1. The Learner's series – Everyday science – Published by Infinity Books, NewDelhi
2. Ean? Etharku? Eppadi? Vol I & II by Sujatha, Vikatan publishers Chennai (2007).
3. The Hindu speaks on Science, Vol I & II by Kasturi Ranga Publishers, Chennai (2006)
4. Q-Series, How and Why-Popular Science books, NISCAIR, New Delhi.
5. Theriyuma? P.Ayngaranesan, Arumbu Publishers, Chennai (2007)

2. PHYSICS IN EVERYDAY LIFE – II
(Effective from 2015-2016 batch)

Unit-1: Bernoulli's theorem.

Principle Behind
Gas stove burner- room- spray- fan- atomizer- syringe.
Reason Behind
1. We should not stand at the edge of the platform, when the express train cross the station
2. LPG gas has peculiar odour
3. Blades in a fan are slightly curved
4. When wind blows strongly why roofs fly away not pushed down.
5. You get water in showers forcefully.

Unit-2: surface tension – capillary rise – osmosis.

Principle Behind
Wick in oil lamp – rain coat.
Reason Behind
1. Soap removes dirt and detergents clean clothes.
2. Some insects are able to walk on water
3. Water from soil goes to plants
4. Pickle become saltier and smaller
5. Gulabjamun become sweeter and swell.

Unit-3: Friction – lubrication – Newton's law of gravitation.

Principle Behind
Speed breaker – walking stick and crutches.
Reason Behind
1. We get high tide during new moon and full moon day
2. A snake cannot crawl on smooth surface and lizard cannot move on tiles
3. Why do not we get eclipse during every new moon and full moon
4. Planets revolve round the sun.
5. We use oil along with fuel in vehicles.

Unit-4: Myopia – hyper metropia – power of lens.

Principle Behind
Contact lens - reading lens- spectacles correct short sightness- spectacles correct long sightness.
Reason Behind
1. Cotton kept under lens burnt in sunlight
2. Sky is blue
3. Sky appears reddish during sun rise and sunset
4. Dust particle in path of sunray passing through a small hole in a dark room becomes more visible.
5. Space above atmosphere is colourless.

Unit-5: Sound waves – reverberation – echo – noise - earth quake – ritcher scale.

Principle Behind
Reason Behind

1) Sound is heard first in TV, before picture, while lightning is seen before thunder.
2) We get less noise outside, when people talk inside glass room and also we don't hear noise from outer space.
3) Bursting of balloon or electric bulb produce noise.
4) Building reverberates (or) glass panes crack sometimes when an aeroplane passes.
5) Gravels are put in between the rails in railway tracks.

Books for Study

1. The Learner's series – Everyday science – Published by Infinity Books, NewDelhi
2. Ean? Etharku? Eppadi? Vol I & II by Sujatha, Vikatan publishers Chennai (2007).
3. The Hindu speaks on Science, Vol I & II by Kasturi Ranga Publishers, Chennai (2006)
4. Q-Series, How and Why-Popular Science books, NISCAIR, New Delhi.
5. Theriyuma? P.Ayngaranesan, Arumbu Publishers, Chennai (2007)

3. ASTROPHYSICS

Unit 1: Astronomical instruments

Optical telescopes-refracting telescope-reflecting telescope- types of reflecting telescopes – detectors and image processing.

Unit 2: Solar system

The Sun- physical and orbital data-photosphere-chromosphere-corona-solar prominences – sunspot - solar flare- mass of the sun- solar constant- temperature of the sun- sources of solar energy-solar wind.

Unit 3: Members of the solar system

Mercury – Venus- Earth – Mars – Jupiter- Saturn- Uranus- Neptune- Pluto- Moon – Bode's law – asteroids- comets – meteors.

Unit 4: Stellar evolution

Birth and death of a star –brightness of a star – stellar distance- Chandrasekar limit- white dwarfs-Neutron stars – black holes- Supernovae.

Unit 5: Theories of the Universe and Galaxies

Origin of the Universe - the big bang theory- the steady state theory- the oscillating universe theory – Hubble's law. Galaxies – types of galaxies- Milky way

Books for study

1. Astrophysics - a modern perspective by K.S.Krishnaswamy, New Age International (P) Ltd, New Delhi (2002).
2. An introduction to Astro physics by Baidyanath Basu, second printing, Prentice – Hall of India (P) Ltd, New Delhi (2001).
3. Vindaimigu paerandam(Tamil), by Dr.P.Iyemperumal, Chennai (2002).
4. Tamizhaga vaanaviyal sindanaigal (Tamil), by World Tamil Research Centre, Chennai
5. Indriya Vinveli (Tamil) by Mohan Sundar rajan, NBT New Delhi (2003).
6. Topics in Physics Compiled by Dept.of.Physics, DGVC College, Rochouse & Sons, Chennai. (1977)

Books for reference

1. Modern Physics by R.Murugeshan, 11th edition, S.Chand & Company Ltd, New Delhi (2003).
2. Astronomy by S.Kumaravelu, Janki Calendar Corporation, Sivakasi (1993).

4. NON CONVENTIONAL ENERGY SOURCES

Unit 1 : Solar energy

Conventional Energy sources – Renewable Energy sources- solar energy – solar radiation and its measurements- solar energy collectors- parabolic collector- storage of solar energy

Unit 2 : Applications of solar energy

Solar water heater- solar driers- solar cells- solar electric power generation- solar distillation- solar pumping – solar cooking

Unit 3: Wind energy

Basic principles of wind energy conversion- power in the wind – forces in the Blades- wind energy conversion- Advantages and disadvantages of wind energy conversion systems (WECS) Energy storage- Applications of wind energy

Unit 4: Oceanic energy

Energy from the oceans- Energy utilization- Energy from tides- Basic principle of tidal power – Utilization of tidal energy

Unit 5 : Energy from other sources

Chemical energy – Nuclear energy - Energy storage and distribution

Books for study

1. Non-conventional sources of energy by G.D. Rai, 4th edition, Khanna Publishers, New Delhi (1996).
2. Solar Energy, Principles of thermal collection and storage by S.P.Sukhatme 2nd edition, Tata McGraw-Hill Publishing Co. Ltd., New Delhi (1997).
3. Energy by A.K.Bakhshi, National Book Trust, New Delhi (2006)
4. Topics in Physics Compiled by Dept.of.Physics, DGVC College, Rochouse & Sons, Chennai. (1977)

Book for reference

1. Energy Technology by S.Rao and Dr. Parulekar.
2. Energy Models for 2000 and beyond by Jyoti Parikh, Tata McGrawHill Publishers, New Delhi (1997).

5. Biophysics

Unit 1 Fluid Flow

Steady laminar flow, turbulence, capillary rise, Poiseuille's formula, energetics of fluid flow, hemodynamics, fluid flow in plants
.
Unit 2 Gas Transport

Ideal gas, convection and diffusion of gases, , Physiology of respiration.

Unit 3 Physics of Audition

Transverse and longitudinal waves, physiological characteristics of sound, human ear, Doppler Effect.

Unit 4 Physics of Vision

Wave nature of light, lenses, focal length, refractive power, retina and photoreceptors, resolving power of eye, short sight and long sight, contact lenses

Unit 5 Biomechanics

Introduction, biostatics, mechanical properties of muscle, biodynamics, locomotion on land, water and air.

Books for study

1. Elementary Biophysics: An Introduction by P. K. Srivastava, Narosa Publishing House, New Delhi (2005).
2. Biophysics by Vasantha Pattabhi and N. Gautham, second edition, Narosa Publishing House, New Delhi (2009).

Books for reference

1. Biophysics: An Introduction by Rodney Cotterill, Wiley and Sons, England (2005).
2. Biological physics: Energy, Information and Life, by Philip Nelson, W. H. Freeman and Co., New York (2003).
3. Basic biophysics and biologists, Daniel M, Wiley International, New Delhi (1992).
4. Biophysics: An Introduction by Sybesma C, **Kluwer Publishers,** New York (1989)

6. Introduction to Numerical Methods

Unit-1: Statistics

Mean, meridian, mode, standard deviation, variance, range, co-efficient of variation, covariance - Related problems-role of Statistical methods in Physics

Unit-2: Probability

Probability theory – application of probability in physics- Relation to randomness and errors- types of errors in physics-Theory of errors - errors analysis

Unit-3 Curve fitting

Curve fitting, principle of least squares- Straight line fitting- numerical problems

Unit-4 Computational techniques

Iteration – iteration techniques – Bisection method, Newton-Raphson method –numerical problems

Unit-5 Numerical analysis

Trapezoidal rule- Simpson's $1/3^{rd}$ Rule- Numerical problems

Books for Study:

1. Mathematical Physics by Sathya Prakash, Sultan Chand and Sons, New Delhi (1996)
2. Numerical methods - M.K.Venkatraman, National Publishing Company, (1990).
3. Numerical methods by V. Rajaraman, Prentice - Hall India Pvt. Ltd., (2003).
4. Numerical methods by P. Kandasamy, K. Thilagavathy and K. Gunavathy, S. Chand & Co. (2002).

Books for Reference :

1.Mathematical Physics by B.D. Gupta, Vikas Publishing House Pvt. Ltd., New Delhi(1996).
2.Numerical methods for Scientific and Engineering computation by Jain Iyenger and Jain, New Age International (P) Ltd.,(2004).
3.Numerical methods by S.S.Sastry, Prentice Hall of India Pvt. Ltd., New Delhi(2003).

7. Contribution of India to Modern Science

Unit -1

Aristotle's view of world –Pythagorean view-Indian Philosophy and its impact on Greek Philosophers-Geocentric theory-Heliocentric theory-Newtonian view of world

Unit -2

Contribution of Indians to Mathematics and Astronomy-Indian Mathematicians during 10th to 15th century-Almagest - Ptolemy-Mathematicians form Kerala- Value of Pi-Contributions of Ramanujan

Unit-3

Idea of Biosphere-Ecosystem-Pyramid & Oceanic circle-Cognition in plants-J.C.Bose-Impact of Vivekananda on J.C.Bose – Einstein-wave particle duality- Quantum theory-Double Slit experiment-Heisenberg-Copenhagen scientist-Schrodinger – Impact of Indian philosophy in the evolution of duality principle- S.N.Bose –Saha

Unit-4

The great trigonometrical survey of India –Sir C.V.Raman- Raman effect and his contributions-Prof. K.S. Krishnan- Swami Vivekananda and genesis of IISc

Unit-5

Prof.G.N.Ramachandran- Triple Helix Structure of collagen-Crik & Watson-Dorothy Hudkinson ECG.Sundarshan

Books for Study:

Journey into light:Life and Science of C.V.Raman by G.Venkatraman : Some famous Indian Scientist by TIFR Booklet Book series on History of Science & Technology, Government of India.

Bright Sparks by Arvind Guptha

Vignettes in Physics by G.Venkatraman

Seeing and Believing by Richard Panek

Surely you're Joking Mr.Feynman by Feynman, Leighton et al

 Uncommon wisdom by Fritj of Capra

Cosmos by Carl Sagam

Semester – III

Core Paper – 3

OPTICS
(Effective from 2015-2016)

No. of credits: 5
No. of hours allotted: 5/ Week
Unit 1: Geometrical Optics

Refraction – laws of refraction – refractive index using a microscope – critical angle – air cell – refraction through a prism – angle of minimum deviation – dispersion through a prism – spectrum – dispersive power - Combination of two small angled prisms to produce dispersion without deviation - deviation without dispersion - defects of images – coma – distortion - Spherical aberration in lenses - methods of minimizing spherical aberration - condition for minimum spherical aberration in the case of two lenses separated by a distance - Chromatic aberration in lenses - Condition for achromatism of two thin lenses (in and out of contact) – achromatic prisms.

Unit 2: Interference

Interference- Young's double slit experiment-Analytical treatment of interference - expression for intensity - condition for maxima and minima in terms of phase and path difference – interference in thin films – reflected ray- transmitted ray – colours of thin films - Air wedge - determination of diameter of thin wire - test for optical flatness - Haidinger's fringes - Michelson's interferometer - theory - applications - determination of wavelength - thickness of thin transparent material.

Unit 3: Diffraction

Fresnel diffraction - diffraction at a circular aperture – at a narrow wire - Fraunhoffer diffraction - single slit - double slit , Plane transmission grating – theory – normal incidence – experimental determination of wavelength using grating - oblique incidence (theory) - Dispersive power of a grating - Rayleigh's criterion for resolution - limit of resolution of the eye - resolving power of telescope, microscope - Difference between resolving power and dispersive power.

Unit 4: Polarization

Double refraction - Nicol prism -polarizer and analyzer - Huygen's explanation of double refraction in uniaxial crystals - dichroism - polaroids and their uses - quarter wave plate - halfwave plate - plane, elliptically and circularly polarized light - production and detection - Babinet's compensator - optical activity - Fresnel's explanation of optical activity - specific rotatory power - determination using Laurent's half shade polarimeter.

Unit 5: Spectroscopy

Introduction to spectroscopy - Electromagnetic spectrum - characterization of electro magnetic radiation - quantization of energy - regions of the spectrum –- Brownian motion – Tyndall effect - scattering of light – blue of the sky – halo of the moon - - Raman effect - experimental set up - Characteristics of Raman lines - Lasers - ruby laser - He-Ne laser, CO_2 laser - construction and working - application of lasers.

Books for Study

1. A Text book of Optics by Subrahmanyam N., Brij Lal and M.N. Avadhanulu, S.Chand & Co., New Delhi (2006).

2. Optics by Khanna D.R. & Gulati H.R., S.Chand & Co., New Delhi (1979).

3. Optics and Spectroscopy by R.Murugeshan and Kiruthiga Sivaprasath, S. Chand & Co., New Delhi (2006).

4. Molecular structure and spectroscopy by Aruldhas, Prentice Hall of India Pvt. Ltd., New Delhi (2005).

Books for Reference

1. Fundamentals of Physics, by D.Halliday, R. Resnick and J. Walker, Wiley, 6th Edition, New York (2001)

2. Optics by Ajay Ghatak, Tata McGraw-Hill publishing Co. Ltd., New Delhi (1998)

3. Spectroscopy by Gurdeep Chatwal, Sham Anand, Himalaya Publishing House (1990)

Semester – IV

Core Paper – 4

ATOMIC PHYSICS
(Effective from 2015-2016 batch)

No. of credits: 5
No. of hours allotted: 5/ Week
Unit 1: Discharge phenomenon through gases

Movement of charge in transverse electric and magnetic fields - specific charge of an electron - Dunnington's method- positive rays – Dempster's mass spectrograph – Bainbridge mass spectrograph - critical potential – experimental determination of critical potential – Frank and Hertz experiment – Davis and Gaucher experiment.

Unit 2 : Photo-electric effect

Photo electric effect - Lenard's experiment - Richardson and Compton experiment - Laws of photoelectric emission – Einstein's photo electric equation – Experimental verification of Einstein's photo electric equation by Millikan's experiment - photo electric cell - photo emissive cell - photovoltaic cell - photo conducting cell - photomultiplier.

Unit 3: Atomic structure

Bohr atom model - Sommerfield atom model – various quantum numbers - Vector atom model - Pauli's exclusion principle - electronic configuration of elements and periodic classification - coupling schemes - LS and JJ coupling - spatial quantization - Stern and Gerlach experiment - Bohr magneton.

Unit 4: Fine structure of spectral lines

Spectral terms and notations - selection rules - intensity rule and interval rule - fine structure of sodium D lines - Zeeman effect – Zeeman shift - Larmor's theorem - Debye's explanation of normal Zeeman effect - anamalous Zeeman effect - theoretical explanation - Lande's `g' factor - explanation of splitting of D1 and D2 lines of sodium - Paschen - Back effect - Stark effect (qualitative study only).

Unit 5: X-Rays

X- rays - continuous X-rays - characteristic X-ray spectra – absorption of X-rays by matter – Moseley's law - diffraction of X- rays - Bragg's law in one dimension – Bragg's spectrometer - uses of X- rays - Compton effect – expression for Compton shift in wavelength - experimental verification.

Books for Study

1.   Atomic Physics by J.B. Rajam, S. Chand & Co., 20th Edition, New Delhi (2004).
2.   Modern Physics by D.L.Sehgal, K.L.Chopra and N.K.Sehgal., Sultan Chand & Sons Publication, 7th Edition, New Delhi (1991).
3.   Atomic and Nuclear Physics by N. Subrahmanyam and BrijLal, S. Chand & Co. 5th Edition, New Delhi (2000).
4.   Modern Physics by R. Murugeshan, Kiruthiga Sivaprasath, S. Chand & Co., New Delhi (2008).

Book for Reference:

1.   Modern Physics by J.H. Hamilton and Yang, McGraw-Hill Publication, (1996).
2.   Concepts of Modern Physics by A. Beiser, Tata McGraw-Hill, New Delhi (1997).
3.   Fundamentals of Physics by D.Halliday, R.Resnick and J. Walker, Wiley, 6th Edition, New York (2001).
4.   Modern Physics by Kenneth S.Krane, John Willey & sons, Canada (1998).

CORE PRACTICAL – II

(Practical Examination at the end of the Fourth semester)
(Any fifteen experiments)

No. of credits: 4
External: 60 marks.   Record: 10 marks   Practical Exam: 50 marks

1. Young's modulus - cantilever - depression - Static method-Scale and telescope
2. Young's modulus - cantilever oscillations - Dynamic method
3. Rigidity modulus - Static torsion
4. Compound pendulum - g and k
5. Sonometer - A.C. Frequency - Using Steel wire.
6. Melde's string - frequency, Relative Density of a solid and liquid
7. Thermal conductivity of a bad conductor - Lee's disc method
8. Spectrometer - μ of a glass prism - i-d Curve
9. Spectrometer - Grating N and λ - normal incidence method
10. Spectrometer - Grating N and λ - minimum deviation method
11. Air wedge - Thickness of a wire
12. m and B_H - deflection magnetometer -Tan C position and vibration magnetometer
13. Carey Foster's bridge - Temperature coefficient of resistance of a coil
14. Potentiometer - Calibration of low range voltmeter
15. Potentiometer - Ammeter calibration.
16. Figure of merit of galvanometer (Mirror Galvanometer Or Table Galvanometer).

Note: Use of Digital balance is permitted

The following procedure is to be followed for internal marks (40 marks)

Attendance: 5 marks
Practical test – best 2 out of 3: 30 marks
Record: 5 marks.

Semester – V

Core Paper- 5
ELECTRICITY AND ELECTROMAGNETISM
(Effective from 2015-2016 batch)

No. of crédits: 5
No. of hours allotted: 5/ Week

Unit 1: Chemical Effects of Electric Current

Faraday's laws of electrolysis - ionic velocities and mobilities - Calculation - experimental determination of ionic mobilities - transport number. Thermoelectricity- Peltier effect - Experimental determination of Peltier coefficient - Thomson coefficient - experimental determination of Thomson coefficient - application of thermodynamics to a thermocouple and connected relations - thermoelectric diagram and uses.

Unit 2: DC and AC Circuits

DC Circuits

Growth and decay of current in a circuit containing resistance and inductance - growth and decay of charge in a circuit containing resistance and capacitor - growth and decay of charge in an LCR circuit - condition for the discharge to be oscillatory - frequency of oscillation - network analysis - Thevenin and Norton's Theorems.

AC Circuits

AC voltage and current - Power factor and current values in AC circuit containing LCR - series and parallel resonant circuits - AC motors - single phase, three phase - star and delta connections - electric fuses - circuit brakers.

Unit 3: Magnetic effect of electric current

Biot and Savart's law - magnetic field intensity due to a solenoid carrying current - effect of iron core in a solenoid – magnetic field at a point due to circular current carrying coil - Helmholtz galvanometer - moving coil ballistic galvanometer - theory - damping correction – experimental determination of the absolute capacity of a condenser using B.G – experiment to compare the capacitance, emf of cells using B.G.

Unit 4: Electromagnetic induction and its applications

Faraday's laws of electromagnetic induction - inductance - determination of self inductance of a coil using Anderson method - mutual inductance - experimental determination of absolute mutual inductance - coefficient of coupling - earth inductor - Uses of earth inductor - measurement of horizontal component of the earth's magnetic field - measurement of vertical component of earth's magnetic field – angle of dip - calibration of B.G. - Induction coil and its uses.

Unit 5: Maxwell's equations and electromagnetic theory

Basic equations - types of currents - vacuum displacement current - Maxwell's equations - Maxwell's equations in free space - electromagnetic waves in free space - propagation of electromagnetic wave in a non conducting medium - Hertz Experiment - energy density of e.m. wave - Poynting's theorem - energy per unit volume.

Books for Study

1.   Electricity & Magnetism by M.Narayanamurthy & N.Nagarathnam, NPC pub., Revised edition (1996).
2.   Electricity and Magnetism by Brijlal and Subrahmanyam; S.Chand & Co., New Delhi, (2000).
3.   Electricity & Magnetism by D.Chattopadhyay and P.C. Rakshit, Books and Allied (P) Ltd.(2001).
4.   Fundamentals of Electricity and Magnetism by B.D. Dugal and C.L. Chhabra, Shobanlal Nagin, S. Chand & Co., 5th edition, New Delhi(2005).
5.   Electricity and Magnetism by R. Murugeshan, S.Chand & Co., New Delhi, (2008).

Books for Reference

1.   Electricity & Magnetism by K.K.Tewari, S.Chand & Co., New Delhi, .(2002).
2.   Introduction to Electrodynamics by D.J.Griffiths, Printice Hall of India Pvt. Ltd., 3rd Edition, New Delhi(2003).

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Core Paper– 6
MATHEMATICAL METHODS IN PHYSICS
(Effective from 2015-2016 batch)

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No. of credits: 5
No. of hours allotted: 5/ week

Unit 1: Vector Analysis

Scalar and vector fields: Gradient, divergence and curl - physical interpretation, Lamellar and solenoidal field – (only definition), line, surface and volume integrals – Gauss Divergence theorem – Stoke's theorem – Green's theorem - Application of vectors to hydrodynamics: Equation of continuity, Bernoulli's theorem,

Unit 2: Matrices

Characteristic equation of a matrix – eigen values and eigen vectors – Cayley Hamilton theorem – Theorems on eigens values and eigen vectors – Hermitian and unitary matrices – Diagonalisation of matrices – matrices in Physics: rotation matrix, Pauli spin matrices (elementary ideas only).

Unit 3: Special functions

Gamma and Beta functions – definition – Evaluation – other forms of the functions – symmetry property of Beta function- relation between Beta and Gamma functions - Series solutions of Bessel's differential equation and Legendre differential equation.

Unit 4: Lagrangian formulation

Mechanics of a system of particles – Degrees of freedom – constraints – Generalised coordinates – Configuration space – principle of virtual work – D'Alembert's principle – Lagrange's equation of motion from D'Alembert's principle for a conservative system - Applications of Lagrange's equation: Atwood's machine, a bead sliding on uniformly rotating wire – simple pendulum.

Unit 5: Hamiltonian formulation

Phase space – Hamiltonian function H – physical significance – Hamilton's equations - Applications of Hamiltonian equations: Simple pendulum – motion of a particle in a central force field.

Books for study

1. Mathematical Physics by Satya Prakash, S.Chand & Sons, New Delhi (1996)
2. Classical Mechanics by J.C. Upadhyaya, Himalaya Publishing House, Mumbai (2003).
3. Mechanics and Mathematical methods by R.Murugesan, S.chand & Company, New Delhi (1996)

Books for Reference

1. Mathematical Physics by B.D. Gupta, Vikas Publishing House Pvt. Ltd, New Delhi (1996)
2. Classical Mechanics by H. Goldstein, Special Indian Student Edition, Narosa Publishing House, New Delhi (1985)

Core Paper- 7
SOLID STATE PHYSICS
(Effective from 2015-2016 batch)

No. of credits: 5
No. of hours allotted: 4/ Week

Unit I: Crystal structure

Crystal Lattice – Primitive cell - Unit cell - Seven classes of crystals - Bravais Lattice – crystal planes and Miller Indices – inter planar spacing in crystal lattice - structure of crystals - Simple cubic, Face centered Cubic, Body Centered Cubic crystal structure, Hexagonal close packed structure, Sodium Chloride, Diamond, Zinc Blende and Caesium Chloride structure.

Unit II: X- rays in crystal study

Diffraction of X-rays by crystals - Bragg's Law in one dimension - Experimental method in X-ray Diffraction - Laue method, rotating crystal method - Powder photograph method - Von Laue's equations – crystal imperfections - point defects, line defects - surface defects - volume defects - effects of crystal imperfections.

Unit III: Bonding and Super Conductivity

Types of bonds in crystals – Ionic, covalent, metallic, van-der-waal's and hydrogen bonding – characteristic of various bonding – cohesive energy of cubic ionic crystals – Madelung constant for sodium chloride crystal – Phonons – monoatomic one dimensional lattice – specific heat of solids – Einstein's theory – Debye theory.

Super conductivity – general properties of super conductors - Meissner effect – Type I and Type II super conductors – applications of super conductors.

Unit IV: Dielectrics

Fundamental definitions in dielectrics - different types of Electric polarization - frequency and temperature effects on polarization - dielectric loss - local Field on Internal Field Clausius-Mosotti Relation - Determination of dielectric constant - dielectric Breakdown - properties of different types of insulating materials.

Unit V: Magnetic materials

Different type of magnetic materials - Langevin's theory of diamagnetism - Langevin's theory of paramagnetism - Weiss theory of paramagnetism - qualitative explanation of Heisenberg's internal field quantum theory of ferromagnetism.

Books for Study

1. Introduction to Solid State Physics by Charles Kittel, John Wiely and sons, 7th edition (2004).
2. Material Science by Arumugam.M, Anuradha Technical Book publishers (1997).
3. Solid State Physics, P.K. Palanisamy, Scitech publications (India) Pvt.Ltd.(2005).
4. Modern physics, R.Murugesan and Kiruthiga Sivaprasath,S.Chand and Company, New Delhi (2005)

Books for Reference

1. Marerial Science and Engineering First Course 5th edition, V.Raghavan, Prentice Hall (India)Pvt. Ltd. (2004)
2. Text Book of Solid State Physics, S.L.Kakani and L.Hemrajani, Sultan Chand and sons, New Delhi (1997)
3. Solid State Physics, A.J. Dekker, Macmillan India Ltd (2005).
4. Concepts of Modern Physics, Arthur Bieser, Tata Mc.Graw Hill, 6th edition (2005).
5. Solid state physics, S.O. Pillai, New Age International Pvt.Ltd,6th edition (2005).

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Core paper - 8
BASIC ELECTRONICS
(Effective from 2015-2016 batch)

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No. of credits: 5
No. of hours allotted: 4/ Week

Unit 1: Semiconductors:-

Energy bands in a solid – intrinsic semiconductors – extrinsic semiconductors – Fermi level - pn junction – volt – ampere characteristic curve – biasing the pn junction - diode as rectifier – half wave rectifier – full wave rectifier – centre tapped, bridge rectifier – efficiency and ripple factor - circuits using diode – clipper, clamper – zener diode – zener diode as voltage regulator.

Unit II: Transistors:-

Basic transistor amplifier – Transistor input and collector characteristics – common base and common emitter amplifier – relation between α and ß – transistor biasing techniques – emitter bias – voltage divider bias. Transistor hybrid model – the h parameter – analysis of transistor amplifier (CE only) circuit using h parameters.

Unit III: Transistor amplifiers:-

Emitter follower, RC coupled amplifier – analysis using h parameters – frequency response – power amplifiers – classification – class A, push – pull, class B, power amplifier – collector efficiency – differential amplifier – A_d, A_{CM} and CMRR.

Unit IV: Oscillator and switching circuits:

Feedback in amplifier – negative feedback - Essential of transistor oscillator – basic LC oscillator circuit – Hartley oscillator – phase shift oscillator – Wein's bridge oscillator – expression for frequency. Types of multivibrators – Astable – monostable and bi-stable multivibrators.

Unit V: Special semiconductor devices:

Junction field transistor (JFET) – characteristics – Common source FET amplifier – UJT – characteristics – UJT as relaxation oscillator – SCR – characteristic – SCR as a rectifier.

Books for Study

1. Principles of electronics, V.K. Metha, S.Chand and company, 6th edition (2004).
2. Elements of electronics – M.K. Bagde, S.R. singh, Kamal Singh, S.Chand and company (2002).
3. A Textbook of Applied Electronics, R.S.Sedha, S.Chand and Company,New Delhi (1998)
4. Handbook of Electronics, Gupta and Kumar, Pragati Prakashan , Meerut (1991)

Books for Reference

1. Electronic devices and circuits, Allen Mottershead, Prentice Hall of India (1989).

2. Integrated electronics, Millman and Halkias, Tata McGrawHill Publication, New Delhi (2005).
3. Grob's Basic Electronics, Mitchell E Schultz, Tata McGraw Hill., New Delhi 10th Edn.(2006)

Semester – V
Elective - 1
APPLIED ELECTRONICS
(Effective from 2015-2016 batch)

No. of credits: 5
No. of hours allotted: 4/ Week
Unit I: Operational Amplifier fundamentals

Characteristics– op-amp parameters – inverting amplifier- non- inverting amplifier – unity follower – summing amplifier – difference amplifier. Differentiator,integrator, comparator using op-amp.

Unit II: Analog computation and waveform generation

Analog computation and waveform generation using op amp - solving simultaneous equation – second order differential equation – square wave generation (astable operation) – sine wave generation – Wien's Bridge oscillator.

Unit III: 555 Timer

555 Timer – internal block diagram – and working – applications – Schmitt Trigger – astable, monostable multivibrator.

Unit IV: D/A and A/D converters

Introduction – Binary weighted resistor D/A converter – R -2R ladder method – resolution A/D converter – counter type – successive approximation type – resolution.

Unit V: Semiconductor Memories

Semiconductor memories- classification based on Principle of operation – ROM – organization – 256 x 4 ROM – 1K x 4 ROM – PROM – EPROM – EEPROM – Random Access Memory(RAM) – static RAM – Dynamic RAM –memory parameters.

Books for study

1. Op- AMPs and Linear Integrated Circuits by Ramakant A.Gayakwad, Prentice Hall of India (1994)
2. Introduction to Integrated Electronics by V.Vijayendran, S.Viswanathan(printers and publishers) Pvt. Ltd, Chennai (2005)
3. Integrated electronics, Millman and Halkias, Tata McGrawHill Publication, New Delhi (2005).

Books for reference
1. Linear integrated circuits by D. Roy Choudhury and Shail Jian, New Age International (P) Ltd (2003).
2. Integrated Electronics by J. Millman and C. Halkias, Tata McGraw Hill, New Delhi (2001).

Semester VI
Core Paper - 9
RELATIVITY AND QUANTUM MECHANICS
(Effective from 2015-2016 batch)

No. of credits: 5
No. of hours allotted: 6/ week

Unit I: Relativity

Frame of reference – Gallilean transformation – Michelson – Morley experiment – Postulates of special theory of relativity – Lorentz transformation – length contraction – time dilation – relativity of simultaneity – addition of velocities – variation of mass with velocity – mass energy equation – elementary ideas of general theory of relativity – Principle of equivalence – Bending of rays of light due to gravitational field- shift of spectral lines - Minkowski's four dimensional space.

Unit II: Wave nature of matter

Matter wave – phase and group velocity – wave packet – expression for de Broglie wavelength – experimental confirmation of particle waves – Davisson and Germer's experiment – G.P. Thomson's experiment – applications of electron diffraction – electron microscope – principle of complementarity – Heisenberg's uncertainity principle – experimental illustration of uncertainity principle – applications of uncertainity principle.

Unit III: Schroedinger's Equation

Inadequacy of classical mechanics – basic postulates of wave mechanics – properties of wave function – probability interpretation of a wave function – operator formalism – linear operators – self – adjoint operators – expectation value – eigenvalues and eigenfunctions – commutativity and compatibility – Schroedinger's equation - steady state and time dependent form.

Unit IV: Angular Momentum

Orbital angular momentum operators and their commutation relations – elementary ideas of spin angular momentum of an electron – Pauli matrices – spin matrices - properties.

Unit V: Solution of Schroedinger's Equations

Free particle solution – particle in a box – Qualitative treatment of the Barrier penetration problem (one dimension only), linear harmonic oscillator, rigid rotator and Hydrogen atom.

Books for Study

1. Mechanics and Relativity by Brijlal Subramanyam, S.Chand & Co., New Delhi,. (1990)
2. Quantum mechanics by G. Aruldas ,Prentice Hall India (2002).
3. Modern Physics by R. Murugeshan and Kiruthiga Sivaprasath, S. Chand & Co.,(2008)
4. Quantum Mechanics, Satyaprakash, Pragati Prakashan, Meerut (2009)

Books for Reference

1. A text book of Quantum mechanics by P.M.Mathews and S.Venkatesan, Tata McGraw – Hill, New Delhi (2005).
2. Concepts of modern physics by Arthur Beiser. Tata McGraw - Hill, 5th edition, New Delhi (1997).
3. Quantum mechanics by A.Ghatak and Loganathan, McMillan India Pvt. Ltd.
4. Quantum Mechanics by V.K. Thankappan, New Age International (P) Ltd. Publishers, New Delhi (2003).

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Core Paper-10
NUCLEAR AND PARTICLE PHYSICS
(Effective from 2015-2016 batch)

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No. of credits: 5
No. of hours allotted: 6/week

Unit I: General Properties of Nuclei

Nuclear size, charge, mass-determination of nuclear radius-mirror nucleus - mass defect and binding energy-packing fraction – nuclear spin – magnetic dipole moment – electric quadrupole moment – nuclear models – liquid drop model – Weizacker semi empirical mass formula – shell model and magic numbers – nuclear forces-meson theory of nuclear force(qualitative)

Unit II: Radioactivity

Natural radioactivity – properties of alpha, beta and gamma rays - alpha rays – characteristics - determination of e/m of alpha particle – determination of range of alpha particle– Geiger Nuttal experiment and law – α-ray spectra – Gamow's theory of α-decay (qualitative study) – beta rays – characteristics - beta ray spectra – neutrino hypothesis – violation of parity conservation – gamma rays – determination of wavelength - internal conversion – nuclear isomerism - law of disintegration – half life and mean life period – units of radioactivity – transient and secular equilibrium – radiocarbon dating – age of earth.

Unit III: Radiation Detectors and Particle Accelerators

Ionization chamber – G.M. Counter and resolving time – scintillation counter – photo multiplier tube – Linear accelerators – cyclotron – synchrocyclotron - betatron.

Unit IV: Nuclear Reactions

Conservation laws – nuclear reaction Kinematics-Q-value-threshold energy – artificial radioactivity – radioisotopes and its uses – classification of neutrons – nuclear fission – chain reaction – critical mass and size – nuclear reactor-breeder reactor – transuranic elements – nuclear fusion – thermonuclear reactions – sources of stellar energy.

Unit V: Elementary Particles

Classification of elementary particles – particles and anti particles – anti matter - fundamental interaction – elementary particle quantum numbers – isospin and strangeness – conservation laws.

Books for study
1. Atomic and nuclear Physics by N. Subrahmanyam and Brijlal, S. Chand & Co., New Delhi (1996).
2. Nuclear Physics by Tayal D.C., Himalaya publishing House, Mumbai(2006)
3. Nuclear Physics by R.C. Sharma, K. Nath & Co., Meerut (2000)
4. Modern physics, R.Murugesan and Kiruthiga Sivaprasath, S.Chand and Company, New Delhi (2005)

Books for reference
1. Nuclear Physics by R.R. Roy and B.P. Nigam, New Age International (P) Ltd., New Delhi(1997)
2. Nuclear Physics by Irving Kaplan, Narosa Publishing house, New Delhi(2002).

Semester VI
Elective -2
DIGITAL ELECTRONICS
(Effective from 2015-2016 batch)

No. of credits: 5
No. of hours allotted: 4/ Week

Unit I: Number System and Binary Code

Introduction, binary, octal and hexadecimal number system. Binary operations-addition; Subtraction, multiplication and division. Subtraction using 1's and 2's complement; BCD system.

Unit II: Combinational Logic Design

Boolean algebra-De Morgan's theorem- basic logic gates- NAND and NOR as universal gates-SOP, POS- Karnaugh map representation and simplification, pair, quad, octet (limited to four variables). Arithmetic circuits - half and full adders, half and full subtractors), BCD adder. Demultiplexers /Decoders, Multiplexers, Encoders, Code converters (BCD-to Binary, Binary to BCD converters).

Unit III: Flip flops

Sequential logic circuits – 1-bit memory, Latch, R-S Flip flop, J-K Flip flop – Race-around comdition – master – Slave Flip flop – T and D flip flops.

Unit IV: Registers and counters

Registers, Modes of operation, shift right, shift left registers. Counters (4 bit). Ripple (or) asynchronous Counters – synchronous counters –Up - down counters – decade counter – BCD counter.

Unit V: Introduction to IC technology

Basic fabrication steps: epitaxial growth, oxidation, photolithography, etching, diffusion, ion implantation, film deposition and metallisation. Process integration for integrated Circuits, Diodes and transistor for monolithic circuits, integrated resistors, capacitors.

Books for Study
1. Introduction to Integrated Electronics by V.Vijayendran, S. Viswanathan (Printers and Publishers) Pvt. Ltd., Chennai(2005).
2. Digital Electronics by Practice Using Integrated Circuits - R.P.Jain - Tata McGraw Hill(1996).
3. Integrated Electronics by J.Millman and C.Halkias, Tata McGraw Hill, New Delhi (2001)
4. Digital Principles and Application by Malvino Leach, Tata McGraw Hill, 4th Edition (1992).

Books for Reference

1. Linear Integrated Circuits by D. Roy Choudhury and Shail Jain - New Age Internation(P) Ltd.(2003)
2. Electronics - Analog and Digital by I.J. Nagrath - Prentice Hall of India, New Delhi(1999).

Semester VI
ELECTIVE - 3
MICROPROCESSOR FUNDAMENTALS
(Effective from 2015-2016 batch)

No. of credits: 5
No. of hours allotted: 4/ Week

Unit 1: Architecture

Architecture of 8085 – registers, flags, ALU, address and data bus, demultiplexing address/data bus – control and status signals – control bus, Programmer's model of 8085 – Pin out diagram – Functions of different pins.

Unit 2: Programming Techniques

Instruction set of 8085 – data transfer, arithmetic, logic, branching and machine control group of instructions – addressing modes – register indirect, direct, immediate and implied addressing modes.

Assembly language & machine language – programming techniques: addition, subtraction, multiplication, division, ascending, descending order, largest and smallest (single byte)

UNIT 3: Interfacing memory to 8085

Memory interfacing – Interfacing 2kx8 ROM and RAM, Timing diagram of 8085 (MOV R_d, R_s – MVI R_d, data(8) .

Unit 4: Interfacing I/O Ports to 8085

Interfacing input port and output port to 8085 – Programmable peripheral interface 8255 – control word-three modes of operation-flashing LEDs.
Unit 5: Interrupts

Interrupts in 8085 - hardware and software interrupts – RIM, SIM instructions – priorities – simple polled and interrupt controlled data transfer.

Books for Study

1. Microprocessor Architecture programming and application with 8085 / 8080A. by R.S.Gaonkar, Wiley Eastern Ltd.(1992).
2. Fundamental of microprocessor 8085 by V. Vijayendran, S.Viswanathan Publishers, Chennai(2003).
3. Fundamentals of Microprocessors and microcomputers by B.Ram - Dhanpat Rai publication.

Books for Reference

1. Introduction to microprocessor by Aditya Mathur - Tata Mc.Graw Hill Publishing Company Ltd.(1987).
2. Microprocessor and digital system by Dougles V. Hall - 2nd Edition - McGraw Hill Company (1983).

CORE PRACTICAL – III
(Practical Examination at the end of the Sixth semester)
No. of credits: 4
External: 60 marks.   Record: 10 marks   Practical Exam: 50 marks
General (Any 15 experiments)

1. Young's modulus – Koenig's method – Non uniform bending.
2. Young's modulus – Non uniform bending – optic lever – scale and telescope.
3. Newton's Rings - $R_1 R_2$ and μ of a long focus convex lens.
4. Spectrometer $i – i^{'}$ curve fixing i.
5. Spectrometer – Cauchy's constants.
6. Field along the axis of a circular coil – Deflection Magnetometer – B_H and M.
7. Field along the axis of a Circular coil – vibration magnetic needle.
8. EMF of Thermocouple – Potentiometer (199P method).
9. EMF of Thermocouple – Potentiometer (108P method).
10. Calibration of high range Voltmeter – Potentiometer.
11. Figure of merit – B.G.
12. Internal resistance of a cell – B.G.
13. Comparison of Capacitances – B.G.
14. Comparison of EMFs – B.G
15. Absolute capacitance of a capacitor -B.G.
16. Series resonance Circuit – LCR – finding L, Resonant frequency, Bandwidth, Q.
17. Spectrometer – narrow angled Prism.

CORE PRACTICAL – IV
(Practical Examination at the end of the Sixth semester)
No. of credits: 4
External: 60 marks.   Record: 10 marks   Practical Exam: 50 marks
Basic Electronics (Any 15 experiments)

1. Full wave Rectifier.
2. Bridge rectifier.
3. Zener regulated power supply – 9V - regulation characteristics.
4. Transistor characteristics – CB mode.
5. Transistor characteristics – CE mode.
6. Single Stage RC coupled amplifier – gain – frequency response.
7. Emitter follower.
8. Hartley oscillator.
9. Colpitt's oscillator.

10. Transistor – astable multivibrator.
11. Basic logic gates – AND, OR, NOT gates using diodes & transistors.
12. NAND/NOR universal building blocks.
13. De Morgan's theorem – Verification.
14. Half adder – full adder using IC - XOR, AND and OR gates.
15. Half subtractor, full subtractor using IC - XOR, AND and OR gates.

16. 4 bit ripple counter using IC 7473.
17. Decade counter - IC 7490.

PRACTICAL – V
(Practical Examination at the end of the Sixth semester)
No. of credits: 4
External: 60 marks.   Record: 10 marks   Practical Exam: 50 marks
Applied Electronics (Any 15 experiments)
1. OP Amp – IC 741 – Inverting amplifier, non –inverting amplifier, unity follower.
2. OP Amp – Summing and difference amplifier.
3. Op Amp – Differential amplifier – CMRR.
4. OP Amp – AC frequency response.
5. OP Amp – Square wave generator.
6. OP Amp – Wien's bridge oscillator.
7. OP Amp – Phase Shift oscillator.
8. 555 Timer – astable multivibrator.
9. 555 Timer – Schmitt Trigger.
10. D/A convertor – 4 bit binary weighted resistor method.
11. µp- 8085 8 bit addition, multiplication.
12. µp- 8085 8 bit subtraction, division.
13. µp - Sorting in ascending order – 8 bit data.
14. µp -Sorting in descending order – 8 bit data.
15. µp - Finding the largest number in an array.
16. µp - Finding the smallest number in an array.

The following procedure is to be followed for internal marks (40 marks)

Attendance: 5 marks
Practical test – best 2 out of 3: 30 marks
Record: 5 marks.