KANNUR UNIVERSITY
(Abstract)

BSc Physics Programme - Revised Scheme, Syllabus & Model Question Papers of Core, Complementary and Open Courses under Choice Based Credit Semester System for Under Graduate Programme - implemented with effect from *2014 admission - Orders Issued.*

ACADEMIC BRANCH

No. Acad/C2/986 /2014 Dated, Civil Station P.O, 28-05-2014

Read: 1 .U.O No. Acad/C2/2232/2014 dated 14-03-2014
2. Minutes of the meeting of the Board of Studies in Physics (UG) held on 01-01-2014
3. Minutes of the meeting of the Faculty of Science held 25-03-2014
4. Letter dated 23-01-2014 from the Chairman, BOS in Physics (UG)

ORDER

1. The Revised Regulations for UG Programme under Choice based Credit Semester System were implemented in this University with effect from 2014 admission as per paper read (1) above.

2. As per paper read (2) above the Board of Studies in Physics (UG) finalized the Scheme , Syllabus & model Question Papers for Core, Complementary & open courses of BSc Physics programme to be implemented with effect from 2014 admission..

3. As per read (3) above the Faculty of Science held on 25-03-2014 approved Scheme, syllabus & model question papers for core/complementary & open courses of BSc Physics programme to be implemented with effect from 2014 admission.

4. The Chairman, Board of Studies in Physics (UG)) vide paper read (4) above has submitted the finalized copy of Scheme, syllabus & Model question papers for core/complementary and open courses of BSc Physics programme for implementation with effect from 2014 admission.

5. The Vice Chancellor, after examining the matter in detail, and in exercise of the powers of the Academic Council as per section 11(1) of Kannur University Act 1996 and all other enabling provisions read together with, has accorded sanction to implement the revised scheme, syllabus& model question papers of BSc Physics Programme with effect from 2014 admission.

6. Orders, are therefore issued implementing the revised scheme, syllabus & model question papers for core, complementary& open courses of BSc Physics programme under CBCSS with effect from 2014 admission subject to report to Academic Council

7. Implemented revised Syllabus is appended.

Sd/-
DEPUTY REGISTRAR (ACADEMIC)
FOR REGISTRAR

To

1. The Principals of Affiliated Colleges offering B.Sc Physics Programme
2. The Examination Branch (through PA to CE)

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Section Officer

KANNUR UNIVERSITY KANNUR PIN-670567

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KANNUR UNIVERSITY

SCHEME & SYLLABUS OF

UG (PHYSICS)

Based on Kannur University regulations: KUCBCSSUG 2014

(Kannur University Choice Based Credit Semester System for Under Graduate system 2014)

BSc Core (Physics), Complementary (Physics) & Open (Physics) courses

(With effect from 2014 admissions)

Contents

Curriculum of BSc (Physics) Programme

Scope: By doing the BSc (Physics) programme students are aimed at developing interest in physics in order to continue further in the field of physics or to attain the necessary physics and allied background which an employer needs.

The BSc (Physics) programme curriculum consists of:

- Common (English) courses &Common (Additional language-Optional) courses
- Core (Physics) courses
- Complementary I (Maths) & Complementary II (Optional) courses
- Open (Optional) course

For the definitions of the terms mentioned above readers are requested to refer the UG regulations-2014 of Kannur University (KUCBCSSUG-2014) available at the website www.kannuruniversity.ac.in.

The Common (English), Common (Addl. language) & Complementary courses will be conducted during semester I to IV. The Core courses will span from semester I to VI. Open course will be during V semester alone.

Credit & Mark distribution of BSc (Physics) Programme

Total credits for the BSc (Physics) programme will be 120 & total marks: 1800 distributed through six semesters with the following details.

Table 1: Distribution of Credits & Marks for the BSc (Physics) programme.

Item	Credits	Marks
Common course (English)	22	300
Common(Addl. language) Optional	16	200
Complementary I(Maths)	12	200
Complementary II(Optional)	12	200
Core(Physics) courses	56	875
Open(Optional) course	2	25
Total	120	1800

Table 2**:** Semester wise Credit & Mark distribution of BSc (Physics) programme:

Sem.	Common		Core Physics	Complementary		Open	Total Credits	Total Marks
	Eng	Addl.		Maths	Compl.II			
I	4+3	4	3	3	2		19	290
II	4+3	4	3	3	2		19	290
III	4	4	3	3	2		16	240
IV	4	4	3+4	3	2+4		24	330
V			3+3+3+3+3			2	17	275
VI			3+3+3+3+3+4+4+2				25	375
Total	22	16	56	12	12	2	120	1800

Table 2(a):

SEMESTER I						
S No.	Title of the course	Hrs/week	Credits	Marks		
				IA**	ESE***	Total
1	Common course (English) I	5	4	10	40	50
2	Common course (English) II	4	3	10	40	50
3	Common course(Addl. language) VII	4	4	10	40	50
4	**Core course (Theory-1B01PHY)**	**2**	**3**	**10**	**40**	**50**
5	**Core course (Practical I-4B05PHY)***	**2**	**-**	**-**	**-**	**-**
6	Complementary (I) Theory I (Maths)	4	3	10	40	50
7	Complementary (II) Theory I	2	2	8	32	40
8	Complementary (II) Practical I *	2	-	-	-	-
Total		25	19	58	232	290

*External examination at the end of fourth semester

Internal assessment ; * End Semester Examination (external assessment)

Table 2(b):

S No	SEMESTER II					
	Title of the course	Hrs/ week	Credits	Marks		
				IA	ESE	Total
1	Common course (English) III	5	4	10	40	50
2	Common course (English) IV	4	3	10	40	50
3	Common course(Addl. language) VIII	4	4	10	40	50
4	**Core course (Theory-2B02PHY)**	**2**	**3**	**10**	**40**	**50**
5	**Core course (Practical I-4B05PHY)***	**2**	**-**	**-**	**-**	**-**
6	Complementary (I) Theory II(Maths)	4	3	10	40	50
7	Complementary (II) Theory II	2	2	8	32	40
8	Complementary (II) Practical *	2	-	-	-	-
Total		25	19	58	232	290

*External examination at the end of fourth semester

Table 2(c):

SEMESTER III						
S No.	Title of the course	Hrs/week	Credits	Marks		
				IA	ESE	Total
1	Common course (English) V	5	4	10	40	50
2	Common course(Addl. language) IX	5	4	10	40	50
3	**Core course (Theory-3B03PHY)**	**3**	**3**	**10**	**40**	**50**
4	**Core course (Practical I-4B05PHY)***	**2**	**-**	**-**	**-**	**-**
5	Complementary (I) Theory III(Maths)	5	3	10	40	50
6	Complementary (II) Theory III	3	2	8	32	40
7	Complementary (II) Practical *	2	-	-	-	-
Total		25	16	48	192	240

*External examination at the end of fourth semester

Table 2(d):

SEMESTER IV						
S No.	Title of the course	Hrs/week	Credits	Marks		
				IA	ESE	Total
1	Common course (English) VI	5	4	10	40	50
2	Common course(Addl. language) X	5	4	10	40	50
3	**Core course (Theory-4B04PHY)**	**3**	**3**	**10**	**40**	**50**
4	**Core course (Practical I -4B05PHY)**	**2**	**4**	**10**	**40**	**50**
5	Complementary (I) Theory IV(Maths)	5	3	10	40	50
6	Complementary (II) Theory IV	3	2	8	32	40
7	Complementary (II) Practical	2	4	8	32	40
	Total	25	24	66	264	330

Table 2(e):

SEMESTER V						
S No.	Title of the course	Hrs/ week	Credits	Marks		
				IA	ESE	Total
1	Open course	2	2	5	20	25
2	**Core course (Theory-5B06PHY)**	**3**	**3**	**10**	**40**	**50**
3	**Core course (Theory-5B07PHY)**	**3**	**3**	**10**	**40**	**50**
4	**Core course (Theory-5B08PHY)**	**3**	**3**	**10**	**40**	**50**
5	**Core course (Theory-5B09PHY)**	**3**	**3**	**10**	**40**	**50**
6	**Core course (Theory-5B10PHY)**	**3**	**3**	**10**	**40**	**50**
7	**Core course (Practical II -6B16PHY)!**	**4**	**-**	**-**	**-**	**-**
8	**Core course (Practical III -6B17PHY)!**	**4**	**-**	**-**	**-**	**-**
	Total	25	17	55	220	275

! External examination at the end of sixth semester

Table 2(f):

SEMESTER VI						
S No.	Title of the course	Hrs/week	Credits	Marks		
				IA	ESE	Total
1	**Core course (Theory -6B11PHY**	**3**	**3**	**10**	**40**	**50**
2	**Core course (Theory-6B12PHY)**	**3**	**3**	**10**	**40**	**50**
3	**Core course (Theory-6B13PHY)**	**3**	**3**	**10**	**40**	**50**
4	**Core course (Theory-6B14PHY)**	**3**	**3**	**10**	**40**	**50**
5	**Core course (Theory-6B15PHY) - Elective**	**3**	**3**	**10**	**40**	**50**
6	**Core course (Practical II-6B16PHY)**	**4**	**4**	**10**	**40**	**50**
7	**Core course (Practical III-6B17PHY)**	**4**	**4**	**10**	**40**	**50**
8	**Project (6B18PHY)**	**2**	**2**	**5**	**20**	**25**
9	**Study tour (6B19PHY)**	**-**	**-**	**-**		**-**
	Total	25	25	75	300	375

Components of Core (Physics)

The core courses of BSc (Physics) programme will consists of the following components.

- Theory
- Practical
- Project (Investigatory)
- Study tour (Visiting science institute/laboratory).

Objectives of theory, Practical, Project & Study tour

- **Theory courses**: The design of the theory syllabus is to lay the foundations of physics by learning the history, concepts involved, its language (mathematics), problem solving, and theoretical/experimental developments in various branches of Physics.

- **Practical courses**: To verify the theory they have learned using the laboratory, to develop skill(ability to handle apparatus) there by making them confident to handle delicate instruments, to perform precise measurements in future, data analysis by drawing graph, error analysis, computer based skill & to realize limitation of experimental measurements. In other words it aims at the needs that an employer expects from a physics graduate/ to prepare them for scientific research.

- **Project**: To develop investigation aptitude in Physics/Life. Selection of the topic for the project must be based on the physics (theory/experimental) they have learned through Semesters I to IV. The topic may be theoretical, experimental or a combination of both. Besides familiarisation of books/journals, familiarisation of software such as Mathematica, Matlab, Origin, Grapher, Latex etc. are also expected.
  It also aims at promoting scientific report writing practice*

- **Study tour**: Visiting of a science institute is aimed to get an awareness/idea of the set up/working/research occurring in institutes/laboratory.

  Components of complementary physics will include theory and practical; Open course will have theory only.

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  *A commonly accepted form of an investigatory project report in science/physics will include:

  (1) An introductory section containing a brief historical development of theory/experimental back ground, objectives and relevance of the present investigation.

  (2) The present work &

  (3) Discussion of results he/she has obtained, conclusion & bibliography.

Scheme of Core (Physics), Complementary (Physics) & Open (Physics)

The distribution of various courses, course code, credits, marks & contact hours (known as scheme) for core physics, complementary physics, and open physics will be as follows.

(i) Scheme of Core (Physics)

For Core (Physics), total credits: 56 & total marks: 875

Table 3.**Scheme: BSc (Physics)-Core**

S No	Semester	Course code	Title of Course	Credits	Hrs/week	Marks!		
						IA	ESE	total
1	I	1B01PHY	Physics primers	3	2	10	40	50
2	II	2B02PHY	Electronics-I	3	2	10	40	50
3	III	3B03PHY	Allied Physics	3	3	10	40	50
4	IV	4B04PHY	Optics	3	3	10	40	50
5	I,II, III, IV	4B05PHY *	Practical 1	4	2	10	40	50
6	V	5B06PHY	Electrodynamics-I	3	3	10	40	50
7	V	5B07PHY	Thermal Physics	3	3	10	40	50
8	V	5B08PHY	Classical Mechanics & Relativity	3	3	10	40	50
9	V	5B09PHY	Python programming	3	3	10	40	50
10	V	5B10PHY	Atomic, Nuclear and Particle Physics	3	3	10	40	50
11	VI	6B11PHY	Electrodynamics- II	3	3	10	40	50
12	VI	6B12PHY	Photonics&Spectroscopy	3	3	10	40	50
13	VI	6B13PHY	Quantum mechanics	3	3	10	40	50
14	VI	6B14PHY	Electronics-II	3	3	10	40	50
15	VI	6B15PHY **	Elective	3	3	10	40	50
16	V,VI	6B16PHY ***	Practical II	4	4	10	40	50
17	V,VI	6B17PHY ***	Practical III	4	4	10	40	50
18	VI	6B18PHY ***	Project	2	2	5	20	25
19	V or VI	6B19PHY!!	Study tour	-	-	-	-	-

* External examination (ESE) will be held at the end of IV semester
** Options available are listed in Table 3(a): 6B15PHY (Elective)
*** External examination (ESE) will be held at the end of VI semester
! For detailed distribution of marks, see the section: Assessment pattern
!! Audit course: Course for which no credits are awarded.

Table-3(a) Options available for elective course (6B15PHY) :

S No	Title of the course
1	A. Plasma Physics.
2	B.Astronomy & Astrophysics
3	C. Atmospheric Physics
4	D. Nanoscience
5	E. Material Science
6	F.Computational Physics

(ii) Scheme of Complementary Physics courses

Table-4 Scheme of Complementary (Physics) courses:

Complementary (Physics) courses are expected to provide physics back ground for students of other BSc programmes. Total credits: 12 & total marks: 200, distributed as per the table given below.

S No	Semester	Course code	Title of the course	Hrs/ week	Credits	Marks*		
						IA	ESE	total
1	I	1C01PHY	Complementary Physics I (Mechanics)	2	2	8	32	40
2	II	2C02PHY	Complementary Physics II (Electricity, Magnetism and Thermal Physics)	2	2	8	32	40
3	III	3C03PHY	Complementary Physics III (Optics and Photonics)	3	2	8	32	40
4	IV	4C04PHY	Complementary Physics IV (Modern Physics and Electronics)	3	2	8	32	40
5	I,II,III &IV	4C05PHY **	Complementary Physics practical	2	4	8	32	40

*For detailed distribution of marks, see the section: Assessment pattern

** External examination will be conducted at the end of IV semester.

(iii) Scheme of Open course-Physics

The open course is meant for all the students in the institution except the students of BSc (Physics) programme. Motivation behind open course is that integration of concepts/theories/techniques from two or more disciplines will enable to advance understanding / solve problems whose solutions are beyond the scope of a single discipline. External examination will be conducted at the end of V semester.

Total credits: 2; Total marks: 25.

Table 5: **Scheme of Open course-Physics:**

S No	Semester	Course code	Title of the course	Hrs/week	Credits	Marks*		
						IA	ESE	total
1	V	5D01PHY	Open course **	2	2	5	20	25

* For detailed distribution of marks, see the section: Assessment pattern

**Table 5(a): Options available for Open course (Physics)

S No	Title of the course
1	A. Environmental Physics
2	B. Joy of star watching
3	C. Disaster Management
4	D. Biophysics

Assessment pattern

A general pattern of assessment as per KUCBCSSUG 2014 will be followed. Accordingly 20% of the total marks will be reserved for internal assessment (IA) and the remaining 80% through external examination (ESE). It is applicable for Core, Complementary and Open courses as well.

Internal assessment (Core (physics), Complementary (physics) & Open (physics)):

Internal assessment will include

- Regularity in attending the classes (Attendance)
- Test papers
- Assignment
- Seminar
- Viva

Internal assessment is continuous throughout the semester and to be conducted by the concerned Department in mark system.

Objectives of Attendance/Test paper/Assignment/Seminar/Viva:

- **Attendance:** To develop punctuality in students.

- **Test paper**: To assess the hard work/understanding of the subject and thereby to induce students the need for hard work in life.....

- **Assignments**: The objectives of assignment in general are to increase the knowledge/ to promote the abilities and skills of the students/ to extend what they know in to new situations/to develop the traits for developing physics/ to reinforce what students have already learned/ to prepare them for forthcoming complex lessons....

- **Seminar**: During a seminar assigned readings are discussed, questions raised and debates conducted in order to promote the interaction aspects of life...

- **Viva voce**: It is a measure of student's understanding of a subject/their ability to verbally explain the subject to others. (During viva voce a student may be made to face a group of teachers rather than a single teacher as far as possible)...

Topics for Assignment /Seminar/Viva

Students must be encouraged to familiarise with as much books/Journals/e-journals/internet resources as possible through assignment /seminar/viva. Topics for assignment/Seminar/viva for internal assessment may be given so as to induce them the various traits demanded by the term "Education". It must include topics such as **disaster management, drug abuse, alcoholism, de addiction centres, messages for abstention drug**, besides the subject area in order to remind their social commitments/prevention of social evils.

The total number of test papers/assignment/seminar/viva that may be conducted during a semester is decided by the concerned department depending on the time available/ student's capacity.

External assessment (Core (physics), Complementary (physics), &Open (physics)):

External assessment will include Theory, Practical & Project evaluation conducted by University after the completion of a semester called end semester examination (ESE). Duration of theory examination for Core (Physics) & Complementary (physics) courses will be 3 hours, where as for Open (physics) course is 2 hours. The practical examination for Core (Physics) & Complementary (physics) will be of 3 hour duration. Evaluation of the project will be made along with practical examination of core(Physics).

Practical log book: of students must be submitted to the external examiners during their University practical examination.

Project report & Study tour report: Students have to submit their project report & report of the study tour along with practical examination. No credit will be given for study tour report.

Practical log book, Project report & Study tour report must be certified by the teacher in charge and countersigned by the Head of the Department.

Table 6: Distribution of internal marks for Theory courses (Core, Complementary & Open).

Attendance	25%
*Assignment /Seminar/Viva	25%
**Test paper	50 %

* A minimum of one general assignment and one physics assignment are to be conducted and average mark is to be taken.
** At least two test papers are to be conducted and average of these two is to be taken for awarding marks.

Table 7: Distribution of internal marks for Practical courses (Core &Complementary)

Attendance	25%
* Record + **Lab involvement	50%
Test papers	25%

*A student is required to maintain a log book of their practical works which must include a brief theory of the each experiment, observations, tabulation, calculation, graph, result etc., regularly signed by the teacher in charge. Fair record is not required.

**Students may be asked to write a brief report (brief theory, formula, diagram/ circuit diagram, model graph) of each experiment before they enter in to the laboratory. Students must be encouraged to draw a sketch of the apparatus/instruments before they start doing the experiment for better familiarisation.

Table 8: Distribution of internal and external marks for Project

Internal (20% of total)	%	External (80 % of total)	%
Punctuality	20 %	Relevance of topic/statement of objectives and Methodology	20%
Use of data	20%	Presentation/Quality of analysis and findings	30 %
Scheme and organization of report	30%	Viva voce	50%
Viva voce	30 %		

Criteria for awarding marks for Attendance:

Table 9: Distribution of marks for attendance

.

Attendance %	Marks%
Above 90%	100%
85 to 89%	80%
80 to 84%	60%
76 to 79%	40%
75%	20%

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Grading of students

Internal marks alone need to be sent to the University. External examination will be conducted and assessed by the University using mark system. The semester wise performance called SGPA(Semester Grade Point Average) and overall performance on completion of the programme called CGPA (Cumulative Grade Point Average) of a student will be made by the University by taking the marks of internal and external assessments using a 7 Point Indirect Grading System (table 10) as per KUCBCSSUG 2014. Finally an overall letter grade (called Cumulative Grade) for the entire programme will be awarded by the University. For the detailed calculations of SGPA, CGPA & Overall letter grade readers are directed to refer KUCBCSSUG 2014.

Table 10: Seven Point Indirect Grading System**.**

% Marks	Grade	Interpretation	Grade point average	Range of grade	Class
90 and above	A+	Outstanding	6	5.5 - 6	First class with distinction
80 to 89	A	Excellent	5	4.5 - 5.49	
70 to 79	B	Very good	4	3.5 - 4.49	First class
60 to 69	C	Good	3	2.5 - 3.49	
50-59	D	Satisfactory	2	1.5 - 2.49	Second class
40-49	E	Adequate	1	0.5 - 1.49	Pass
Below 40	F	Failure	0	0.0 - 0.49	Fail

Distribution of Marks & type of questions for Core (Physics), Complementary (Physics) & Open (Physics) courses.

Table 11. Type of questions & Marks for external examination (theory) - Core Physics

Type of questions	No. of questions	No. of questions to be answered	Marks for each question	Marks
Very short answer	4	4	1	4
Short answer	10	7	2	14
Short essay/Problems	6	4	3	12
Long essay	4	2	5	10
Total	24	17		40

Distribution of marks & appointment of examiners for the external practical examination (Core Physics):

The distribution of marks for the external practical examination of core (Physics) will be decided by the concerned Board of examinations. There will be two examiners for the external practical and project examination.

Table 12. Type of Questions & Marks for external examination (theory) - Complementary Physics:

Type of questions	No. of questions	No. of questions to be answered	Mark for each question	Marks
Very short answer	5	5	1	5
Short answer	6	4	2	8
Short essay/Problems	5	3	3	9
Long essay	4	2	5	10
Total	20	14		32

Distribution of marks & appointment of examiners for the external practical examination (Complementary Physics):

Distribution of marks for the external practical examination of complementary physics will be decided by the concerned Board of Examinations. There will be two examiners for the external practical examination.

Table 13. Type of Questions & marks for external examination (theory) - Open course (Physics):

Type of questions	Total questions	No. of questions to be answered	Marks for each question	Marks
Very short answer	5	5	1	5
Short answer	5	3	2	6
Short essay/Problems	5	3	3	9
Total	15	11		20

Pattern of Question paper for U.G Core (Physics) Courses -Theory

KANNUR UNIVERSITY

Reg. No.: Course code:
Name:
---------Semester

Course title..... **Programme.....**

Total marks: 40
Time: 3hrs.

Answer the questions in English only

Section A

(Very short answer type - Each carries 1 mark -Answer all 4 questions)

1. Very short answer type question
2. Very short answer type question
3. Very short answer type question
4. Very short answer type question

[4x1=4]

Section B

(Short answer type - Each carries 2 marks -Answer 7 questions out of 10)

5. Short answer type question
6. Short answer type question
7. Short answer type question
8. Short answer type question
9. Short answer type question
10. Short answer type question
11. Short answer type question
12. Short answer type question
13. Short answer type question
14. Short answer type question

[7x2=14]

Section C

(Short essay/problem type - Each carries 3 marks -Answer 4 questions out of 6)

15. Short essay/problem type question
16. Short essay/problem type question
17. Short essay/problem type question
18. Short essay/problem type question
19. Short essay/problem type question
20. Short essay/problem type question

[4x3=12]

Section D

(Long essay type - Each carries 5 marks -Answer 2 questions out of 4)

21. Long essay type question
22. Long essay type question
23. Long essay type question
24. Long essay type question

[2x5=10]

Pattern of Question paper for U.G Complementary (Physics) Courses -Theory

KANNUR UNIVERSITY

Reg. No.: Course code:
Name:
---------Semester

Course title..... **Programme.....**

Total marks: 32
Time: 3hrs.

Answer the questions in English only

Section A

(Very short answer type - Each carries 1 mark -Answer all 5 questions)

1. Very short answer type question
2. Very short answer type question
3. Very short answer type question
4. Very short answer type question
5. Very short answer type question

[5x1=5]

Section B

(Short answer/problem type - Each carries 2 marks -Answer 4 questions out of 6)

6. Short answer type question
7. Short answer type question
8. Short answer type question
9. Short answer type question
10. Short answer type question
11. Short answer type question

[4x2=8]

Section C

(Short essay type - Each carries 3 marks -Answer 3 questions out of 5)

12. Short essay/problem type question
13. Short essay/problem type question
14. Short essay /problem type question
15. Short essay /problem type question
16. Short essay /problem type question

[3x3=9]

Section D

(Long essay type - Each carries 5 marks -Answer 2 questions out of 4)

17. Long essay type question
18. Long essay type question
19. Long essay type question
20. Long essay type question

[2x5=10]

Pattern of Question paper for U.G Open (Physics) Course -Theory

KANNUR UNIVERSITY

Reg. No.: Course code:
Name:
---------Semester

Course title..... **Programme.....**

Total marks: 20
Time: 2 hrs.

Answer the questions in English only

Section A

(Very short answer type - Each carries 1 mark -Answer all 5 questions)

1. Very short answer type question
2. Very short answer type question
3. Very short answer type question
4. Very short answer type question
5. Very short answer type question

[5x1=5]

Section B

(Short answer type - Each carries 2 marks -Answer 3 questions out of 5)

6. Short answer type question
7. Short answer type question
8. Short answer type question
9. Short answer type question
10. Short answer type question

[3x2=6]

Section C

(Short essay/problem type - Each carries 3 marks -Answer 3 questions out of 5)

11. Short essay /problem type question
12. Short essay/problem type question
13. Short essay/problem type question
14. Short essay/problem type question
15. Short essay/problem type question

[3x3=9]

Sd/
Dr.P.V.Kunhikrishnan,
Chairman,Board of Studies,UG(Physics),
Kannur University.

Syllabus

BSc (Physics) - Core

BSc (Physics): Core I-Theory

1B01PHY: Physics Primers

Semester-1, Credit-3, Contact hours -36, Max. Ext. Marks- 40, Max. Int. marks-10

Module 1: Perspective of physics (6 hrs)

What does physics deal with? Brief history of physics during last century- Planck's hypothesis of quantum. Quantum mechanics-Einstein's theory of relativity- Contributions by Bose, Saha, Raman, and Chandrasekhar. Semiconductor revolution in physics, Nano techonology, Expanding Universe, Fundamental particles, Standard model of high energy physics, Higgs boson ,Unification of all forces.(Book 1 & 2) (Minimum Marks: 5)

Module 2: Mathematical methods in Physics (14 hrs)

Vector Analysis: Vector operations-vector Algebra-Component form-vector calculus- Del operator-gradient, divergence, curl-physical interpretation-Integral calculus-Line integral. Surface integral, volume integral-l fundamental theorem of gradients-gauss divergence theorem (statement only) fundamental theorem of curl-stokes theorem (statement only) Divergence less and cur less fields. Curvilinear co–ordinates, spherical polar coordinates-cylindrical co-ordinates (basic ideas) (Book 3, Chapter 1) (Minimum Marks: 15)

Module 3: Waves and oscillations (16 hrs):

Waves-Progressive wave-General equation of wave motion- plane progressive harmonic wave-Energy density-Transverse waves in stretched strings-longitudinal waves in rods-longitudinal waves in gases-Fouriers theorem-mathematical expression-conditions.

Harmonic oscillator: Simple harmonic motion and harmonic oscillator—Energy of harmonic oscillator-oscillation of two particle connected by a spring- vibrational state of a diatomic molecule-compound pendulum - composition of two simple harmonic motions of equal periods in straight line, composition of two rectangular simple harmonic motion of equal periods-Lissajous figures.(Book 4,Chapters 9,10) (Minimum Marks: 20)

Books for study:

1. Concepts of modern physics by Arthur Beiser,

2. Modern Physics by R. Murugeshan

3. Introduction to Electrodynamics by David J Griffith Prentice Hall India Pvt Ltd .

4. Mechanics by J.C. Upadhyaya.

Books for reference:

1. Introduction to Mathematical Physics by Charlie Harper

2.Properties of matter by J.C.Upadhyaya

BSc (Physics): Core II- Theory

2B02PHY: Electronics I

Semester-2, Credit-3, Contact hours -36, Max. Ext. Marks- 40, Max. Int. Marks-10

Module 1: Bipolar Junction Transistors and their biasing (Marks: Min.10)
BJT Operation, BJT Voltages and Currents, BJT amplification, CB, CE and CC Characteristics, DC Load line and Bias point, Base bias, Collector to base bias, Voltage divider bias, Comparison of bias circuits, Bias circuit design, Switching circuits.

9 Hrs. (Book 1, Chapter 4 & 5)

Module 2: Field Effect Transistors and their biasing (Marks: Min.10)
Introduction, JFET - n channel and p channel, JFET characteristics, DC load line and bias point, Gate bias, Self bias and Voltage divider bias. 9 Hrs. (Book 1, Chapter 9 & 10)

Module 3: Number Systems, Operations and Codes (Marks: Min.10)
Binary numbers, Decimal to Binary Conversion, Binary Arithmetic, 1's and 2's Complements of Binary Numbers, Signed Numbers, Arithmetic Operations with Signed Numbers, Hexadecimal Numbers, Octal Numbers, Binary Coded Decimals, Gray code, ASCII code.

9 Hrs. (Book 2, Chapter 2)

Module 4: Logic gates (Marks: Min.10)
The inverter, AND, OR, NAND, NOR, The Exclusive- OR and Exclusive - NOR Gates, Basic combinational Logic circuits, The universal property of NAND and NOR gates, Combinational logic using NAND and NOR gates. 9 Hrs. (Book 2, Chapter 3 & 5)

Books for Study:
1. Electronic Devices and Circuits - 5th Edition, David A Bell (Oxford)
2. Digital Fundamentals - 8th Edition, Thomas L. Floyd (Pearson Education PHI)

Books for Reference:
1. Principles of Electronics - V K Mehta (S Chand & Co.)
2. Electronic Devices and circuit theory - Robert L Boylestad & Louis Nashelsky (PHI)
3. Digital Principles and Applications - D P Leach and A P Malvino (TMH)

BSc (Physics): Core III - Theory

3B03PHY: Allied physics

Semester-3, Credit-3, Contact hours -54, Max. Ext. Marks- 40, Max. Int. marks-10

Module 1: Solid State Physics

Crystal structure:-Introduction- crystal lattice and translation vectors- unit cell-basis-symmetry operations–point groups and space groups(qualitative) - types of lattices - Bravais lattices–lattice directions and planes-Miller indices-inter planar spacing for orthogonal lattice(no derivation)-simple crystal structures-close packed structures-loose packed structures-structure of diamond –structure of sodium chloride

X-ray diffraction:– Bragg's law –X-ray diffraction methods-Laue's method- Powder crystal method- powder method(Book 1,Chapter1,2) **14hrs**; Marks: Minimum 12.

Module 2: Properties of matter

Elasticity:- Stress, strain, elastic constants, Poisson's ratio relation connecting various elastic constants- angle of twist and angle of shear – twisting couple on a cylindrical rod of wire – torsion pendulum- Bending of beams –expression for bending moments-cantilever- expression for depression –beam supported at its ends and loaded in the middle-expression for depression –stiffness of a beam

Hydrodynamics: Streamline and turbulent flows-tubes of flow and equation of continuity-energy possessed by a liquid- Bernoulli's theorem-practical applications-Torricelli's theorem

Viscosity:-critical velocity-flow of liquid through a capillary tube (Poiseulle's formula)-Stokes formulae.

Surface tension:-surface energy-expression for excess pressure on a curved surface - measurement of surface tension by capillary tube method (Book 2-Chapters 12,14,15,16)

22hrs; Marks: Minimum 14

Module 3: **Electricity**

DC Network theorems:-Kirchoff's laws –voltage and current sources-source conversion-superposition theorem- Maximum power transfer theorem- reciprocity theorem- Thevenin's and Norton's theorems –equivalent circuits-star/delta ,delta/star transformations

Transients and ac circuits:- Charging and discharging of capacitor- time constants-ac through R,L and C-choke coil-skin effect-ac through LR, CR and LCR series and parallel circuits-resonance-power in ac circuits-power factor(Book 3,Chapters 2,5,10,11,13.)

18hrs; Marks: Minimum 14

Books for study:

1. Solid state Physics, R.K.Puri, V.K. Babbar, S. Chand and Company

2. Mechanics: J. C. Upadhyaya , Ram Prasad and sons.
3. A text book of Electrical Technology, Volume 1, 22nd Edn., B.L.Theraja & A.K.Theraja.

Books for Reference:

1. Solid State Physics, M.A. Wahab, Narosa publishing house

2. Introduction to solid State Physics, Charles Kittel, John Wiley and sons

3. Properties of matter, Brijilal-Subrahmaniam, S.C&Co

4. Elements of properties of matter, D.S.Mathur, S.Chand

5. Fundamentals of magnetism and electricity, D.N.Vasudeva

BSc (Physics): Core IV- Theory

4B04PHY: Optics

Semester-4, Credit-3, Contact hours -54, Max. Ext. Marks- 40, Max. Int. Marks-10

Module 1:- Matrix Method in Paraxial Optics (10 Hrs)

Introduction-The Matrix method-Effect of Translation-Effect of Refraction-Imaging by spherical refracting surface- coaxial optical systems-unit planes-Nodal planes –a system of thin lenses (Chapter 4) (Marks: Minimum 6)

Module 2:-Interference by division of amplitude (13 Hrs)

Introduction-Interference by a parallel film when illuminated by a plane wave-The cosine law-Non reflecting films-Highly reflecting films by thin film deposition-Interference by a film with two non parallel reflecting surfaces-Colour of thin films-Newton's Rings (reflected system)-Michelson's Interferometer-determination of wavelength of monochromatic source (Chapter13)(Marks: Minimum 11)

Module 3 :- Fresnel Diffraction(8Hrs)

Introduction-Fresnel half period zones-Diffraction by a circular aperture-The zone plate-comparison between zone plate and convex lens-Diffraction by a straight edge (Chapter 17) (Marks: Minimum 5)

Module 4 :- Fraunhoffer Diffraction(11 Hrs)

Introduction-Single slit diffraction pattern-Position of maxima and minima-Two slit Fraunhoffer diffraction pattern-position of maxima and minima-N slit diffraction pattern-position of maxima and minima-Width of principal maxima-The plane diffraction grating-Grating spectrum-Resolving power of a grating. (Chapter 16) (Marks: Minimum 8)

Module 5 :- Polarization and Double refraction(12 Hrs)

Introduction-Polarization by reflection-Brewster's law- Nicol prism-Polarization by scattering- Malus's law -Superposition of two disturbances-Mathematical analysis-The phenomenon of double refraction-Interference of polarized lights-Quarter wave and Half wave plates-Analysis of polarized light.(Chapter 19) (Marks: Minimum 10)

Book for study :
Optics by Ajoy Ghatak (3rd Edition) -Tata MC Grow hill publishing company

Books for Reference :
1. Geometrical and Physical optics by P.K.Chakroborthy
2. A text book of Optics by N.Subramhaniam and Brijlal
3. Optics by E. Hecht.

BSc (Physics): Core V – Practical

4B05PHY: Practical – I

Semester-1,2,3&4, Credit-4, Total hours -144 ,Max. Ext. Marks- 40, Max. Int. Marks-10

Note: **I**.A brief theoretical back ground of each experiment must be given to the students before each cycle of experiments and assess it (3 to 4 hrs). Students have to maintain a practical log book regularly signed by the teacher in charge and to be submitted at the time of University Examination. Fair record is not required. All the 20 experiments have to be performed.
II. Students must refer diode/transistor/IC data manual to get details of the components in all electronics experiment before they start doing the experiment.

1. Compound pendulum (symmetric) – Find 'g', radius of gyration and moment of inertia
2. Fly wheel – Moment of inertia
3. Torsion pendulum- Moment of inertia of a disc and rigidity modulus of the wire
4. Young's modulus of the material of the bar (non uniform bending) – using pin and microscope
5. Young's modulus of the material of the bar (uniform bending) – using optic lever
6. Newton's law of cooling- Specific heat capacity of a liquid
7. Melde's string – Frequency of a tuning fork
8. Liquid lens I-Refractive index of liquid and material (mercury given)
9. Liquid Lens II-Refractive index of liquid and material with another liquid of known index (water, $\mu = 1.33$)
10. Spectrometer- Refractive index of the material of the prism
11. Spectrometer- Dispersive power of a prism
12. Deflection Magnetometer- Moment of a magnet in Tan A, Tan B and Tan C position

13. Deflection Magnetometer and Box type vibration magnetometer – m and B_o
14. Carey Fosters bridge – Resistance and resistivity
15. Potentiometer – Calibration of low range voltmeter (Null method)
16. Verification of network theorems – Thevenin's and Norton's
17. Static characteristic of a semiconductor diode
18. Rectifiers –half wave & full wave (2 diodes)- study of ripple factor with and without filter
19. Voltage multiplier circuit(by soldering)
20. Static characteristic of BJT – CE mode

References:

1. Advanced practical physics for students by Worsnop & Flint
2. Practical Physics by Sasikumrar (PHI)
3. Core course Experimental Physics by Dr. P Sethumadhavan & Dr. A K Anila (Manjusha publication, Vol. I and Vol. II)
4. Electronics Lab Manual by Dr. K A Navas (Rajath Publishers, Vol. I)
5. Electronics Laboratory Primer by S Poorna Chandra & B Sasikala (S Chand)
6. Core Course Practical Physics I and II by C J Babu & K Vijayalakshmi (Calicut University Central Co-Operative Stores).

BSc (Physics): Core VI-Theory

5B06PHY: Electrodynamics-I

Semester-5, Credit-3, Contact hours -54, Max. Ext. Marks- 40, Max. Int. marks-10

Module 1: Electrostatics.

The electrostatic field –Coulomb's Law-The electric field-Continuous charge distributions-Field lines & Gauss's Law –The divergence of **E-** Dirac Delta function-The divergence of $(\frac{1}{r^2})\hat{r}$ -The one dimensional and three dimensional Dirac delta function – Applications of Gauss's Law (Why symmetry is crucial – plane symmetry- cylindrical symmetry –spherical symmetry -uniform & non-uniform charge distributions) –The curl of **E.**

Electric potential - comments on potential – Poisson's equation & Laplace equation –The potential of a localized charge distribution – Electrostatic boundary conditions – Work done in moving a charge – The energy of a point charge distribution – The energy of a continuous charge distribution – Comments on electrostatic energy – Basic properties of conductors – induced charges – The force on a surface charge – Capacitors.(Chapters 1& 2, Book 1)

20**hrs**; Marks: Minimum 14

Module 2: Electrostatic Fields in Matter.

Multipole expansion- approximate potentials at large distances-the monopole and dipole terms-the electric field of a dipole **-**Dielectrics –induced dipoles - Alignment of polar molecules –Polarization - Bound charges – Physical interpretation of bound charges – The field inside a dielectric – Gauss's law in the presence of a dielectric –A deceptive parallel-Boundary conditions-Displacement vector – Linear dielectrics –Susceptibility –permittivity – dielectric constant – Boundary value problems with linear dielectrics – Energy in dielectric systems –Force on dielectrics – Clausius –Mossotti equation. (Chapters 3 & 4, book 1)

16hrs; Marks: Minimum 12

Module 3: Magnetostatics

Magnetic fields- The Lorenz force law – Cyclotron motion –Cycloid motion –- Magnetic force & work -–Line current –Surface current –Volume current- Continuity equation –Steady currents –Biot Savart law— Magnetic field due to(Infinitely long wire –circular coil – solenoid) -The divergence & Curl of **B** – Ampere's law –Applications of Ampere's law – Comparison of magnetostatics & electrostatics –Magnetic vector potential – Magnetostatic boundary conditions –Multipole expansion of vector potential & magnetic dipole moment.

(Chapter 5, book 1) 18hrs**;** Marks: Minimum 14

Book for Study:

1. Introduction to electrodynamics -David .J .Griffiths

Books for Reference:

1. Electromagnetic field theory fundamentals - Bhag Guru & Huseyin Hiziroglu
2. Feynman lectures on Physics Volume II
3. Principles of Physics : Resnick, Halliday , Walker and Jeans

BSc (Physics): Core VII-Theory

5B07PHY: Thermal Physics

Semester-5, Credit-3, Contact hours -54, Max. Ext. Marks – 40, Max. Int. Marks-10

Module I: Fundamental concepts

Macroscopic and microscopic point of view, thermal equilibrium- zeroth law-concept of temperature-intensive and extensive parameters - thermodynamic equilibrium - equation of state (Chapters 1&2, book 1) 5hrs Marks: Minimum 2

Module II: Work, heat and first law of thermodynamics

Concept of work, heat, internal energy, concept of path and state function, first law of thermodynamics- Isothermal process, adiabatic, isochoric and isobaric process. work done in

isothermal, adiabatic and isobaric processes- p-v diagrams-equations for isothermal and adiabatic process-first law of Thermodynamics for various process—Kinetic theory of ideal gases-postulates-pressure exerted by gases, kinetic interpretation of temperature, r.m.s speed, internal energy, law of equipartition of energy(no derivation), specific heats of gases, Mayers relation (Chapters3, 4 & 5, Book 1) 10 hrs Marks: Minimum 10

Module III: Heat engines and second law of thermodynmics

Conversion of work into heat and vice-versa, principle of heat engines , cyclic process, Carnot engine and its efficiency, gasoline engine and its efficiency, Diesel engine and its efficiency ,principle of two stroke engine, refrigerator, coefficient of performance, second law of Thermodynamics-Kelvin-Planck and Clausius statements and their equivalence. Reversible and irreversible process- Carnot theorem and its corollary. (Chapter 6&7 Book 1)15 hrs Marks: Minimum10

Module IV: Entropy and thermodynamic potentials

Concept of entropy, Second law and entropy, change in entropy in irreversible and reversible process,clausius inequality, entropy of an ideal gas, entropy and disorder, heat death, Temperature-Entropy diagram, T-S diagram of Carnot cycle hence equation for efficiency - Thermodynamic potentials-Internal energy, Enthalpy, Helmholtz free energy, Gibbs function, Maxwells relations, applications of Maxwell equations (1)T ds equations (2) Clausius - Clapeyron equation (3) Joule-Thomson expansion, Joule-Thomson coefficient for ideal and Vander Waal gases. (Chapters 10 & 11 Book 1)18 hrs. Marks: Minimum 12

Module V: Statistical mechanics

Statistical equilibrium-entropy and probability-phase space-Maxwell-Boltzmann distribution-Bose-Einstein distribution-Fermi-Dirac distribution (no derivation)-Fermi level-comparison of this three distribution functions-Black body radiation-Planck radiation law (qualitative idea) Stefan's law (Chapter 9 Book 2) 6hrs; Marks: Minimum 6

Books for study:

1. Heat and Thermodynamics-Mark W Zemansk,Richard H Dittman (seventh Edn.)

2. Concepts of Modern physics-Arthur Beiser (fifth Edn.)

Books for Reference:

1. Heat and thermodynamics-D.S.Mathur

2. Thermodynamics and Statistical physics –BriJ Lal, N.Subrahmanyam and P.S.Hemne (multi colour edn.7)

3. A treatise on heat-Maghanad Saha

4. Thermodynamics, Kinetic Theory, Statistical –Thermodynamics –Francis W.Sears & Gerhard L Salinger.

BSc **(Physics): Core VIII-Theory**

5B08PHY: Classical mechanics & Relativity

Semester-5, Credit-3, Contact hours -54, Max Ext. Marks- 40, Max. Int. marks-10

Module 1: Relativity (16hrs) (Book 1, Ch.3)

Background of Michelson-Morley Experiment-Inertial and non-inertial frames—Ether hypothesis- Postulates of special relativity—Lorentz transformations—Consequences: length contraction—time Dilation-Simultaneity—Addition of velocities-variation of mass with velocity- relativistic energy: mass – energy relation with examples—electron-positron annihilation-nuclear energy-energy and momentum-transformation of momentum and energy-particles with zero rest mass-binding energy-force in relativistic mechanics. (Minimum marks: 13)

Module 2: Linear and Angular momentum (18hrs) (Book 1, Ch.6)

Linear momentum- Conservation of linear momentum –Centre of mass –Velocity of Centre of mass –Centre of mass frame- Centre of mass of thin uniform rod and triangular lamina-collision of two particles-deflection of moving particle by a particle at rest-impact-loss of kinetic energy during impact-Angular momentum and Torque- Conservation of angular momentum- Relation connecting total angular momentum and angular momentum about Centre of mass-Examples of conservation of angular momentum-spin and orbital angular momentum (Minimum marks:13)

Module 3: Potentials and Fields (12hrs) (Book 1, Ch.7)

Central force- Inverse square law force-Superposition principle- Potential energy of a system of charges and masses- Gravitational field and potential-Velocity of Escape-satellite in circular orbit- Electric field and potential- Gravitational potential and field due to i) thin spherical shell ii) Solid sphere- Potential and field due to conducting sphere- gravitational and electrostatic self energy- Kepler's laws with proof (Minimum marks:10)

Module 4: Lagrangian formulation (8hrs) (Book 2, Ch.3)

Constraints- Holonomic and non Holonomic constraints - Generalized Coordinates-D'Alembert's principle- Lagranges equation. simple examples (Minimum marks: 4)

Books for study:

1. Mechanics – J.C.Upadhyaya

2. Mechanics – R.G.Takwale and P.S.Puranik

Books for reference:

1. Classical Mechanics – J.C.Upadhyaya

2. Classical Mechanics -Goldstein

3. Mechanics-D.S.Mathur

4. Concepts of Modern Physics (6^{th} Edn) ----Arthur Beiser –TMH Edn.

BSc (Physics): Core IX-Theory

Core IX: 5B09PHY Python programming

Semester-5, Credit-3, Contact hours-54, Max. Ext. Marks- 40, Max. Int. marks-10

Module I: Programming in Python (23hrs)

Getting started with python-Variables and data types-operators and their precedence-python strings-Slicing-python lists-mutable and immutable types-input from the key board-iteration: while and for loops-condition execution: if, elif and else-modify loops-line joining-functions-python modules and packages-file input/output-formatted printing-exception handling-turtle graphics. (Min.Marks.12)

Module II:(7 hrs)

Arrays and matrices: The NumPy Module - creating arrays and Matrices- copying - arithmetic operations- cross product- dot product -saving and restoring-Matrix inversion. (Min.Marks.8)

Module III: (7 hrs.)

Data visualization: The Mathplotlib Module- plotting mathematical functions-famous curves-power series-Fourier series-2D plot using colors. (Min.Marks.7)

Module IV :(15 hrs)

Numerical methods: Derivative of a function- numerical integration - ordinary differential equation – polynomials -finding roots of an equation - system of linear equations - least square fitting-interpolation.(Min.Marks.13)

Books for study:

1.Python for Education: by Ajith kumar B.P ; freely downloaded from the site: **http://expeyes.in/python-programming**. Also Published by Calicut University Central co-operative stores. Installation of GNU/LINUX which contains in built python interpreter are mentioned in detail in the above book. To install Python in windows operating system: Go to the link **http:// www.python.org.**

Books for reference:

1. Write your first program by Amit Saha
2. Programming computer vision with Python by Jan Erik Solem
3. A Primer on scientific Programming with Python by Hans Petter Langtangen ; Springer
3. Python tutorial release 2.6.1 by Guido Van Rossum, Fred L Drake. Jr; Freely downloaded from http://www.altway.com/resources/python/tutorial.pdf
4. http://www.greenteapress.com/thinkpython/
3. http://swaroopch.com/notes/python/

BSc (Physics): Core X-Theory

5B10PHY: Atomic, Nuclear & Particle physics

Semester-5, Credit-3, Contact hours-54, Max. Ext. Marks- 40, Max. Int. marks-10

Module 1: Atomic Structure (Marks: Min. 8)

The nuclear atom, Rutherford scattering, electron orbits, atomic spectra, the Bohr atom, energy levels and spectra, correspondence principle, nuclear motion, atomic excitation - Franck-Hertz experiment, spontaneous and stimulated emission processes.

11 Hrs. (Book 1, Chapter 4)

Module 2: Many- Electron Atoms (Marks: Min. 8)

Electron spin, exclusion principle - Stern- Gerlach experiment, periodic table, atomic structures, atomic structure and chemical behaviour, spin-orbit coupling schemes – L-S and J-J coupling, total angular momentum, X-ray spectra.

11 Hrs. (Book1, Chapter 7)

Module 3: Nuclear Structure (Marks: Min. 8)

Nuclear composition, nuclear properties, nuclear stability, nuclear binding energy, liquid drop model, the semi-empirical mass formula, shell model, meson theory of nuclear forces.

11 Hrs. (Book1, Chapter 11)

Module 4: Nuclear Transformations (Marks: Min. 8)

Radioactive decay, half-life, radioactive series, alpha decay, beta decay, gamma decay, scattering cross section, nuclear reactions, nuclear fission, nuclear reactors, nuclear fusion, energy production in stars, fusion reactors.

11 Hrs. (Book1, Chapter 12)

Module 5: Elementary Particles (Marks: Min. 8)

Interaction of charged particles, leptons, hadrons, baryons and mesons, particle quantum numbers, quark structure of hadrons, the eightfold way, fundamental interactions and exchange particles.

10 Hrs. (Book1, Chapter 13)

Book for Study:

1.Concepts of Modern Physics - Sixth Edition, Arthur Beiser, Tata McGraw-Hill, New Delhi

Books for Reference:

1. Modern Physics - Kenneth Krane (John Wiley & Sons)
2.Atomic Physics - Christopher J. Foot (Oxford University Press, Cambridge)
3.Nuclear Physics - S N Ghoshal (S Chand and Co.)
4.The Atomic Nucleus - R D Evans (Mc Graw Hill, New York)
5.Modern Physics - G Aruldhas & P Rajagopal (PHI, NewDelhi)
6.Atomic and Nuclear Physics by S Sharmahatendra(Pearson)

BSc (Physics): Core XI-Theory

6B11PHY: Electrodynamics-II

Semester-6, Credit-3, Contact hours-54, Max. Ext. Marks- 40, Max. Int. Marks-10

Module 1: Magnetostatic Fields in Matter:

Magnetization – Torques and forces on magnetic dipoles –Effect of a magnetic field on atomic orbits –Magnetization –The field of a magnetized object –Bound currents –Physical interpretation of bound currents –The magnetic field inside matter-The auxiliary field H-Amperes law in Magnetized material –Deceptive parallel–Boundary conditions-Linear and Nonlinear Media-magnetic susceptibility and permeability –Ferromagnetism

(Chapter 6, Book 1) 12hrs; Marks: Minimum 9

Module 2: Electrodynamics:

Ohm's law - Electromotive force – Motional e.m.f - electromagnetic induction-Induced electric field - Inductance –self inductance and mutual inductance –Inductance of coupled coils – Energy in a magnetic field –Electrodynamics before Maxwell-How Maxwell fixed Ampere's law– Maxwell's equations – 'Magnetic charge' –Maxwell's equations inside matter - -boundary conditions- Conservation laws-Charge and energy-The continuity equation – Poynting's theorem- Newton's third law in electrodynamics – potential formulations of electrodynamics – Scalar & vector potentials- Gauge transformations-Coulomb Gauge and Lorenz Gauge .

(Chapters 7,8 &10, Book 1) 20hrs; Marks: Minimum 16

Module 3: Electromagnetic Waves:

Introduction –The wave equation in one dimension – Sinusoidal waves –Boundary conditions – Reflection and transmission – Polarization - Electromagnetic waves in vacuum- The wave equation for E & B –Monochromatic plane waves –Energy and momentum in electromagnetic waves –Propagation in linear media –Reflection and transmission at normal incidence.

(Chapter 9, Book 1) 12hrs; Marks: Minimum 7

Module 4: Applications of Static Fields & Time Varying Electromagnetic Fields:

Deflection of a charged particle –Cathode ray oscilloscope –Electrostatic generator-Electrostatic voltmeter –Magnetic separator –Magnetic deflection –Cyclotron-The velocity selector and mass spectrometer –The Hall Effect –Magneto hydrodynamic generator –An electromagnetic pump – A direct current motor- Applications of electromagnetic fields – The auto transformer -The Betatron. (Chapters 6&7, Book 2) 10hrs; Marks: minimum 8

Books for study:

1. Introduction to electrodynamics -David .J.Griffiths
2. Electromagnetic field theory fundamentals - Bhag Guru & Huseyin Hiziroglu

Book for Reference:

1. Feynman lectures on Physics: Volume-II.

BSc (Physics): Core XII-Theory

6B12PHY: Photonics & Spectroscopy

Semester-6, Credit-3, Contact hours-54, Max. Ext. Marks- 40, Max. Int. Marks-10

Module-1: Lasers: Stimulated absorption-Spontaneous emission-Stimulated emission-Einstein Coefficients-Main components of Laser (1.Active medium 2.Pumping source 3.Optical resonator).Population inversion-cavity life time-Threshold condition-Optical resonator-Line broadening mechanisms (Doppler broadening, Natural Broadening, Collisional Broadening-qualitative ideas) - Laser characteristics - Ruby Laser, He-Ne Laser.(Book 1)

CO_2 Laser-Dye Laser- Semi-conductor laser-applications of laser (Book 2)

20Hrs/ Minimum marks: 13

Module-2: Holography: Introduction - Theory of holography - Requirements for the construction of a good hologram - Applications of holography (Book 1). 6Hrs/Minimum marks: 5.

Module-3: Fibre Optics: Introduction-Total internal reflection-The Optical Fiber - Numerical aperture-Attenuation in optical fibres-Single mode and multi mode fibres-Ray dispersion in Optical fibers-Ray dispersion in Step-index Fibers, Parabolic index fibers, Material dispersion-Fiber -optic sensors(Book 1,) 12Hrs/ Minimum marks: 10.

Module-4: Spectroscopy: Regions of the spectrum-Microwave spectroscopy-The rotation of molecules-Rotational spectra-The rigid diatomic molecule-Intensities of spectral lines-The effect of isotopic substitution-The microwave oven (Book 3) 8Hrs/ Minimum marks: 6.

Module-5: Infrared spectroscopy: The vibrating diatomic molecule-The energy of diatomic molecule-The Simple Harmonic Oscillator - The Anharmonic Oscillator-The diatomic Vibrating Rotator-The vibration-rotation spectrum of carbon monoxide.(Book 3) 8Hrs/Minimum marks: 6

Books for Study:

1. Optics 3rd edition- Ajoy Ghatak,Tata McGraw Hill Publishing Company Ltd.

2. Lasers-Theory and Applications-K.Thyagarajan and A.K.Ghatak,Macmillan India Ltd.

3. Fundamentals of Molecular Spectroscopy-Colin N.Banwell and Elaine M.McCash,Tata McGraw-Hill Publishing Company Ltd.

Books for reference:

1. Laser Fundamentals 2nd edition-William.T.Silfast,Cambridge University Press.

2. Photonics and Lasers - Richard.S.Quimby, John Wiley & Sons(Asia)Pte Ltd.

3. Optical Electronics-Ajoy Ghatak and K.Thyagarajan,Cambridge University Press.

BSc (Physics): Core XIII-Theory

6B13PHY: Quantum mechanics

Semester-6, Credit-3, Contact hours-54, Max. Ext. Marks- 40, Max. Int. Marks-10

Module 1: Origin of Quantum Theory (12 hours)

The Limits of Classical Physics-Planck's Quantum Hypothesis- Einstein's theory of Photoelectric effect- Compton Effect- Quantum theory of Specific heat- Bohr atom model of Hydrogen atom- Existence of Stationary states- Wilson Somerfield Quantization rule- Elliptical orbits of hydrogen atom- The harmonic oscillator- Particle in a box- The Correspondence Principle- Inadequacy of quantum Theory

(Book 1 Chapter 1) Minimum marks: 12

Module 2: Wave Mechanical Concepts (8 hours)

Wave nature of particles- The uncertainty Principle- the Principle of Superposition- Wave packet- expectation value- operators- Time dependent Schrodinger equation- interpretation of wave functions- Ehrenfest' theorem.

(Book 1 Chapter 2) Minimum marks: 6

Module 3: Eigen Functions and Eigen Values (10 hours)

Time independent Schrodinger Equation- Stationary states-Admissibility conditions on the wave functions –Eigen Functions and Eigen Values, Postulates of Quantum Mechanics-Simultaneous measurability of observables

(Book 1 Chapters 2 & 3) Minimum marks: 7

Module 4: One dimensional Energy Eigen value problems (10 hours)

Square well potential with rigid walls - Square well potential with finite walls - square potential barrier - tunnel effect - Alpha emission - Scanning tunnelling microscope - Linear Harmonic Oscillator - Schrodinger method - free particle

(Book 1 Chapter 5) Minimum marks: 7

Module 5: Hydrogen Atom (14 hours)

Schrodinger equation for the hydrogen atom, separation of variables, quantum numbers, principal quantum number, orbital quantum number, magnetic quantum number, Zeeman effect, electron spin, exclusion principle, Stern - Gerlach experiment.
(Book 2, Chapters 6 & 7) Minimum marks: 8.

Books for study:

1. Quantum Mechanics – G Aruldhas (PHI Learning New Delhi)
2. Concepts of Modern physics – Arthur Beiser (John Wiley & Sons Inc)

Books for reference:

1. Quantum Physics Of Atom, Molecules, Solids, Nuclei & Particles By R.Eisberg &R. Resnick (John Wiley)
2. Quantum physics – Stephen Gasiorowicz (John Wiley & Sons, Inc)
3. Modern Physics – Kenneth S Krane (John Wiley & Sons Inc)
4. Quantum mechanics by B.H.Bransden & C.J.Joachain (Pearson)

BSc (Physics): Core XIV-Theory

6B14PHY: Electronics- II

Semester-6, Credit-3, Contact hours-54, Max. Ext. Marks-40, Max. Int. marks-10

Module 1: AC analysis of BJT circuits and small signal amplifiers (Marks: Min. 6)
Coupling and bypass capacitors, AC load lines, transistor models, r-parameters, h-parameters, CE circuit analysis, Frequency response - Logarithms, decibels, Bode plot, Single stage CE amplifier, Capacitor coupled and Direct coupled two stage CE amplifiers.

10 Hrs. (Book 1, Chapters 6 & 12)

Module 2: Feedback in amplifiers, signal generators and power amplifiers (Marks: Min. 10)

Types of feedback-Series voltage negative feedback - advantages, Concept of positive feedback, Barkhausen criterion, Phase shift, Hartley, Colpittts and Wien bridge Oscillators, Audio power amplifiers - Transformer coupled Class A, Class B and Class AB amplifiers, Class C tuned amplifier. 16 Hrs. (Book 1, Chapters 13, 16 & 19)

Module 3: Operational Amplifiers and its applications (Marks: Min.8)

Integrated circuit operational amplifiers, Differential and common mode operation, CMRR, Ideal Operational Amplifier, Op-Amp 741, Voltage follower circuits, Inverting, Non inverting, Summing and Differential amplifier circuits using Op-Amps, Integrator and differentiator circuits using Op-Amps. 12 Hrs. (Book 1, Chapter 14)

Module 4: Standard forms of Boolean Expressions (Marks: Min. 10)

The SOP and POS forms, Conversion of a general expression to SOP and POS, converting standard SOP to POS and vice versa, Boolean Expressions and Truth Tables, Karnaugh Map (up to 4 variables), Karnaugh Map SOP and POS minimization.10 Hrs. (Book 2, Chapter 4)

Module 5: Functions of combinational logic (Marks: Min. 6)

Basic Adders - Half Adder, Full Adder, Parallel Binary Adder, 4 Bit Parallel Adder, Comparators, decoders, encoders. 6 Hrs. (Book 2, Chapter 6)

Books for Study:

1. Electronic Devices and Circuits- 5th Edition, David A Bell (Oxford)
2. Digital Fundamentals- 8th Edition, Thomas L. Floyd (Pearson Education PHI)

Books for Reference:

1. Op-Amps & Linear Integrated Circuits- Ramakant A. Gayakwad (PHI)
2. Electronic Devices and circuit theory - Robert L Boylestad & Louis Nashelsky (PHI)
3. Principles of Electronics - V K Mehta (S Chand & Co.)
4. Electronic Principles - A P Malvino (TMH)
4. The Art of Electronics - Paul Horowitz and Winfield Hill (Cambridge University Press)
5. Digital Principles and Applications - D P Leach and A P Malvino (TMH)

BSc (Physics): Core XV Elective-Theory

6B15PHY(Elective):A. Plasma physics

Semester-6, Credit-3, Contact hours-54, Max. Ext. Marks- 40, Max. Int. Marks-10

Module 1: Plasma State. (8 hrs)

Natural plasma, Concept of temperature, Debye shielding, Fundamental concepts, Criterion of Plasma.(Minimum marks:5)

Module 2: Production of plasma (10 hrs).

Production of plasma through collisions, production of plasma through photo ionization, production of plasma through thermal ionization, Ionization by exploding wire method, Plasma production by laser.(Minimum marks: 8)

Module 3: Plasma Diagnostics (8 hrs).

Single probe method, Double probe method, Magnetic probe, Microwave method, Microwave radiation method, Spectroscopic method. (Minimum marks:5)

Module 4: Single particle Orbit theory (10 hrs.)

Particle in a uniform magnetic field, Particle in the uniform electric and magnetic fields, Particle in a uniform force and a uniform magnetic field, Curvature drift, Particle in a non-uniform magnetic field, Magnetic mirrors, Particle in a non-magnetic electric field and uniform magnetic field.(Minimum marks:8)

Module 5: Fluid Description of plasma (8 hrs.).

Relation of plasma physics and electro magnetism, Equation of motion for fluid, Fluid drifts perpendicular to $\bar{B}$, Fluid drifts parallel to $\bar{B}$,Plasma approximation (Minimum marks:6)

Module 6: Waves in a Fluid plasma (10 hrs.).

Representation of waves, Group velocity of a wave, Linearization of equations, Plasma oscillations, Electron plasma waves, Sound waves, Ion waves, Validity of plasma approximation.(Minimum marks:8)

Book for study:

1.Text book of plasma physics-Suresh Chandra(CBS publishers and distributors)

Books for reference:
1.Introduction to Plasma physics and controlled fusion- Francis .F.Chen (Springer)
2.Plasma Physics –Sen.

BSc (Physics): Core XV Elective-Theory

6B15PHY(Elective): B. Astronomy & Astrophysics

Semester-6, Credit-3, Contact hours -54, Max. Ext. Marks -40, Max. Int. Marks-10

Module 1: Our Galaxy—Introduction—the general structure of the Galaxy—Cosmic rays—continuous radio emission in the galaxy.
6Hrs. (Book Ch.16) (Minimum marks: 6)

Module 2: Absolute magnitude—Apparent magnitude—The colour-index of a star—Luminosities of stars—Stellar parallax (Trigonometric) and the units of stellar distances—

Stellar positions: The celestial coordinates
8Hrs. (Book 1, Ch 3) (Minimum marks: 7)

Module 3: Planck's theory of Blackbody radiation—Pressure of radiation—Continuous, Absorption & Emission spectra—Kirchoff's laws—Doppler effect—Zeeman effect
7 Hrs. (Book 1 Ch 2) (Minimum marks: 6)

Module 4: Harvard system of spectral classification: The H-D Catalogue—H-R diagram
7Hrs (Book 1 Ch 4) (Minimum marks: 6)

Module 5: The sun—the photosphere: Limb-Darkening—Solar granulation—Faculae—the Chromosphere—Solar corona—11 year solar cycle and sunspots—Solar magnetic fields—solar flares—radio emission from sun—solar wind.
14Hrs(Book1 Ch 5) (Minimum marks : 8)

Module 6: Neutron stars—Pulsars—Black holes—Comets—Asteroids—Meteorites-Red shift and expanding Universe 12Hrs
(Book1 Ch.15)(Minimum marks: 7)

Book for study:

1. An Introduction to Astrophysics- Baidyanath Basu

Book for Reference:
1.50 ideas you really need to know—Joanne Baker—Quercus
(www.quercusbooks.co.uk)
2. Astrophysics for Physicists- Arnab Raichoudhuri—Cambridge
3. An introduction to modern Astrophysics-ley w. Carrol& Dale A. Ostlie(Addison Wesley Longman)
4. Astrophysics Stars and Galaxies- K D Abhyankar

BSc (Physics): Core XV Elective-Theory

6B15PHY(Elective): C.Atmospheric Physics

Semester-6, Credit-3, Contact hours -54, Max. Ext. Marks-40, Max. Int. marks-10

Module 1: Basic ideas (8 Hrs.)

Planetary atmosphere-Equilibrium temperature - Hydrostatic equation - Adiabatic rate-Sandstorm's theorem. (Min.marks.5)

Module 2: Radiative equilibrium model (10 Hrs.):

Black body radiation - Atmospheric windows - Absorption and emission - Radiative equilibrium in atmosphere - Radiative time constants - Green house effect. (Min. Marks:8)

Module 3: Atmospheric thermodynamics (10 Hrs.):

Entropy of dry air-vertical motion of saturated air-the Tephigram - total potential energy of air column -available potential energy- Zonal & eddy energy. (Min.marks:7)

Module 4: More complex radiation transfer (10 Hrs.):

Solar radiation- Its modification by scattering-Absorption of solar radiation by Ozone-Absorption by single line-transmission of atmospheric path-integral equation of transfer-Global radiation budget. (Min.marks:8)

Module 5: Atmospheric optics (8 Hrs.):

Visibility - Attenuation of light-Turbidity - Optical phenomena - Rainbows-Haloes-corona-glory-mirage-atmospheric refraction-atmospheric scattering-Raleigh and Mie scattering (basic ideas). (Min. Marks:6)

Module 6: Clouds (8 Hrs.)

Cloud formation-cloud classification—low clouds-precipitating clouds-middle clouds-high clouds-the growth of cloud particles-the radiative properties of clouds-radiation transfer in clouds-cloud radiation feed back. (Min.Marks:6)

Book for study:

1.Physics of atmosphere by John Houton (third edition Cambridge University press)

Books for Reference:

1.Introduction to theoretical Meteorology by S.L.Hess

2.An introduction to atmospheric Physics by D.G.Andrews

3.Meteorology - Understanding the atmosphere by Steven A Ackerman and John A Knox.

BSc (Physics): Core XV Elective-Theory

6B15PHY(Elective):D.Nanoscience

Semester-6,Credit-3,Contact hours- 54 ,Max. Ext. marks-40, Max.Int. marks-10

Module I: Introduction to Nanotechnology (10hrs)
Comparison of bulk and nano materials – change in band gap and large surface to volume ratio, Classification of nanostructured: Zero, One Two and Three dimensional Nanostructures-Size effect and special properties of Nanoparticles. **(Chapter 3, Text 1)** (Minimum marks: 8)

Module II: Band Structure and Density of State at nanoscale: (6hrs) Energy Bands, Density of States at low dimensional structures. **(Chapter 3, Text 2)** (Minimum marks: 4)

Module III: Growth techniques of nanomaterials (Elementary ideas only): (10hrs)

Top down vs bottom up techniques, Lithographic process, Non Lithographic techniques: Plasma arc discharge, sputtering. Evaporation: Thermal evaporation, Electron beam evaporation. Chemical Vapour Deposition (CVD). Pulsed Laser Deposition, Molecular Beam Epitaxy, Sol-Gel Technique, Electro-deposition., Ball-milling. **(Chapter 6, Text 2)** (Minimum marks: 8)

Module IV: Properties of nanoparticles(6hrs)
Composite structure - Surface characteristics - mechanical property – Electrical properties (Section 1.11.3 excluded) – Magnetic properties –optical properties. **(Chapter 1, Text 4)** (Minimum marks: 4)

Module V: Methods of Characterization (9hrs)
Structure- Atomic Structures - Crystallography- Particle Size Determination- Surface Structure-Microscopy-Transmission Electron Microscopy- Field Ion Microscopy- Scanning Microscopy. **(Chapter 3, Text 3)** (Minimum marks: 7)

Module VI: Applications of nanotechnology**:** (Elementary ideas only) **(9hrs)**

Potential applications, Expected benefits from nanotechnologies, Can nanotechnology helps in addres sing various challenges?, Energy and Energy Efficiency, new energy producers, Medicine, security, Other Applications. **(Chapter 5, 6, 7 &8, Text 1).** (Minimum marks: 7)

Module VII: Impact of Nanotechnology (4hrs)
Societal impact of nanotechnology, Social and ethical impact, Health and environmental impact, Risks with nanotechnology, Indian Scenario in nanotechnology. **(Chapter 11, Text 1).** (Minimum marks: 2)

Books for Study:
1. Nanotechnology: Technology Revolution of 21st Century, Rakesh Rathi, S Chand & Company, New Delhi.
2. Introduction to Nanoscience & Nanotechnology by K. K. Chattopadhyay and A. N. Banerjee, Publisher: PHI Learning and Private Limited
3.Introduction to Nanotechnology, Charles P. Poole, Jr. and Frank J. Owens, Wiley,2003
4.Nanoparticle Technology Handbook – M. Hosokawa, K. Nogi, M. Naita, T. Yokoyama (Eds.), Elsevier 2007
Book for References:
1. "Nanotubes and nanowires", C.N.R. Rao and A. Govindaraj, RSC Publishing, 2005.
2. T. Pradeep, "Nano: The Essentials", Tata-McGraw Hill Publishers 2007.
3. Encyclopaedia of Materials Characterization, Surfaces, Interfaces, Thin Films, Eds. Brundle, Evans and Wilson, Butterworth – Heinmann, 1992
4. Springer Handbook of nanotechnology, Bharat Bhushan (Ed.), Springer-Verlag, Berlin, 2004
5. Nano Science and Technology, VS Muraleedharan and A Subramania, Ane Books Pvt. Ltd, New delhi
6. A Handbook on Nanophysics, John D, Miller, Dominant Publishers and Distributors, Delhi-51
7. Nano-and micro materials, K Ohno *et. al*, Springer International Edition 2009, New Delhi.

BSc (Physics): Core XV Elective-Theory

6B15PHY(Elective):E. Material science

Semester-6, Credit-3, hours-54, Max. Ext. Marks-40, Max.Int. Marks-10

Module I- Materials Science:

Introduction-Materials Science-Levels of structure- Classification of engineering materials – Metallurgy- Selection of Materials.

(Book 1, Chapter 1) 6hrs; Marks: Minimum 4

Module II- Properties of Materials:

Introduction-Physical properties-Types of Mechanical properties – thermal properties-electrical properties-dielectric properties-magnetic properties-fabrication characteristics

(Book1, Chapter2) 10hrs; Marks: Minimum 6

Module III -Imperfections in solids:

Introduction-Crystal Growth- undercooling - homogenous nucleation- heterogenous nucleation- dendritic growth-grains-single crystal & polycrystals -Types of imperfections-Point Defects- line defects- surface defects- volume defects- Sources of Dislocation - Movement of dislocation- Solidification of crystalline materials.

(Book1, Chapter 4) 16hrs; Marks: Minimum 12

Module IV-Solid solutions:

Diffusion in solids- Diffusion couple-Definitions of terms-Classification of diffusion process-Mechanism of diffusion- Fick's laws of diffusion- Applications of diffusion-Solid solutions-Alloys –Ferrous and non-ferrous alloys (brief /qualitative).

(Book1, Chapters 5,12) 10hrs; Marks: Minimum 8

Module V- Engineering Materials:

Semiconducting materials- semiconductor devices- Insulating materials- Polarization in an insulating material- dielectric strength- Ferroelectric material- Magnetic materials-classification of magnetism in magnetic materials-Magnetic hysteresis-classification of magnetic materials -–Organic materials- organic compounds- polymers- polymerization-strengthening mechanism of polymers-plastics-thermoplastics- thermosetting plastics-synthetic rubbers- composite materials- Ceramics- glasses- smart materials- nano materials-optical fibres- super alloys –Biomaterials - Materials for hip joint replacement. (Book2, PartIV) 12hrs; Marks: Minimum 10

Books for study:

1. Metallurgy and Materials science-[Revised Second Edition, 2012] S Jose and E V Mathew (Pentagon Educational services, Kollam)
2.Materials Science- R S Khurmi and R S Sedha [Fifth revised and enlarged Edition 2007,

Reprint 2008], (S Chand).

Books for references:

1. Materials science and engineering- V Edn- V Raghavan (PHI)
2. Materials Science- G K Narula, K S Narula and V K Gupta (TMH).

BSc (Physics): Core XV Elective- Theory

6B15PHY(Elective):F. Computational physics

Semester-6, Credit-3,Contact hours-54 ,Max.Ext.Marks-40,Max.Int. Marks-10

Module 1: Introduction to C programming (10 hrs)

Type declaration-Arithmetic instructions-Variables-Logical statements-Important statements Graphics related to physics-Gotoxy-Setcolor-Setfilstyle-Rectbv angle-Line-Poly-Drawpoly-Delay- Settextstyle-Outtextxy –Move to (Book 1; Chapter 1 & 2)

Marks: Minimum 7

Module2: Introduction to Fortan-77 language (10 hrs)

Characters, data types, operators and expressions, built in FORTRAN functions-type declaration statement-if and go to statement-do loops-arrays (Book 2; Chapter 2 & 3)

Marks: Minimum 7

Module 3: Numerical approach to physical problems (12 hrs)

Euler method-Feynman-Newton method- Runge Kutta method - Predictor corrector method-Fourier analysis (Book 1; Chapter 3)

Marks: Minimum 8

Module 4: Simulations in physics using C language (12 hrs)

Freely falling bodies-Body falling through viscous medium-Projectiles-Motion of satellites-Harmonic oscillator-Damped harmonic oscillator-Forced oscillations-Travelling pulse-Superposition of waves-Fourier analysis (Book 1; Chapter 4)

Marks: Minimum 10

Module 5: Computer problems using FORTRAN (10 hrs)

Finding even and odd numbers between given limits-minimum, maximum and range of numbers, frequency distribution of table of data, mean and standard deviation, sum of a finite series-matrix algebra-roots of a quadratic equation. (Book 2; Chapter 4)

Marks: Minimum 8

Books for study:

1. Physics through C-programming by S.Palaniswamy- Published by Pragathi Prakasan

2. Computational Physics by V.K.Mittal, R.C.Verma & S.C.Gupta-Published by Ane Books

Books for reference:

1. Introductory Methods of Numerical Analysis, S. S. Sastry (Prentice-Hall India)

2.Let us C by Yaswant Kanetkar –published by BPB Publications, B-14, Connaught place,New Delhi.

BSc (Physics): Core XVI-Practical

6B16PHY: Practical –II

Semester-5&6, Credit-4,Contact hours-72,Max. Ext. Marks-40, Max. Int. Marks-10

Note: **I.** A brief theoretical back ground of each experiment must be given to the students before each cycle of experiments and assess it (3 to 4 hrs). Students have to maintain a practical log book regularly signed by the teacher in charge and to be submitted at the time of University Examination. Fair record is not required. All the 20 experiments have to be performed.
II. Students must refer the diode/transistor/IC data manual to get details of the components in all electronic experiments.

1. Surface Tension of given liquid (water) by capillary rise method (radius using microscope)
2. Field along the axis of a coil (circular coil) - Determination of m and B_0
3. Rigidity modulus of the material -Static torsion
4. Spectrometer - grating-normal incidence
5. Spectrometer - Cauchy's constants assuming wavelengths
6. Moving Coil Galvanometer (Mirror Galvanometer) - Figure of merit
7. Ballistic Galvanometer - high resistance by leakage
8. Determination of dielectric constant using charging and discharging of a capacitor
9. Planck's constant using LED (use different colour LED's)
10. Laser - slit width and grating pitch
11. Potentiometer - Calibration of high range voltmeter
12. Conversion of a galvanometer into an ammeter and calibration using potentiometer
13. Newton's Rings - wavelength of sodium light
14. Common emitter amplifier (single stage) - frequency response and gain (by soldering)
15. Feedback circuits - voltage series and current series
16. Multi vibrator (astable) using Transistors

17. Hartley Oscillator using Transistor(by soldering)

18. Op-amp - multi vibrator (astable)

19. Construction of a voltage regulator using Zener diode after finding Zener voltage

20. Construction of a Single transistor voltage regulator

References:

1. Advanced practical physics for students by Worsnop & Flint

2. Practical Physics by Sasikumrar (PHI)

3. Core course Experimental Physics by Dr. P Sethumadhavan & Dr. A K Anila (Manjusha publication, Vol. I and Vol. II)

4. Electronics Lab Manual by Dr. K A Navas (Rajath Publishers, Vol. I)

5. Electronics Laboratory Primer by S Poorna Chandra & B Sasikala (S Chand)

6. Core Course Practical Physics I and II by C J Babu & K Vijayalakshmi (Calicut University Central Co-Operative Stores).

BSc (Physics): Core XVII-Practical

6B17PHY: Practical-III

Semester- 5&6, Credit-4, hours-72, Max.Ext. Marks-40, Max.Int. marks-10

Note: **I**.A brief theoretical back ground of each experiment must be given to the students before each cycle of experiments and assess it (3 to 4 hrs). Students have to maintain a practical log book regularly signed by the teacher in charge and to be submitted at the time of University Examination. Fair record is not required. All the 20 experiments have to be performed.

II. Students must refer the diode/transistor/IC data manual to get details of the components in all electronic experiments.

1. Spectrometer: i - i^1 curve
2. Spectrometer - grating- minimum deviation
3. Ballistic Galvanometer - absolute capacity of a capacitor
4. Ballistic Galvanometer - ballistic constant using solenoid inductor
5. Energy band gap of a semiconductor (semiconductor diode in forward bias)
6. Air Wedge - Diameter of a thin wire
7. Carey Foster's Bridge - Temperature coefficient of resistance
8. Potentiometer - Resistance and resistivity
9. Potentiometer - Reduction factor of TG and B_o
10. Power amplifier - Frequency response and band width

11. Phase Shift Oscillator using Transistor
12. Bridge Rectifier- study of ripple factor with and without filter (by soldering)
13. Op-amp - inverting and non-inverting amplifier, voltage follower
14. Op-amp - differentiator & integrator
15. Wein Bridge Oscillator using IC 741
16. Realization of logic gates using transistors(by soldering)

Computer Programming using python*

1. Solution of equations by bisection method (square root of a number)
2. Solution of equations by Newton - Raphson method (cube root of a number)
3. Numerical Integration - Trapezoidal and Simpson's $1/3^{rd}$ rule
4. Solution of differential equation Runge - Kutta method (Harmonic Oscillator)

*****Students must be encouraged to use Linux operating system.

Books for Reference:

1. Practical Physics by Sasikumrar (PHI)
2. Core course Experimental Physics by Dr. P Sethumadhavan & Dr. A K Anila (Manjusha publication, Vol. I and Vol. II)
3. Electronics Lab Manual by Dr. K A Navas (Rajath Publishers, Vol. I and Vol. II)
4. Electronics Laboratory Primer by S Poorna Chandra & B Sasikala (S Chand)
5. Python for Education by Ajith Kumar B P (Calicut University Central Co-Operative Stores)
6. Core Course Practical Physics I and II by C J Babu & K Vijayalakshmi (Calicut University Central Co-Operative Stores).

BSc (Physics): Core XVIII

6B18PHY: Project

Semester- VI,

Credit-2,

Contact hours/week: 2 hrs.

Max. Ext. Marks -20,

Max. Int. Marks -5.

To be done under the guidance of a teacher.

Topics for project must be selected with the guidance of the concerned teacher**.**

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Syllabus

Complementary (Physics) Courses

Complementary (Physics) course I-Theory

1C01PHY: Mechanics

Semester-1, Credit-2, Contact hours -36, Max. Ext. Marks- 32, Max. Int. marks-8

Module 1 Elasticity :(7hrs)

Hooke's law- modulii of elasticity- Poisson ratio-relations connecting elastic constants- and Poisson's Ratio, Bending of Beams-Bending Moment, Cantilever, Transverse vibrations of a loaded cantilever, Uniform and Non-uniform Bending, Twisting Couple on a cylindrical rod-Torsional Oscillations, Work done in twisting a rod.

(Chapters 1& 2- Book 1). (Minimum marks: 7)

Module 2 Wave Motion: (7hrs)

General equation of wave motion, plane progressive harmonic wave, characteristics of progressive harmonic wave -energy density-potential and kinetic energies-Transverse waves in stretched strings-Modes of vibration-Longitudinal waves in rods and gases, Stationary waves-flow of energy

(Chapter 11- Book1). (Minimum marks: 7)

Module 3 Harmonic Oscillator: (10hrs)

Periodic motion-Simple harmonic Motion –differential equation of SHM- characteristics of SHM- Energy of Simple harmonic oscillator- examples of SHM- Torsion pendulum-Anharmonic oscillator-Compound Pendulum-**(Chapter 9- Book1)**

Damped Harmonic oscillator - Q Factor, examples of Damped harmonic oscillator- Forced Harmonic oscillator- (Qualitative Ideas) - **(Chapter 10 – Book 1)**.

(Minimum marks: 8)

Module 4 Rigid Body Motion: - **(6hrs)**

Rigid body-Torque- Centre of mass, radius of gyration- Angular Momentum, Moment of Inertia-Parallel Axis Theorem-Perpendicular Axis Theorem-Moment of inertia of thin Rod, Circular Disc, Annular Ring, Cylinder and Sphere. Moment of inertia of fly wheel

(Chapter 8 - Book 1). (Minimum marks: 5)

Module 5 Quantum Mechanics: - (6hrs)

De Broglie waves, wave-particle duality, Davisson – Germer experiment, Uncertainty Principle verification. Postulates of wave mechanics - time dependent and time independent Schrödinger equation, Particle in a box.

(Chapters 3 & 5 – Book 3). (Minimum marks: 5)

Books for study:

1. Mechanics – J.C. Updhyaya

2. Mechanics - D.S.Mathur

3. Concepts of Modern Physics –Arther Beiser

Books for reference:

1. Feynman lectures on Physics by Richard Feynman

2. Fundamentals of Physics by Resnick & Haliday

Complementary (Physics) course II-Theory

2C02PHY: Electricity, Magnetism and Thermal Physics

Semester-2, Credit-2, Contact hours -36, Max. Ext. Marks- 32, Max. Int. Marks-8

Module 1: Electrical Measurements (4hrs)

Carey Foster bridge-Theory-Determination of Resistance, resistivity and temperature coefficient-Potentiometer-theory- Calibration of Ammeter- Calibration of Voltmeter (low & High Range)- **(Book 1, Ch.7).** (Minimum marks: 5)

Module 2: Magnetic effect of electric current (10hrs)
Magnetic flux-Lorentz force-Biot-Savart law- Magnetic induction at a point due to a straight conductor carrying current- Magnetic induction at a point on the axis of a circular coil- force on a current carrying conductor-Torque on a current loop in a uniform magnetic field- Theory of moving coil Ballistic Galvanometer -Damping Correction -Comparison between B.G and dead –beat Galvanometers. Current and voltage sensitivities **(Book 1, Ch.10).** (Minimum marks: 8)

Module 3: Transient currents (4hrs)
Growth and Decay of current in LR circuit- Growth and Decay of charge in CR circuit- Time Constant- Growth and Decay of charge in LCR Circuit-Resonant frequency. **(Book 1, Ch.12).** (Minimum marks: 5)

Module 4: Introduction and First Law of Thermodynamics (10hrs)

Thermal Equilibrium- Zeroth law concept of Heat and temperature- Thermodynamic processes – Internal energy and first Law of Thermodynamics-applications of I law, specific heat of gas - Isothermal, Adiabatic Isochoric and Isobaric processes- Work done during isothermal and adiabatic processes-relation between isothermal and adiabatic elasticities. **(Book 2, Ch. 6)** (Minimum marks: 8)

Module V: Second law of thermodynamics (8hrs)

Irreversible and reversible process- Second Law of Thermodynamics –Carnot's reversible Engines- Carnot cycle-working and efficiency, - Refrigerator- Carnot's Theorem Definition-entropy(qualitative ideas only). **(Book 2, Ch.6)** (Minimum marks: 6)

Books for study:

1. Electricity and Magnetism(2008th edition)-R.Murugeshan

2 Heat and Thermodynamics(16th edition) by Brijlal and Subrahmanyam

Books for reference:

1. Electricity and Magnetism-D.N .Vasudeva

2. Heat and Thermodynamics-D.S.Mathur.

Complementary (Physics) course III-Theory

3C03PHY: Optics and Photonics

Semester-3, Credit-2, Contact hours -54, Max. Ext. Marks- 32, Max. Int. marks-8

Module – 1: Interference (13 Hours) Marks: Mini. 7

Interference of light-Conditions for sustained interference of light waves-Theory of interference fringes--Conditions for maximum and minimum intensities- Colours of thin films (Interference by reflected light only)-Wedge shaped film-Newton's Rings by reflected light-Determination of wave length of sodium light and refractive index of a transparent liquid by Newton's rings(Book-1)

Module - 2: Diffraction (13 Hours) Marks: Mini. 7

Fresnel and Fraunhofer diffraction - Fresnal's Explnation of Rectlinear Propagation of light-Zone plate-Diffraction at a straight edge – Construction and theory – Diffraction at a straight edge- Fraunhofer diffraction –Fraunhofer Diffraction at a single slit –Plane Transmission Grating – Dispersive power of a Grating – Determination of wavelength of light using Transmission Grating. (Book-1)

Module - 3: Polarization (10 Hours) Marks: Mini. 6

Introduction – Polarization of light – Polarization by Reflection –Pile of plates –Law of Malus –Double Refraction – Uniaxial crystals –Nicol prism –Quarter Wave plate-Half wave plate-Production and detection of plane, circularly and elliptically (Book-1)

Module - 4: Laser Physics (6 Hours) Marks: Mini. 4

Introduction- Induced absorption-Spontaneous emission-Relation between Einstein's A&B coefficients-Principle of Laser-Ruby laser-Helium –Neon laser-Semiconductor laser-Properties of a laser beam.(Book – 2 Chapter 19)

Module -5: Molecular Physics (6 Hours) Marks: Mini. 4

Raman Effect-Discovery- Experimental study of Raman Effect –Quantum theory of Raman effect-Raman effect and fluorescence- Applications.(Book 1 Chapter 5)

Module – 6:Fibre optics (6 Hours) Marks :Mini . 4

Introduction – Fibre Construction – Light propagation in Fibres – The coherent bundle – Fibre optic Communication Systems – Advantage of fibre optic Communication systems – Fiber optic sensors. (Book- 1 Chapter 8)

Books for study:

1. Optics and Spectroscopy (Third edition) –R.Murugeshan (S Chand &Company)

2 .Modern Physics –R. Murugeshan (S.Chand & Company)

Books for reference:

1. Feynman lectures on Physics by Richard Feynman

2. Fundamentals of Physics by Resnick & Haliday

Complementary (Physics) course IV-Theory

4C04PHY: Modern Physics and Electronics

Semester-4, Credit-2, Contact hours -54, Max. Ext. Marks- 32, Max. Int. Marks-8

Module 1: Nuclear Physics (13 Hours) Marks: Mini. 8

Natural Radio activity – Fundamental laws of Radioactivity – Law of Radioactivity Disintegration – The Mean life – Measurement of Decay constants – Radioactive Dating – Biological effects of Nuclear Radiations – Nuclear Fission – Energy released in Fission – Chain Reaction – Nuclear Reactors – Nuclear Fusion – Sources of stellar energy.

(Book 1 –Chapter 31)

Module 2: Astrophysics and Particle Physics (12 Hours) Marks :mini . 7

Introduction – Classification of stars – H R Diagram – Luminosity of a star – Stellar Evolution **–** Black Holes – Supernova Explosion.

(Book 1 Chapter -78)

Particle Physics: Introduction – Particles and Anti- particles – Leptons- Hadrons – Idea of Quarks. (Book 1 Chapter 2)

Module 3 : Material Physics (8 Hours) Marks : Mini.5

Defects in crystals : Introduction – Classification of crystal Defects - Point defects – Vacancies – Interstitialcies – Impurities – Line defects – Edge dislocation – Screw dislocation – Surface defects – Effects of Crystal imperfections.

Module 4 : Electronics (13 Hours) Marks :Mini. 8

Single stage transistor amplifiers – Classification of amplifications – CE amplifier – Characteristics – Principle of feedback amplifiers – Amplifiers with negative and positive feedback and advantages.

Oscillator – oscillatory circuit – Essentials of a feedback LC oscillator – tuned oscillator – Hartley oscillator.

Integrated circuits – Advantages and drawbacks of ICs – Classification of ICs by function- Linear integrated circuits and digital integrated circuits.

(Book -2 Chapter 22,25,28&31)

Module 5: Digital Electronics (8 Hours) Marks : Mini .4

Decimal Number system – Binary number system – Conversion of decimal number into binary number – Logic gates OR-AND-NOT Gates – Half Adder – Full Adder

(Book – 1 Chapter 70, 71)

Books for study:

1 . Modern Physics – R .Murugeshan and Kiruthiga Siva Prasath. (13th Edition)

2 . Basic Electronics – Solid state – B..L. Thereja

Book for reference:

1. Concepts of Modern Physics – Arthur Beiser.

Complementary (Physics) course V-Practical

4C05PHY: Practical

Semester-1,2,3&4, Credit-4, Contact hours -72, Max. Ext. Marks- 32, Max. Int. Marks-8

Note: A brief theoretical back ground of each experiment must be given to the students before each cycle of experiments & assess it (3 to 4 hrs). Students are to maintain a practical log book regularly signed by the teacher in charge. Fair record not required. All the experiments are to be done.

1. Flywheel- Moment of inertia
2. Compound pendulum-determination of g
3. Torsion pendulum- Moment of inertia of a disc
4. Young's modulus of the material of bar -Uniform Bending using optic lever
5. Young's modulus of the material of bar – using pin and microscope
6. Liquid Lens: (a) Refractive index of a liquid and material of the lens with mercury

   (b) Refractive index of a liquid and material of the lens with another liquid of known refractive index
7. Spectrometer – Refractive index of the material of a prism
8. Spectrometer –Dispersive power of a prism
9. Spectrometer –grating-normal incidence
10. Surface tension-Determination of surface tension of given liquid
11. Air Wedge-Diameter of a thin wire
12. Newton's Rings- wavelength of sodium light
13. Deflection Magnetometer –Tan A and Tan B
14. Searle's Vibration magnetometer- moment and m_1/m_2
15. Circular coil- Determination of B_0
16. Carey Fosters Bridge- resistance &resistivity
17. Potentiometer- resistance &resistivity
18. Potentiometer- Conversion of given galvanometer into voltmeter
19. Potentiometer- Calibration of ammeter
20. Newton's law of cooling- Specific heat of a liquid
21. Half wave Rectifier- study of ripple factor with and without filter

22. Zener diode voltage regulator (V_z given)

23. Logic gates using diodes

24. Common base transistor characteristics

Books for reference:

1. Advanced practical physics-S.P.Singh-vol-I

2. Advanced practical physics-S.P.Singh-vol-II

3. Geeta Sanon, BSc Practical Physics, 1st Edn. (2007), R. Chand & Co.

4. B. L. Worsnop and H. T. Flint, Advanced Practical Physics, Asia Publishing House, New Delhi.
5. Indu Prakash and Ramakrishna, A Text Book of Practical Physics, Kitab Mahal, New Delhi.
6. D. P. Khandelwal, A Laboratory Manual of Physics for Undergraduate Classes, Vani Publication House, New Delhi.
7. Nelson and Jon Ogborn, Practical Physics.

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Syllabus

Open Course (Physics)

OPEN COURSE (PHYSICS) -Theory

5D01PHY: A. Environmental Physics

Semester-V, Credit-2, Contact hours -36, Max. Ext. Marks- 20, Max. Int. marks-5

Module 1:- The Forces of Nature (4 Hrs)

Fundamentals-Newtonian Mechanics-Forces-Action and Reaction-Motion-SI Units-Friction and Air Resistance-Gravity-Newtonian Gravity-Universal gravity-Big G and little g.

(Marks: Minimum 3)

Module 2:- Energy (6 Hrs)

Kinetic Energy and Potential Energy-Electrical Power-Renewable Energy-Hydro Electric Power and Potential Energy-Wind Power-Tides and Tidal Power-Energy Storage- Trophic Levels-Biomass Energy (Marks: Minimum 3)

Module 3: - Heat and Radiation (8 Hrs)

Transmission of Heat-Convection-Conduction-Heat in buildings-Heat balance in animals and plants-Engines-Thermal power stations-The Carnot's Cycle-Geo thermal power-Solar water heaters-Radiation-Electromagnetic Spectrum-Transmission, absorption and reflection of Radiation-Radiation from hot objects-Black bodies (Marks:Minimum 4)

Module 4:- Solids, Liquids and Gases (3 Hrs)

Hydrology and Hydrogeology-Hydrological processes-Darcy's law-Ground warer flow-Contaminant transport in groundwater. (Marks: Minimum 2)

Module 5:-The Earth's Climate and Climate Change (9Hrs)

The earth's climate-The atmosphere-General circulation of the atmosphere-Weather disturbances-clouds-Ocean currents-The Ozone layer-Climate change-The earth's radiation balance--,albedo and green house effect-Green house warming-Ice ages and colder climates-sea level-climate modelling-predicting change. (Marks: Minimum 5)

Module 6 :-Sound and Noise (6 Hrs)

Sound waves-Music-Ultra sound-Propagation of sound and acoustics-The Doppler effect-Apparent frequency expression (derivation not required) Measuring sound-The Decibel-Noise and noise nuisance-Human perception of sound and noise-Noise levels-Controlling noise.(Marks: Minimum 3)

Book for Study:

1. Environmental Physics by Clare Smith (Routledge Publications)

Books for Reference:

1. Environmental Science by Daniel Chiras

2. Environmental Science by Michael LMc Kinney and Robert M Schoch

3. Principles of environmental Science by William P Cunningham and Marry Ann Cunningham

Open(Physics) Course -Theory

5D01PHY: B. Joy of star watching

Semester-V, Credit-2, Contact hours -36, Max. Ext. Marks- 20,Max. Int. marks-5

Module 1: Astrophysics

The study of the Universe - Problems and prospects. The Universe - its origin-_Galaxies__Milkyway. A star is born. The death of a star. The comets–The pole star
(Book 1) (14 Hrs)(Marks: Minimum 7)

Module 2: The constellations

Orion- Canis major-Taurus—Leo-(Book 2) (2 Hrs)
(Marks: Minimum 2)

Module 3: Stars in kerala culture

The origin and expansion of Astrology -Stars and constellations in Kerala culture- (12 Hrs)
(Marks: Minimum 6)

Module 4: Star watching

How to experience star watching — For a better view (Book 2) (8 Hrs) (Marks: Minimum: 5)

Book for study:

1. The Great Universe- G.K.Sasidharan- S.Chand

2. Joy of star watching – BimanBasu- National Book Trust , India.

Book for reference:

1.Jyothishavum Jyothisasthravum- K. Pappootty-K.S.S.P.

Open (Physics) Course-Theory

5D01PHY: C. Disaster Management

Semester-V, Credit-2, Contact hours -36, Max. Ext. Marks- 20, Max. Int. marks-5

Module 1 Global warming: Challenges for food security.2Hrs (Ch.3)

Landslide Disasters and its management: Introduction—Nature of landslides—causes of landslides—Factors that lead to a reduction in the shear resistance on a slope—steps towards hazard reduction—Vulnerability adjustments—Forecasting and warning—Land use planning—conclusion. 5Hrs. (Ch.4)

(Marks: Minimum 4)

Module 2 Flood Disaster: Its Impact, Challenges and Management 3 Hrs. (Ch.5)

Earthquake Hazard Management: Introduction—Methods to be adopted for Hazard reduction—conclusion 4Hrs.(Ch.6)

(Marks: Minimum 4)

Module 3: Temporal Transport Hazard Dynamics 3 Hrs. (Ch.7)

Fire Hazard Management in Urban areas: Introduction—Nature of fire—for fire Mitigation the rules to be followed are—issue of no objection certificates—Public co-operation—Information required about fire/rescue emergency—conclusion.
6 Hrs. (Ch.15)

(Marks: Minimum 6)

Module 4: Future Applications and challenges of Remote sensing, GPS and GIS in Disaster Management. 6 Hrs. (Ch.16)

Impact of Tsunami on Coastal zones 4Hrs (Ch.23)

Challenges and opportunities to Disaster Management.3 Hrs.(Ch. 24)

(Marks: Minimum 6)

Book for study:

1. Disaster Management—Future challenges and opportunities----Jagbir Singh (L.K. International publishing House Pvt. Ltd. Bangalore)

Open (Physics) - Course Theory

5D01PHY: D. Biophysics

Semester-V, Credit-2, Contact hours -36, Max. Ext. Marks- 20, Max. Int. marks-5

Module 1 Bio-mechanics: 12 Hrs, Marks: Min – 7

Types of muscles- striated, cardiac, tonic muscles, properties of muscles-Excitability – conductibility-contractibility – extensibility – tonicity – structure of striated muscles – Newton's laws – centre of mass – Bio-mechanical analysis of movements of snakes – swimming of fishes – aerodynamic basis of flights (Book-1 Chapter 12)

Module 2 Radiation bio-physics: 12 Hrs, Marks: Min - 6

X-rays – Production and uses – Natural and artificial Radioactivity - Properties of α,β and γ radiations – Half life –Units of radioactivity – Biological effects of radiation – Radiation Detectors – Electrometer (Book 2)

Module 3 Bio – medical instrumentation: 12 Hrs,Marks: Min 7

Basic principle of lasers and its medical applications – Qualitative ideas of ECG, VCG, EEG, NMR imaging, CT scan and ventilators - Foetal heart rate measurement with direct foetal ECG (FECG) – Labour activity monitoring (Book 3&4)

Books for study

1 Introduction to Bio-Physics by Pranab Kumar Banerjee (S Chand)
2 Modern Physics by B L Theraja (S Chand)
3 Hand book of Bio-Medical instruments by R S Khanpur (Tata MacGraw Hill)
4 Medical Bio- Physics by R N Roy – (Books and allied (P) Ltd

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Sd/
Dr.P.V.Kunhikrishnan,
Chairman,Board of Studies,UG(Physics),
Kannur University.

KANNUR UNIVERSITY

Model Question papers-UG (Physics)

- **Core (Physics) courses**
- **Complementary (Physics) courses**
- **Open (Physics) courses**

(With effect from 2014 admissions)

KANNUR UNIVERSITY

Core I: Model Question paper-1B01PHY-PHYSICS PRIMERS

FIRST SEMESTER BSc DEGREE EXAMINATION

Course title: Core I- 1B01PHY: PHYSICS PRIMERS

Reg. No…….. Code:
Name …….. Programme: BSc (Physics)

Time: 3 Hrs Max .Marks: 40

Write answers only in English

Section A

(Answer **ALL**- Very short answer type- Each question carries ONE mark)

1. The mass energy equivalence is expressed through the relation ----------

2. The expression for the velocity of longitudinal waves in a solid rod is----------

3. General equation of wave motion is----------.

4. The estimated mass of Higgs boson in terms of energy ----------

SECTION B

(Answer any **Seven**-Short answer type- Each question carries **Two** marks)

5. Define Curl of a vector Field? What is its physical significance?

6. What is Fourier theorem? Explain its importance.

7. In SHM when the displacement is one half the amplitude, what fraction of the total energy are kinetic and potential?

8. What are Lissajous figures?

9. Prove that if the scalar product of three vectors vanishes, the vectors are coplanar?

10. What is meant by energy current of a progressive wave? Write down its expression.

11. What is the importance of Higgs boson in the history of physics?

12. State Planck's quantum hypothesis.

13. What is Gauss Divergence theorem?

14. What is the loop hole in the Standard model of physics?

Section C

(Answer any FOUR-Short essay/problem type- Each question carries 3 marks)

15. A body of mass M connected with a massless horizontal spring of force constant k is set in to simple harmonic motion. Derive an expression for the time period.

16. Express the velocity of a particle in cylindrical coordinates.

17. Discuss the importance of standard model in Physics.

18. If in air a plane wave of frequency 256 Hz and amplitude .001mm is produced, calculate the radiated energy per unit volume and the energy current. Velocity of sound 332m/s and density of air 1.29 kg/m^3

19. A thin rod of length 60cm is used as compound pendulum. Find the position of a point such that the period about it is a minimum.

20. Prove that div (curl F) = 0

SECTION D

(Answer any **TWO-**Long essay type**-** Each question carries 5 marks)

21. Derive an expression for the velocity of longitudinal waves in a gas and discus Laplace's correction.

22. State and prove Stokes theorem.

23. Derive an expression for the time period of a compound pendulum. Draw a graph between length of the pendulum and square of the time period. How will you calculate value of g from the graph?

24. What is meant by standard model in high energy physics? Discuss about various particle families in the standard model. Write short notes on Higgs mechanism.

KANNUR UNIVERSITY

Core II: Model Question paper-2B02PHY-ELECTRONICS –I

Reg. No…….. Code:
Name ……..

SECOND SEMESTER BSc. DEGREE EXAMINATION
Programme: BSc (Physics)
Course title: Core II- 2B02PHY-- ELECTRONICS - I
Time : 3 Hours Max. Marks: 40

Section A

(All questions are to be answered- Very short answer type- Each question carries 1 mark)

1. Emitter current = Collector current +…….
2. In common Base connection the saturation region is defined as that region of the characteristics to the left of V_{CB} = ……v.
3. 1's compliment of 1001 is …….
4. …….is a Universal gate

Section B

(7 questions are to be answered. Short answer questions- Each question carries 2 marks)

5. Explain the working of a p-channel enhancement type FET.
6. Explain the operation of BJT
7. What are signed numbers?
8. Write De Morgan's theorem.
9. What is the need of biasing a transistor?
10. Define α of a transistor. Show that it is always less than unity.
11. Sketch the output characteristics of JFET
12. Realize Ex-OR gate using NAND and NOR gates
13. Explain the statement- 'The phase difference between the output and input voltages of a CE amplifier is 180^0'
14. Compare n channel JFET and p channel JFET.

Section C

(Four questions are to be answered-Short essay/problem type- Each question carries 3 marks)

15. What is meant by dc load line of a transistor circuit? Sketch the model of a dc load line and show the Q-point saturation point and cut off.
16. Explain the need for the stabilization of operating point.
17. What are the JFET parameters? Obtain the relation between them.
18. In a self bias n- channel JFET, I_D=1.5 mA, V_{DS}=10 V. The parameters I_{DSS}=5mA and V_P=-2V.Find the value of R_S, given V_{DD}=20V
19. Convert decimal 65,535 to its hexadecimal and binary equivalents.
20. Add these 8-bit numbers: 0101 0111 and 0011 0101. Then, show the same numbers in hexadecimal notation.

Section C

(Two questions are to be answered-Long essay type- Each question carries 5 marks)

21. Design a voltage divider circuit by drawing necessary figures.
22. Explain combinational logic circuits using NAND and NOR logic circuits.
23. Describe how a transistor works as an Amplifier. Draw necessary figures and graphs.
24. What are Binary coded decimals? How two BCD numbers are Arithmetically operated

KANNUR UNIVERSITY

Core III: Model Question paper-3B03PHY-ALLIED PHYSICS

THIRD SEMESTER BSc DEGREE EXAMINATION

Programme: BSc (Physics)

Reg. no. : …….. Code:

Name: ……

Course title: Core III- 3B03PHY: Allied Physics

Time: 3 Hours Max. Marks: 40

Write answers in English only

Instructions :

1. Section A: Answer all questions (Very short answer type, Each question carries 1 mark)
2. Section B: Answer any seven questions (Short answer type-Each question carries 2 marks)
3. Section C: Answer any four questions (Short essay/problem type -Each question carries 3 marks)
4. Section D: Answer any two questions (Long essay type-Each question carries 5 marks)

Section A

1. What is the maximum number of possible Bravais lattices?
2. Packing fraction of face centered cubic structure is ……
3. What is the unit of coefficient of viscosity?
4. A practical current source will have …… internal resistance

(4x1 = 4)

Section B

5. State Hooke's law and explain the stress-strain diagram.
6. Show that potential energy per unit volume of a strained wire is U= ½ stress x strain.
7. Derive Stoke's formula.
8. Derive the expression for excess pressure inside a soap bubble.
9. State and prove maximum power transfer theorem
10. With reason state which of the following sets is suitable for obtaining rapid growth and decay of current in L-R circuit: a) L= 10mH and R= 100ohm b) L=1mH and R= 1000 ohm
11. Give description about a parallel LC resonance circuit
12. What are point groups and space groups?
13. State and explain Kirchoff's law.
14. State and prove Bernoulli's theorem.

(7x2 = 14)

Section C

15. What are symmetry operations? Show that five- fold rotational axis is not permissible in the case of lattices.
16. State and explain Thevenin's theorem
17. What amount of energy will be liberated, if 1000 droplets of water each 10^{-6} cm in diameter coalesce to form one large spherical drop? Assume the surface tension of water to be 0.075N/m.
18. Two equal drops of water are falling through air with steady velocity of 5cm/s. if the drops coalesce, what will be the new terminal velocity?
19. Calculate the Poisson's constant for steel, given that Young's modulus is $2x10^{11}$ N/m^2 and rigidity modulus $8x10^{11}$N/m^2
20. What are Miller indices?

(4x3 =12)

Section D

21. What is stream line flow? Obtain the Poiseuille's formula for the rate of flow of liquid through a narrow tube.
22. What is x-ray diffraction? Explain powder method.
23. Derive an expression for the couple per unit twist on a cylindrical rod.
24. Derive the expression for growth of charge in an LCR circuit and explain the different conditions for oscillations.

(2x5=10)

KANNUR UNIVERSITY

Core IV: Model Question paper-4B04PHY-OPTICS

Reg. no……..... Code:

Name……

FOURTH SEMESTER B.Sc DEGREE EXAMINATION

Programme: BSc (Physics)

Course title: Core IV 4B04 PHY – OPTICS

Time: 3Hrs Maximum Marks: 40

Write answers in English only

SECTION A

(Answer all questions- Very short answer type- Each carries 1mark)

1.The thin lens formula for a biconvex lens is ……

2. The Cosine law in interference is ……

3. The functioning of a zone plate is similar to a …….

4. A Quarter wave plate is one whose path difference between ordinary and extraordinary Wave is……

SECTION B

(Answer any Seven Questions-Short answer type- Each carries 2 Marks)

5. What is a Translation Matrix? Explain the symbols in it.

6. Define Unit planes and Nodal planes.

7. Distinguish between Interference by division of wave fronts and amplitudes.

8. Explain the colour of thin films.

9. Mention two similarities and dissimilarities of a zone plate and a convex lens.

10. Write down the expression for the resolving power of a grating and explain the symbols.

11. State the Brewster's law.

12. State the Malus's law.

13. Describe how a circularly polarized and elliptically polarized light are distinguished.

14. Give the principle of quarter wave plate and half wave plate.

SECTION C

(Answer any Four Questions-Short essay/problem- Each carries 3 Marks)

15. Explain the principle of a highly reflecting film.

16. Show the graphical variation intensity of the Diffraction pattern of a straight edge.

17. Explain the working principle of a Nicol Prism.

18. A lens of thickness 1 cm made of glass with refractive index 1.5 is placed in air. The radii of the two surfaces are4 cm each. Find the system Matrix and the focal length of the lens.

19.In Michelson's Interferometer one mirror has to be moved through a distance 0.07mm and 210 fringes crosses the field of view. Determine the wavelength of the light.

20. In double slit Fraunhoffer diffraction pattern the screen is 1.6m away from the slits. The slit widths are 0.08mmandthey are 0.4mm apart. Calculate the wavelength of light If the spacing of the fringes are0.25cm.

SECTION D

(Answer any Two Questions-Long essay type-Each carries 5 Marks)

21. What are Newton's rings ? With proper theory explain how the wavelength of a Monochromatic light may be determined by this method?

22. Through matrix method explain the image process by a coaxial optical system.

23. With proper theory explain the two slit Fraunhoffer diffraction pattern and obtain the conditions of maxima minima.

24. What are Fresnel's half period zones? Explain the Diffraction by a circular aperture by the concept of half period zones.

KANNUR UNIVERSITY

Core VI: Model Question paper-5B06PHY-ELECTRODYNAMICS-I

FIFTH SEMESTER BSc DEGREE EXAMINATION

Reg. No. : ……..

Name: ……

Time: 3 Hours Max Marks: 40

Course title: Core VI- 5B06PHY-ELECTRODYNAMICS-I

Write answers in English only

Instructions:

1. Section A: Answer all questions (Very short answer type, Each question carries 1 mark)

2. Section B: Answer any seven questions (Short answer type-Each question carries 2 marks)

3. Section C: Answer any 4 questions (Short essay/problem type-Each question carries 3

marks)

4. Section D: Answer any two questions (Long essay type-Each question carries 5 marks)

Section A

1. Write $\nabla.(\frac{\hat{r}}{r^2})$ in terms of Dirac delta function.
2. Write the expression for electric field at a separation r due to an infinite plane sheet with charge density σ.
3. The electric analogue to a bar magnet is known as ……..
4. Magnetic field strength outside an infinitely long closely wound solenoid is ……

(4x1 = 4)

Section B

5. State Coulomb's law. Write Coulomb's law for different continuous charge distributions
6. State Gauss law in electrostatics. Give the importance
7. Obtain the expression for the potential of a localized charge distribution
8. Deduce Gauss's law in presence of dielectric in integral form
9. Explain electrostatic boundary condition
10. Find the electric field inside a uniformly charged sphere (charge density ρ) using Gauss law.
11. Define the term a) Atomic polarizability and b) Molecular polarizibility
12. What are the basic properties of a conductor?
13 .Define a) susceptibility, b) permittivity c) dielectric constant in the case of linear dielectrics.
14. Write comments on Maxwell's equations for a) electrostatics, b) magneto statics

(7x2 = 14)

Section C

15. Find electric field at a distance z above the midpoint of a straight line segment L, which carries a uniform line charge λ.
16. Find the energy of a uniformly charged solid sphere of radius R and charge density ρ
17. Obtain the expression for approximate dipole potential at large distance and deduce the expression for dipole field.
18. Find the magnetic field at a distance z above the centre of a circular loop of radius R, which carries a steady current I.
19. Find the capacitance per unit length of two coaxial metallic cylindrical tubes of radii *a* and *b*
20. Apply Ampere's law for determining magnetic field strength inside
    a) long solenoid of 10 turns per cm and carrying a current of 2A
    b) toroidal coil having 2turns per mm and diameter 50cm

(4x3 =12)

Section D

21. Define electrostatic field and potential. Show that a) $curl\ E = 0$ and b) $E = -\nabla V$
22. What are bound charges? Give physical interpretations.
23. State and explain Biot- Savart's law. Obtain the expression for magnetic force per unit length between two long straight wires carrying a steady current *I*
24. Derive the expression for curl B, and div B using Biot-Savart law

(2x5 =10)

Core VII: Model Question paper-5B07PHY- THERMAL PHYSICS

FIFTH SEMESTER BSc DEGREE EXAMINATION

Programme: BSc (Physics) **Code:**

Course title: CORE VII 5B07-THERMAL PHYSICS

Write answers in English only

Time: 3hrs Marks: 40

SECTION A

(Answer all the questions- Very short answer type- Each carries 1 mark)

1. Name the process in which dq = dU.
2. Change in entropy in an irreversible process is ----------.
3. Slope of isochoric curve on TS diagram is ----------.
4. Change in Gibbs function in process like sublimation, fusion etc is ----------.

SECTION B

(Answer any 7 questions -Short answer type- Each carries 2 marks)

5. Explain the concept of internal energy function.
6. Calculate the work done in isobaric expansion.
7. What is meant by adiabatic free expansion?
8. Explain the working of two stroke engine.
9. What is the more effective way of increasing thermal efficiency of Carnot engine?
10. Prove that entropy is a state function.
11. Distinguish between bosons and fermions.
12. How does melting point of ice changes with the change in pressure?
13. Prove that pressure exerted by ideal gas is 2/3 of its energy density.
14. Calculate the efficiency of Otto engine if adiabatic compression ratio is 8.

SECTION C

(Answer any 4 questions-Short essay/problem type, Each carries 3 marks)

15. Calculate the work done in quasi static adiabatic expansion.

16. A liquid is irregularly stirred in an insulated container and thereby experiences a rise in temperature. If the system is a liquid, A) Has heat been transferred? B) Has work been done? C) What is the sign of dU?

17. Ocean contains enormous amount of internal energy, can a ship run by using this energy? In the tropics, water near the surface is warmer than deep water. Would an engine is operating between this two levels?

18. A Carnot engine absorbs 100 J of heat absorbed from heat reservoir at the normal boiling point of water and rejects heat to reservoir at temperature of triple point of water. Find heat rejected, work done and efficiency.

19. One gram molecule of a gas expands isothermally to twice its initial volume. Calculate change in entropy.

20. Prove that enthalpy remains constant in throttling process.

SECTION D

(Answer any two questions-Long essay type- each carries 5 marks)

21. State postulate of kinetic Theory. Hence derive the expression for pressure exerted by ideal gas.

22. State Kelvin Plank and Clausius statements of second law of Thermodynamics. Derive the equivalence between these two statements.

23. Describe the working of Carnot engine, Draw the TS diagram for cannot cycle. Hence derive the expression for efficiency.

24. What are thermodynamic potentials? Derive Maxwell relations from potentials.

KANNUR UNIVERSITY

Core VIII: Model Question paper-5B08PHY- CLASSICAL MECHANICS & RELATIVITY

FIFTH SEMESTER BSc DEGREE EXAMINATION

Reg. No.: **Code:**
Name:

Programme: BSc (Physics)

Course title: Core VIII: 5B08PHY – Classical mechanics & Relativity

Total marks: 40
Time: 3hrs.

Answer the questions in English only

Section A

(Very short answer type - Each carries 1 mark -Answer all 4 questions)

1. An example for conservative force is ----------
2. The trajectory of a particle in central force field where E=0 is----------
3. The four dimensional space is known as ----------
4. Mass-energy relation----------

[4x1=4 marks]

Section B

(Short answer type - Each carries 2 marks -Answer 7 questions out of 10)

5. State the postulates of special theory of relativity?
6. Explain twin paradox.
7. What is Lorentz Fitzgerald contraction?
8. Give an expression for velocity of centre of mass.
9. What do you mean by an inertial frame of reference?
10. Explain electron-positron annihilation.
11. Derive an expression for centre of mass of triangular lamina?
12. Show that a particle of zero rest mass travels with speed of light.
13. What are equipotential surfaces?
14. Define torque and angular momentum?

[7x2=14 marks]

Section C

(Short essay/problem type - Each carries 3 mark -Answer 4 questions out of 6)

15. Derive relativistic formula for variation of mass with velocity?
16. Derive the equation $E^2 = P^2 + m_0^2c^4$.
17. Calculate Velocity of escape from earth ?
18. Calculate speed of an electron with Kinetic energy 2 MeV.
19. Distinguish between Holonomic and Non Holonomic constraints.
20. Derive an expression for total energy of a particle in central force field.

[4x3=12 marks]

Section D

(Long essay type - Each carries 5 marks -Answer 2 questions out of 4)

21. State and prove Kepler's laws of planetary motion?
22. Obtain an expression for angular momentum of a system of particles. Show that angular momentum with respect to the origin of coordinate system is equal to vector sum of angular momentum of centre of mass with respect to origin and angular momentum of system with respect to centre of mass.
23. Draw energy diagram in central force field and use it to explain trajectory in central force field.
24. Derive Lagrange equation of motion using D'Alembert's principle. [2x5=10 marks]

KANNUR UNIVERSITY

Core IX: Model Question paper-5B09PHY- PYTHON PROGRAMMING

FIFTH SEMESTER BSc DEGREE EXAMINATION

Reg. No.: **Code:**
Name:
Semester: V

Programme: BSc (Physics)

Course title: Core IX-5B09PHY - Python programming

Total marks: 40
Time: 3hrs.

Answer the questions in English only

Section A

(Very short answer type - Each carries 1 mark -Answer all 4 questions)

1. The output of the following programme will be----------
```
a='hello world'
print a[3:5]
```
2. What do you mean by the term 'dynamic data typing'?
3. Write the meaning of (i) 2**3 & (ii) 5%2
4. What is the use of Numpy Module?

[4x1=4 marks]

Section B

(Short answer type - Each carries 2 marks -Answer 7 questions out of 10)

5. What are the rules associated with slicing?
6. Explain the differences between Mutable and Immutable Types.
7. What is the syntax of 'for loops'?
8. Write a programme to generate the coordinates to plot a sine wave
9. Explain how formatted printing are achieved in Python?
10. How will you plot a circle using polar ( ) function?
11. What is Newton - Raphson method for finding the roots?
12. What is the principle involved in Least Square Fitting?
13. What are (i) Spirals of Archimedes (ii) Polar Rose curves?
14. How will you compute cross product and dot product in Python?

[7x2=14 marks]

Section C

(Short essay/problem type - Each carries 3 marks -Answer 4 questions out of 6)

15. Given: s='012345'.(a) slice it to remove last two elements (b) remove first two elements
16. Write a programme to convert Fahrenheit to Celsius?
17. What will be the output of the following programme?
```
From numpy import *
a= array ([[2,3],[4,5]])
b= array([[1,2],[3,0]])
print a+b
print a*b
```
18. Write a programme to plot a circle.
19. Write a note on turtle graphics.
20. What are the different data types used in Python? Give two examples for each type.

[4x3=12 marks]

Section D

(Long essay type - Each carries 5 marks -Answer 2 questions out of 4)

21. What are the conditional executions used in Python. Illustrate with examples.
22. Create a 3x2 matrix and print the sum of its element using for loops.
23. Write the algorithm and python programme for Taylor's series.
24. Explain how least square fitting can be done using python?

[2x5=10 marks]

KANNUR UNIVERSITY

Core X: Model Question paper-5B10PHY-ATOMIC, NUCLEAR & PARTICLE PHYSICS

FIFTH SEMESTER BSc DEGREE EXAMINATION

Reg. No.: ……

Name: ……. **Code:**

Programme: BSc (Physics)

Course title: 5B10PHY- Atomic, Nuclear and Particle Physics

Time: 3 Hrs. **Max. Marks: 40**

Write answers in English only

Section A

(Answer **ALL -** Very short answer type **-** Each question carries **1** mark)

1. The missing energy that keeps a nucleus together is _____
2. Joining two light nuclei together to give a single nucleus is called _____
3. Which nuclear theory says particle exchange can produce either attraction or repulsion?
4. What is the SI unit of radioactivity?

Section B

(Answer any **SEVEN**-Short answer type- Each question carries **TWO** marks)

5. State Pauli exclusion principle
6. Differentiate L - S and j – j coupling
7. Write a note on spin orbit coupling

8. Write a note on Hadrons
9. Write a note on periodic table
10. Discuss total angular momentum
11. Differentiate spontaneous and stimulated emission.
12. Differentiate Nuclear fission and nuclear fusion
13. Write a note on nuclear decay
14. Discuss radioactive series

Section C

(Answer any **FOUR**-Short essay/problem- Each question carries **THREE** marks)

15. What is the impact parameter of a 5.0 MeV alpha particle scattered by 10^{o} when it approaches a gold nucleus?
16. Estimate the magnetic energy for an electron in the 2p state of a hydrogen atom using the Bohr model, whose n= 2 state corresponds to the 2p state.
17. Find the activity of 1 mg of radon (^{222}Rn) whose atomic mass is 222u.
18. The activity of a certain radionuclide decreases to 15 percent of its original value in 10 days. Find its half life.
19. An atom has a single electron outside closed inner shells. What total angular momentum J can the atom have if it is in P state? In a D state?
20. Find the energy and the wavelength of the K_{α} X-rays of aluminium?

Section D

(Answer any **TWO**-Long essay type-Each question carries **FIVE** marks)

21. Explain the phenomenon of large angle scattering of alpha particles and derive the Rutherford's formula for it. Describe how the size of the nucleus and nuclear model has been obtained from scattering phenomenon.
22. Discuss X ray spectra in detail.
23. Explain energy production in stars.
24. Discuss four fundamental interactions

KANNUR UNIVERSITY

Core XI: Model Question paper-6B11PHY-ELECTRODYNAMICS –II

SIXTH SEMESTER BSc DEGREE EXAMINATION

Reg. No. : …….. Code:

Name: …… Programme: BSc (Physics)

Course title: 6B11 PHY- Electrodynamics II

Time : 3 Hours Max Marks : 40

Write answers in English only

Instructions :

1. Section A : Answer all questions (Very short answer type, Each question carries 1 mark)
2. Section B : Answer any seven questions (Short answer type-Each question carries 2 marks)
3. Section C: Answer any four questions (Short essay/problem type-Each question carries 3 marks)
4. Section D: Answer any two questions (Long essay type-Each question carries 5 marks)

Section A

1. Copper is …..magnetic
2. Magnetization is ……. / ……..
3. Velocity of light in terms of μ and ε is ……
4. Write the continuity equation for charge

[4x1 = 4]

Section B

5. Show that the energy of a magnetic dipole in a magnetic field B is given by U = -m.B
6. Obtain the general boundary conditions for electrodynamics
7. Define a) magnetic susceptibility b) permeability c) relative permeability
8. Define motional e.m.f . Obtain flux rule in the case of a rectangular loop moving through uniform magnetic field
9. State and explain Ohm's law . Obtain the expression for J in terms of E
10. Write Maxwell's equation in matter a) in differential form b) in integral form
11. Explain how Newton's third law is not valid in electrodynamics
12. Give description about the working of a Cathode Ray Oscilloscope
13. What is Hall effect? Explain how it can be used to measure the magnetic flux density.
14. Describe the working principle of a Betatron

[7x2 = 14]

Section C

15. Describe diamagnetism, considering the effect of magnetic field on atomic orbits
16. Briefly describe the potential formulation of Maxwell's equations in electrodynamics
17. Obtain the expression for energy associated with magnetic field
18. A long copper rod of radius R carries a uniformly distributed free current *I*. Find H inside and outside. Comment about B inside.
19. Derive wave equation for E and B in free space using Maxwell's equations. Comment on the significance of the equation.
20. What is a cyclotron ? Obtain formula for cyclotron frequency. What is a synchro-cyclotron ?

[4x3 =12]

Section D

21. What are bound currents? Give physical interpretation.
22. Explain the inconsistency in Amperes law. How Maxwell fixed it ?
23. Derive the conservation law for energy in electrodynamics
24. Discuss about the reflection and transmission of e.m. wave at normal incidence in the case of linear media .

[2x5 =10]

KANNUR UNIVERSITY

Core XII: Model Question paper-6B12PHY-PHOTONICS&SPECTROSCOPY

SIXTH SEMESTER BSc DEGREE EXAMINATION

Course title: Core XII: 6B12 PHY – PHOTONICS&SPECTROSCOPY

Programme: BSc (Physics)

Write answers in English only

Time: 3 Hours Max. Marks: 40

SECTION-A

(Answer all the questions- Very short answer type - Each question carries 1 mark)

1. Who predicted the stimulated emission of radiation?
2. Name the first gas laser.
3. What is the wavelength of Ruby laser?
4. Who discovered the principles of Holography?

[4x1=4 marks]

SECTION-B

(Answer any 7 questions-Short answer type- Each question carries 2 marks)

5. What are the special characters of laser?
6. Explain the main components of the laser.
7. What is meant by population inversion in laser?
8. Explain the basic technique of holography.
9. What is the difference between holography and photography?
10. Mention the applications of holography.
11. Distinguish between Single mode Fiber and Multi mode Fibers.
12. What are the advantages of optical fiber over copper wires?
13. Outline the principle of working of a microwave oven.
14. Show that a molecule can never have zero vibrational energy.

[7x2=14 marks]

SECTION-C

(Answer any 4 questions-Short essay/problem type - Each question carries 3 marks)

15. Estimate whether amplification and hence laser action is possible using light of wavelength 600 nm at 500^{o}K.

16. A Ruby laser emits 0.1 J pulses of light of wavelength 720 nm. How many minimum number of Cr^{++} ions are there in Ruby?

17 .Calculate the numerical aperture and acceptance angle of an optical fiber if the refractive indices of the core and cladding are 1.48 and 1.46 respectively.

18. A step index fiber in air has NA = 0.15, core of refractive index 1.52 and diameter 50 µm. Determine the V-number of the fiber when light of wavelength 0.75µm is transmitted. Also find the maximum possible number of modes.

19. Calculate the rotational energy corresponding to J = 1 for Hydrogen molecule, given that inter molecular distance is 0.074 nm, mass of the Hydrogen atom = 1.674×10^{-27}Kg and h = 6.63×10^{-34} Js.

20. The force constant k of the bond in CO molecule is 187 Nm-1. Find the frequency of vibration of CO molecule. Mass C12= 1.99×10^{-26} Kg, mass of $O^{16} = 2.66 \times 10^{-26}$ Kg.

[4x3=12 marks]

SECTION-D

(Answer any 2 questions-Long essay type- Each question carries 5 marks)

21. What are Einstein's Coefficients? Obtain the relations between them.

22. Define acceptance angle and numerical aperture of an optical fibre. Obtain an expression for the numerical aperture in terms of refractive indices of the core and cladding.

23. Discuss the rotational spectra of a rigid diatomic molecule. Draw the rotational energy levels. Explain the effect of isotopic substitution on the rotational spectra of diatomic molecule.

24. Discuss the diatomic vibrating rotator along with its energy level diagram.

[2x5=10 marks]

KANNUR UNIVERSITY

Core XIII: Model Question paper-6B13PHY-QUANTUM MECHANICS

SIXTH SEMESTER BSc DEGREE EXAMINATION

Programme: BSc (Physics)

Course title -Core XIII: 6B13PHY QUANTUM MECHANICS

Write answers in English only

Time: 3 Hrs. **Max. Marks: 40**

Section A

(Answer **ALL**- Very short answer type- Each question carries **ONE** mark)

1. The Wilson-Somerfield quantization rule is _____
2. Express the Planck's radiation formula in terms of wavelength.
3. The time dependent Schrodinger equation _____
4. The energy of a 700 nm photon is _____ [4x1=4 marks]

Section B

(Answer any SEVEN-Short answer type**-** Each question carries **TWO** marks)

5. Why is Compton effect an evidence for the particle nature of radiation?.
6. Explain the significance of Stern-Gerlach experiment.
7. List out the basic experimental results of the photoelectric phenomena.
8. Illustrate the uncertainty principle on the basis of single-slit experiment.
9. Find the value of the normalization constant A for the wave function $\psi = Ae^{-x^2}$
10. What is the de-Broglie wavelength of an electron whose energy is 6.0 eV?
11. What are Eigen functions and Eigen values of an operator?
12. Explain the zero point energy of a harmonic oscillator.
13. Obtain the time dependent Schrodinger equation for a one dimensional problem
14. List the sets of possible quantum numbers for an n=4 hydrogen atom. [7x2=14 marks]

Section C

(Answer any **FOUR**-Short essay/problem type- Each question carries **THREE** marks)

15. Show that at very large quantum number, quantum physics approaches classical one.
16. X-rays of wavelength 10 pm are scattered from a target. (a) Find the wavelength of X-rays scattered through 45°. (b) Find the maximum wavelength present in the scattered X-rays. (c) Find the maximum kinetic energy of recoil electron.
17. Show that the zero pint energy of a linear harmonic oscillator is a manifestation of the uncertainty principle.
18. Calculate the energy levels and wave functions of a particle of mass m moving in the one-dimensional potential well defined by

$$V(x) = \infty \ for\ x < 0;\ \frac{1}{2}m\omega^2x^2 \ for\ x > 0$$

19. A sample of a certain element is placed in a 0.3 T magnetic field and suitably excited. How far apart are the Zeeman components of the 450 nm spectral line of this element?
20. A beam of 12 eV electrons is incident on a potential barrier of height 30 eV and width 0.05 nm. Calculate the transmission coefficient. [4x3=12 marks]

Section D

(Answer any **TWO**- Long essay type- Each question carries **FIVE** marks)

21. Explain the postulates Bohr with regard to hydrogen atom. Apply this theory to singly-ionized helium atom. Compare this spectrum with that of hydrogen atom.
22. Solve the Schrodinger equation for a one dimensional potential barrier. Explain alpha emission and determine the transmission coefficient.
23. Obtain wave equation for linear harmonic oscillator. Find out the eigen values and eigen functions. Draw energy levels with wave functions and probability density.
24. Derive the Schrodinger equation for hydrogen atom in spherical polar coordinates and solve for the possible stationary states. What are the quantum numbers and give their physical significance. [2x5=10 marks]

KANNUR UNIVERSITY

Core XIV: Model Question paper-6B14PHY-ELECTRONICS-II

Reg. No.: ……

Name: …….

SIXTH SEMESTER BSc DEGREE EXAMINATION

Programme: BSc(Physics)

Course title-6B14PHY: ELECTRONICS – II

Write answers in English only

Time: 3 Hrs. **Max. Marks: 40**

Section A

(Answer **ALL** - Very short answer type - Each question carries **ONE** mark)

1. For normal operation of BJT, its _____ junction should be forward biased
2. The phase difference between o/p and i/p voltages of a CE amplifier is _____
3. The ratio of ΔI_C to ΔI_{CBO} is termed as _____
4. Give the relation between α and β of a transistor

Section B

(Answer any **SEVEN**- Short answer type- Each question carries **TWO** marks)

5. What do you mean by feed back in amplifiers?
6. What happens to the gain when negative feedback is introduced?
7. What is open loop gain?
8. Sketch the common emitter output characteristics of a BJT.
9. Give Bark Hausen criterion for oscillators.
10. Draw the gate bias circuit for an n channel JFET.
11. What is meant by dc load line of a transistor circuit?
12. Sketch the model of dc load line and show the Q point, saturation point and cut off point.
13. Sketch the circuit of an op-amp integrator.
14. What are JFET parameters?

Section C

(Answer any **FOUR**- Short essay/problem type- Each question carries **THREE** marks)

15. In a CE circuit I_C = 1.5 mA, R_C = 4.7 kΩ and R_L = 56 kΩ. Calculate circuit voltage gain.
16. A transistor in CE circuit has h_{ie} = 2.1kΩ, R_1 = 68 kΩ and R_2 = 56 kΩ. Find circuit input impedance.
17. In a self bias JFET, I_D = 1.5mA, V_{DS} = 10V and V_{DD} = 20V. Find the value of R_S .
18. Calculate I_C, I_E and β_{dc} for a transistor having α_{dc} = 0.98 and I_B = 100μA.
19. Draw DC load line for an n channel JFET with R_D = 2 kΩ and V_{DD} = 22V

20. Sketch the circuit of an op-amp integrator. Write down the expression for output.

Section D

(Answer any **TWO**- Long essay type- Each question carries **FIVE** marks)

21. Discuss op-amp as differentiator.
22. Discuss class A audio power amplifier. Obtain expression for efficiency.
23. Compare the three basic BJT biasing circuits.
24. Discuss CE h parameter equivalent circuit.

KANNUR UNIVERSITY

Core XV: Model Question paper- Elective-6B15PHY-A.PLASMA PHYSICS

SIXTH SEMESTER BSc DEGREE EXAMINATION

Name: Code:

Reg. No.

Programme: BSc (Physics)

Course title: 6B15PHY (Elective) A. Plasma Physics.

Write answers in English only

Time -3 Hours Max.Marks: 40

SECTION A

(Answer all questions – Very short answer type-each carries one mark)

1. A 1 eV plasma corresponds to a temperature ----------K
2. For the isotropic Maxwellian fluid, the stress tensor P is ----------
3. The equation for drift velocity in an electromagnetic field is----------
4. In Maxwellian distribution average kinetic energy per degree of freedom is ----------

SECTION B

(Answer any seven questions –Short answer type- each carries two marks)

5. Write a short note on plasma in solar corona
6. Derive an expression for Debye length
7. Explain plasma in ionosphere
8. Write a short note on sources of errors in probe measurement
9. Discuss the principles of plasma confinement in a magnetic field
10. Write a short note on magnetic mirrors
11. Write down the complete set of fluid equations
12. Write down Maxwell's equations
13. Differentiate between phase velocity and group velocity

14. Explain plasma frequency

SECTION C

(Answer any four questions-Short essay/problem type- each carries 3 marks)

15. Explain the effect of magnetic field on mobility of electrons

16. Write a note on ionization by collision

17. Explain production of plasma by using LASER

18. With figure explain single probe method

19. Explain guiding center drift

20. Write a note on plasma approximation

SECTION C

(Answer any two questions-Long essay type- each carries five marks)

21. Discuss the concept of temperature in plasma

22. Briefly explain different methods of production of plasma

23. Derive expression for cyclotron frequency and Larmor radius for a charged particle in magnetic field. Show plasma is diamagnetic

24. Derive an expression for fluid drift parallel and perpendicular to the applied magnetic field.

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Core XV: Model Question paper- Elective-6B15PHY-B.ASTRONOMY & ASTROPHYSICS

SIXTH SEMESTER BSc DEGREE EXAMINATION

Reg. No……..
Name ……..

Time: 3 Hours Max. Marks: 40

Programme: BSc (Physics)

Course title: Core XV(Elective)- 6B15PHY-B. Astronomy & astrophysics

Write answers in English only

Section A

(All questions are to be answered- Very short answer type- Each question carries 1 mark)

1. Apparent magnitude of the brightest star Sirius is----------

2. Three thousand and six hundred arc seconds is equal to ----------degrees.
3. Name of the nearest galaxy to Milky Way is----------
4. Pulsating Neutron stars are called----------

Section B

(**Seven** questions are to be answered-Short answer type- Each question carries **2** marks)

5. Define Nadir and Zenith
6. Distinguish between Absorption and emission spectra.
7. What are cosmic rays?
8. Explain Limb darkening.
9. What are red shift and Blue shift?
10. What is colour index of a star?
11. Define 1 par sec.
12. Explain Main sequence of stars.
13. Draw H-R diagram.
14. What are Meteorites?

Section C

(**Four** questions are to be answered-Short essay/problem type- Each question carries **3** marks)

15. The Main sequence star $^{T}_{cet}$ has an apparent B Magnitude of + 4.22 and an apparent V magnitude of 3.50. What is its colour index?
16. The star Alpha Centauri has a parallax **of** P= 0.742 arcsec. Calculate its distance from the observer on earth.
17. Find the gravitational red shift suffered by a photon emitted at the stars surface. ~~675~~
18. Find the Schwarzschild radius of astar of mass M.
19. The K line of singly ionized calcium has a wavelength of 393.3 nm as measured on earth in the spectrum of one of the galaxies; this spectral line appears to have a wavelength of 401.8 nm. Determine the speed of galaxy.
20.Luminosity of a star is 10000 times that of sun and its temperature is 3000K.What is the radius of this star compared to sun when surface temperature of sun is 5800K?

Section D

(**Two** questions are to be answered-Long essay type- Each question carries **5** marks)

21. Explain Harvard system of classification of stars and describe H D catalogue.
22. Explain the different stages of a star which finally leads to a Neutron star.
23. Describe the different celestial coordinates and stellar positions.
24. Describe the structure of sun by explaining
    a) Solar granulation
    b) Faculae
    c) Chromosphere
    d)Corona
    e) Sunspots

KANNUR UNIVERSITY

Model Question paper Core XV: - Elective-6B15PHY-C.ATMOSPHERIC PHYSICS

SIXTH SEMESTER BSc DEGREE EXAMINATION

Name: Code:

Reg. No.

Programme: BSc (Physics)

Course title: Core XV(Elective) 6B15PHY: C. Atmospheric Physics

Write answers in English only

Time: 3hrs Max. Marks: 40

SECTION A

(Answer all the questions- Very short answer type- Each carries 1 mark)

1. The troposphere and mesosphere together are called…..
2. The volume mixing ratio of O_2 in the atmosphere is…..
3. What is smog?
4. The time taken by a drop of radius 1μm to fall through 1 km is…

[4x1=4 marks]

SECTION B

(Answer any seven-Short answer type- Each carries 2 marks)

5. List out four characteristics of stratosphere.
6. What is the significance of tephigram in meteorology?
7. State and explain Sandstorms' theorem.
8. Compare Raleigh scattering with Mie scattering.
9. How 'atmospheric window' influences the climate of the Earth?
10. On a cloudy day we feel hotter. Why?
11. Compare and contrast mirages with images in a mirror?
12. Explain how you can see colored bows near waterfalls or in the spray of lawn sprinkler. Can you also expect to see halos in these situations? Why?
13. Why clouds are white even though they are composed of water drops?
14. Express entropy of dry air in terms of potential temperature.

[7x2=14 marks]

SECTION C

(Answer any four-Short essay/problem type- Each carries 3 marks)

15. From the basic thermodynamic principles derive an expression for adiabatic lapse rate for a dry atmosphere.
16. Discuss the significance of 'Green house effect'.
17. If one third of the solar energy incident outside the atmosphere is were absorbed by the atmosphere, show that the average rate of temperature rise of the atmosphere is 1 K per day.
18. 'The Earth and its atmosphere when viewed as one system are in radiative balance' – Substantiate.
19. Calculate the period of oscillation of an air parcel if $dT/dz = -6.5\ K\ km^{-1}$ and T = 270 K
20. What are various mechanisms by which ozone is produced in the troposphere?

[4x3=12 marks]

SECTION D

(Answer any two-Long essay type- Each carries 5 marks)

21. Derive Hydrostatic equation from fundamental principles. Show that the atmospheric pressure decays exponentially with height.
22. Discuss the modifications of solar radiation by scattering and absorption of atmospheric constituents.
23. What are the various mechanisms by which clouds are formed? Discuss the classification of clouds with its relevance.
24. Derive integral equation for radiative transfer and calculate heating rate due to radiative processes.

[2x5=10 marks]

KANNUR UNIVERSITY

Core XV: Model Question paper- Elective-6B15PHY-D.NANOSCIENCE

SIXTH SEMESTER BSc DEGREE EXAMINATION

Reg. No.: **Code:**
Name:
Semester: VI

Programme: BSc (Physics)

Course title: **Core XV: Elective 6B15PHY- D. Nanoscience**

Total marks: 40
Time: 3hrs.

Write answers in English only

Section A

(Very short answer type - Each carries 1 mark -Answer all 4 questions)

1. One nanometer = ------- meter.
2. Particle size determination can be done by using---------technique.
3.An example for a top down approach is----------
4. Large surface to volume ratio is a characteristic of ----------materials.

[4x1=4 marks]

Section B

(Short answer type - Each carries 2 marks -Answer 7 questions out of 10)

5. Give one example for zero, one, two and three dimensional nanostructures.
6. Define quantum dots.
7. Distinguish between nano materials from their a bulk counterparts.
8. Distinguish between top down and bottom up approaches.
9. Write down the Scherrer formula for particle size determination.
10. TEM stands for what?
11. Name any three growth techniques used for nanoparticles.
12. Who made the historical statement, "There is plenty of rooms at the bottom"?
13. Give one application of nanotechnology in Medicine.
14. Name one nanoparticle used for antibacterial applications

[7x2=14 marks]

Section C

(Short essay/problem type - Each carries 3 marks -Answer 4 questions out of 6)

15. Explain how one can determine crystallite size from XRD.
16. Explain how optical properties are modified in semiconducting nanoparticles.
17. Explain the uses of SEM in the study of nanosystems.
18. Write a note on nano-bio fusion.
19. Discuss the role of Energy and Energy Efficiency by nanotechnology
20. Why nanotech weapons are superior over nuclear weapons?

[4x3=12 marks]

Section D

(Long essay type - Each carries 5 marks -Answer 2 questions out of 4)

21. Describe the modification of band structure and optical properties when transformed to nanoregime.
22. Describe any one chemical method of synthesis of nanoparticles in detail.
23. Discuss the Transmission Electron Microscopy and Scanning Microscopy for nanostructure characterization.
24.Discuss Health and environmental impact of nanotechnology.

[2x5=10 marks]

KANNUR UNIVERSITY

Core XV: Model Question paper- Elective-6B15PHY-E.MATERIAL SCIENCE

SIXTH SEMESTER BSc DEGREE EXAMINATION

Reg. No. : …….. Code:

Name: ……

Programme: BSc(Physics)

Course title: 6B15 PHY (Elective) E. Materials Science

Time : 3 Hours **Max Marks : 40**

Write answers in English only

Instructions :

1. Section A : Answer all questions (Very short answer type, Each question carries 1 mark)
2. Section B:Answer any seven questions (Short answer type-Each question carries 2 marks)
3. Section C:Answer any 4 questions (Short essay/problem type-Each question carries 3 marks)
4. Section D: Answer any two questions (Long essay type-Each question carries 5 marks)

Section A

1. …….. are inorganic compounds between metallic and non-metallic elements.
2. Name the two types of line defects.
3. Write the expression for concentration gradient in the case of diffusion couple.
4. Brass is an alloy of …… and ……

(4x1 = 4)

Section B

5. Give description about the levels of structure of materials.
6. What are the important fabrication characteristics of materials?
7. Write a note about the modern materials.

8. Compare edge and screw dislocation.

9. What is Burger's vector ? Give sketch of a Burger's vector in edge dislocation.

10. Explain the mechanism of slip.

11. What are composites ? Give the classification of composites.

12. Write a paragraph about the biomaterials.

13. Write a short note on natural rubber and synthetic rubber.

14. What are ferroelectric materials ? Give example.

(7x2 = 14)

Section C

15. How engineering materials are classified according to the chemical make-up and atomic structure?

16. List the important mechanical properties of materials.

17. What is polymerization? What are the different strengthening mechanisms of polymers?

18. What is a semiconducting material? Give the significance.

19. Explain about growth of dendrites during cooling of castings.

20. Explain magnetic hysteresis.

(4x3 =12)

Section D

21. Explain Fick's laws of diffusion. Give uses.

22. Write an essay about crystal imperfections

23. Discuss the classification of magnetic materials

24. Briefly describe the different types of organic compounds

(2x5 =10)

KANNUR UNIVERSITY

Core XV: Model Question paper- Elective-6B15PHY-F.COMPUTATIONAL PHYSICS

SIXTH SEMESTER BSc DEGREE EXAMINATION

Programme: BSc (Physics)

Course title-Core XV(Elective): 6B15 PHY.F Computational Physics

Write answers in English only

Time: 3 Hrs. **Max. Marks: 40**

Section A

(Answer ALL. Very short answer type- Each question carries ONE mark)

1. The syntax of move to ( ) statement is _____

2. The general syntax of variable declaration in Fortran is _____

3. The use of outtextxy command is _____

4. The syntax for do loop in Fortran is _____

Section B

(Answer any SEVEN-Short answer type- Each question carries TWO marks)

5. What are the various arithmetic instructions used in C?

6. What are the various text styles possible in C?

7. Write the general form of a Fortran 77 program.

8. Write a Fortran77 program to find the odd numbers between two given integers.

9. Explain the looping statement in Fortran

10. Which are the various fill styles possible in a polygon

11. Briefly explain the Euler method to solve ODE.

12. Which are the data types used in FORTRAN language?

13. Write down the algorithm used in predictor-corrector method.

14. How will you represent the matrix addition in Fortran

Section C

(Answer any FOUR-Short essay/problem type- Each question carries THREE marks)

15. Write a program to solve the differential equation for a falling body using any suitable numerical algorithm. Take the initial condition as v (0) = 0.

16. Compare the Euler method and predictor-corrector method to solve ODE.

17. Write a program to find the roots of a quadratic equation in FORTRAN.

18. Write a program to show the superposition of waves.

19. Analyze Fourier transform using C language.

20. Write a program to add two matrices of order m x n using FORTRN77 language.

Section D

(Answer any TWO- Long essay type- Each question carries FIVE marks)

21. Give a brief notes on characters, variables and functions in FORTRAN. Explain the concepts with suitable examples.

22. How motion of satellite can be represented by a program in C language

23. Find the solution of a damped harmonic oscillator using Runge- Kutta method and write the program in C.

24. Compare the flexibility of C and FORTRAN languages with the help of any problems in physics.

Model Question papers:

Complementary (Physics) courses

KANNUR UNINERSITY

Model Question paper

1C01PHY: Complementary Physics I (Mechanics)

FIRST SEMESTER DEGREE EXAMINATION

.Reg. No.: Code:

Name:

Course title: 1C01PHY – Complementary Physics I (**Mechanics)**

Programme:

Total marks: 32

Time: 3hrs.

Write answers in English only

Section A

(Very short answer type - Each carries 1 mark -Answer all 5 questions)

1. The dimensional formula for Poisson's ratio is ----------

2.One feature of SHM is ----------

3. The Uncertainty Principle was formulated by----------

4. De Broglie wavelength is related to momentum by the equation---------

5. Which material was used as target in Davisson – Germer experiment?

[5x1=5 marks]

Section B

(Short answer type - Each carries 2 marks -Answer 4 questions out of 6)

6. Distinguish between Longitudinal waves and Transverse waves.

7. Define Poisson's ratio and give its theoretical limits.

8. Distinguish between a harmonic oscillator and anharmonic oscillator.

9. Represent graphically the variation of potential energy, kinetic energy and total energy of a harmonic oscillator

10. Assuming the moment of inertia of a disc about its diameter, find moment of inertia about a tangent and about its axis.

11. State and prove the theorem of parallel axes. [4x2=8 marks]

Section C

(Short essay/problem type - Each carries 3 marks -Answer 3 questions out of 5)

12. Derive the expression for Twisting Couple on a cylindrical rod.
13.A thin wire of length L and mass m is bent into the form of a circle. Find the M.I of the ring about its axis.
14. Explain the characteristics of a damped harmonic oscillator. What do you mean by Quality factor?
15. Bring out the relevance of Uncertainty Principle. If uncertainty in location of a particle is equal to De Broglie wavelength, calculate uncertainty in velocity.
16. Calculate the De Broglie wavelength of an electron accelerated through a potential difference of 25kV. [3x3=9 marks]

Section D

(Long essay type - Each carries 5 marks -Answer 2 questions out of 4)

17. Derive an expression for energy density of a plane progressive wave
18. Derive an expression for the moment of inertia of a solid cylinder about an axis passing through its centre and perpendicular to its length
19. Obtain an expression for velocity of transverse vibrations in stretched string.
20. Derive Davisson –Germer experiment. Comment on the results.

[2x5=10 marks]

KANNUR UNINERSITY

Model Question paper

2C02PHY: Complementary Physics II (Electricity, Magnetism and Thermal Physics)

SECOND SEMESTER DEGREE EXAMINATION

Reg. No..... Code:
Name:.....

Course title: 2C02PHY- Complementary Physics II (Electricity, Magnetism &Thermal physics)

Programme:.....
Total marks: 32 Time: 3hrs.

Write answers in English only

Section A

(Very short answer type - Each carries 1 mark -Answer all 5 questions)

1.The resonant frequency condition for an LCR circuit is----------

2. The effective value of alternating current over one cycle is----------

3. Zeroth law of thermodynamics relates to ----------

4. The efficiency of a practical heat engine is always ----------than Carnot engine

5. Entropy remains constant in ----------process.

[5x1=5 marks]

Section B

(Short answer type - Each carries 2 marks -Answer 4 questions out of 6)

6. Distinguish between B.G and dead –beat Galvanometers.

7. Derive an expression for work done in rotating a magnet in a field.

8. Explain how sharpness of resonance curve of a LCR depends on 'Q' factor.

9. State and explain first law of thermodynamics.

10. Differentiate between isochoric and isobaric processes.

11. How does entropy changes during reversible and irreversible process [4x2=8 marks]

Section C

(Short essay/problem type - Each carries 3 marks -Answer 3 questions out of 5)

12. How will you convert given galvanometer into an Ammeter?
13. Deduce Gauss's proof of inverse square law.

14. Derive expressions for work done during isothermal and adiabatic processes.
15. State and explain Carnot's theorem.
16. A Carnot engine is operated between two reservoirs at temperature 400K and 300K. The source provides 4000J of heat energy/cycle. Calculate the amount of heat rejected to the sink/cycle. Also find the efficiency of the engine.

[3x3=9 marks]

Section D

(Long essay type - Each carries 5 marks -Answer 2 questions out of 4)

17. Derive an expression for intensity of magnetic field on the axis of a flat circular magnetic shell of uniform strength
18. Discuss in detail the growth and decay of current in an L-R circuit. Bring out the significance of the time constant of the circuit.
19. Explain the adiabatic process with suitable example. Obtain the expression for the work done during the process.
20. Describe in detail an ideal heat engine. Derive an expression for efficiency of the engine.

[2x5=10 marks]

KANNUR UNIVERSITY

Model Question paper

3C03PHY: Complementary Physics III (OPTICS & PHOTONICS)

THIRD SEMESTER DEGREE EXAMINATION

Programme: **Code:**

Course title: 3C03PHY- Complementary Physics III (Optics &Photonics)

Total marks: 32 Time: 3 Hours

Write answers in English only

SECTION A

(Very short answer type-Each carries 1 mark – Answer all 5 Questions)

1. If ratio of intensities of two light waves is 4:25, then ratio of intensities of constructive and destructive interference pattern will be…….

2. Polarization of light waves establishes that they are …….. in nature.

3.Diffraction phenomena can be divided into……and……class of diffraction

4. Laser emission is due to……..emission.

5...……..is the expression for numerical aperture.

SECTION B

(Short answer type-Each carries 2 marks – Answer any 4 Questions)

6. Write conditions for sustained interference of light waves.

7. Define dispersive power of a grating.

8. Distinguish between spontaneous and stimulated emission.

9. State law of Malus.

10. Write any two applications of Raman Effect.

11. Why are Newton's rings circular in shape?

SECTION C

(Short essay/problem type-Each carries 3 marks – Answer any 3 Questions)

12. Discuss the fringes produced by two non parallel glass plates.

13. Find the radii of the first three transparent zones of a zone plate behaving like a convex lens of focal length 1m for light of wavelength 589.3nm.

14. Discuss Pile of plates.

15. Calculate the numerical aperture and hence acceptance angle for an optical fibre given that refractive indices of the core and the cladding are 1.45 and 1.40 respectively.

16. Establish the relation between Einstein's coefficients.

SECTION D

(Long essay type- Each carries 5 marks – Answer any 2 questions)

17. Discuss the construction of a zone plate and explain its working with necessary theory.

18. Give the theory of Raman Effect and describe an experimental arrangement for studying it.

19. Discuss the theory of Newton's rings. How do you use them to measure the wave length of sodium light?

20. Explain how plain, circularly and elliptically polarized light are produced. How can them distinguished?

KANNUR UNIVERSITY

Model Question paper

4C04PHY: Complementary Physics – IV (Modern physics and Electronics)

FOURTH SEMESTER DEGREE EXAMINATION

Programme: **Code:**

Name:

Reg. No:

Course title: 4CO4PHY Complementary Physics – IV (Modern physics and Electronics)

Total marks: 32 **Time 3 Hours**

Write answers in English only

SECTION A

(Very short answer -Each carries 1 mark – Answer all 5 Questions)

1. The unit of radio activity is…….
2. Zero dimensional defect is……
3. …… is a good semiconductor.
4. ……..is the main source of energy in stars.
5. Give an example for nuclear fission.

SECTION B

(Short answer type- Each carries 2 marks – Answer any 4 Questions)

6. What is potential barrier?
7. What is half Adder?
8. What is meant by half life period of a radioactive element?
9. What do you mean by color of Quarks?
10. How energy is produced in stars?
11. What are the uses of nuclear reactors?

SECTION C

(Short essay/problem type- Each carries 3 marks – Answer any 3 Questions)

12. An amplifier has an open loop gain of 1000. With negative feedback, the voltage gain reduces to 10. Calculate the fraction of the output voltage that is fed back to the input.
13. A radioactive isotope disintegrates to one tenth of its original mass in 10 days. Find its half life period.
14. Determine the age of the earth.
15. Explain the edge dislocation and screw dislocation.
16. Describe the working of an LC oscillatory circuit.

SECTION D

(Long essay type- Each carries 5 marks – Answer any 2 Questions)

17. Draw the circuit diagram of a single stage common emitter amplifier and describe its working with necessary theory.

18. Explain the half life and mean life of a radioactive substance. Derive expressions for them.

19. Give an account of the evolution of a star.

20. Give an account of various point defects.

Model Question papers:

Open (Physics) courses

KANNUR UNIVERSITY

OPEN COURSE (PHYSICS)

Model question paper: 5D01PHY:A. Environmental Physics

FIFTH SEMESTER DEGREE EXAMINATION

Reg. No……. Programme:

Name…….. Code:

FIFTH SEMESTER DEGREE EXAMINATION

Course title: 5D01PHY A. Environmental Physics

Time: 2 Hrs Maximum Marks: 20

Write answers in English only

SECTION A

(Very short answer type -Answer all Questions- - Each carries 1 mark)

1. The Stoke's formula for Form drag is …….
2. The Photosynthesis reaction is ……
3. A combination of both steam turbine and gas turbine is called …….
4. The amount of energy reflected from the earth's surface is called……..
5. The strong wind blowing around the pole between 30 degrees and 60 degrees latitude is called…….

SECTION B

(Short answer type-Answer any three Questions. Each carries 2 Marks)

6. Write down the equation of motion and explain the symbols.
7. What are the advantages and disadvantages of an offshore wave power device?
8. Briefly discuss how a solar water heater works.
9. State Darcy's law.
10. Distinguish musical note and Noise.

SECTION C

(Short essay/problem type-Answer any 3 Questions- Each carries 3 Marks)

11. What is Ozone layer? Describe how it is helpful to the earth's atmosphere?
12. Explain the heat balance in animals and plants.
13. A Carnot's engine absorbs 800 J of energy and do a useful work of 500 J and rejects the rest of the energy. What is its efficiency?
14. Explain the Food Chain and Trophic levels.
15. A body is dropped from a height of 1000m from the ground. What is the time taken by it to reach the ground? What will be its velocity while striking the ground?

Take g=10m/second square.

KANNUR UNIVERSITY

Model question paper

OPEN COURSE (PHYSICS): **5D01PHY B. JOY OF STAR WATCHING**

FIFTH SEMESTER DEGREE EXAMINATION

Course title: 5D01PHY B. Joy of star watching

Reg. No……..
Name ……..

Time: 2 Hours Max. Marks: 20

Write answers in English only

Section A

(Very short answer type -All questions are to be answered -Each question carries 1 mark)

1.Name of our Galaxy is----------
2.Number of constellations in Zodiac is----------
3. Par sec. is the unit of----------
4. Name of a Comet----------
5. Distance from earth to Sun----------AU

Section B

(Short answer type-Three questions are to be answered-Each question carries 2 marks)

6. How a star is born?
7. Draw Orion constellation
8. What are the precautions taken to watch night sky properly?
9. Explain Big Bang theory.
10. What is the difference between Astrology and Astronomy?

Section C

(Short essay/problem type- 3 questions are to be answered. Each question carries 3 marks)
11. How comets are formed?
12. Draw the constellation of Orion and mark the different stars in it.
13. Explain why Ison comet was not clearly visible in 2013.
14. Draw the structure of Milky Way and mark the position of sun
15. How pole star can be detected by using Orion constellation.

KANNUR UNIVERSITY

Model Question paper

Open (Physics) Course

5D01PHY: C. Disaster Management

FIFTH SEMESTER DEGREE EXAMINATION

Course title: 5D01PHY.C.Disaster Management

Reg. No.: Code:
Name:
Semester: V

Total marks: 20
Time: 2 hrs.

Answer the questions in English only

Section A

(Very short answer type -All questions are to be answered .Each question carries 1 mark)

1. FWS stands for …….
2. Increasing Pollution Load is due to two major facts. What are they?
3. Give an example for an ICT tool.
4. Two sources of air pollution in Delhi are..... , ...
5. An impact due to Tsunami on coastal Zone is.....

[5x1=5]

Section B

(Short answer type - Each carries 2 marks -Answer 3 questions out of 5)

6. Draw Disaster Management cycle
7. What are the Precaution Measures to control Fire hazards?
8. How Global warming creates food problem?
9. What is Zoning?
10. Explain two geologically related disasters.

[3x2=6]

Section C

(Short essay/problem type - Each carries 3 marks -Answer 3 questions out of 5)

11. Explain any two rules to be followed for Fire Mitigation.
12. How Bush fire, Chemical fire and Forest fires are to be managed?
13. What are the fire precautions measures (both do's and don't s) for high rise buildings?
14. Give an account on food grains production in India. How it is related to Global warming?
15. Write a note on applications of GIS in Disaster Management in India

[3x3=9]

KANNUR UNIVERSITY

Model Question paper

OPEN COURSE (PHYSICS)

5D01PHY: D. BIOPHYSICS

FIFTH SEMESTER DEGREE EXAMINATION

Course title: 5D01PHY: D.BIOPHYSICS

Reg. No.

Name:

Max. Marks: 20 **Time 2 Hours**

Answer the questions in English only

SECTION A

(Very short answer type **-**Each carries 1 mark -Answer all 5 questions)

1. Rate of change of momentum is known as……..

2. SI unit of force is……

3. Unit of radioactivity is…….

4. Type of electrodes used for recording EEG is…….

5. Laser means……..

SECTION B

(Short answer type-Each carries 2 marks – Answer any 3 questions)

6. What do you mean by excitability?

7. With suitable example explain centre of mass.

8. Explain foetal heart rate measurement.

9. Write a short note about cardiac muscles.

10. Write any two applications of LASER.

SECTION C

(Short essay/problem type-Each carries 3 marks – Answer any 3 questions)

11. State Newton's laws of motion.

12. Discuss briefly about ECG, EEG and CT scan.

13. Explain the properties of alpha, beta and gamma radiations.

14. Discuss Bio-Mechanical analysis of movement of snakes.

15. Explain labour activity monitoring.

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Sd/

Dr.P.V.Kunhikrishnan,

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