Board of Studies in Physics

FACULTY OF SCIENCE

GONDWANA UNIVERSITY, GADCHIROLI

Syllabus of

B.Sc. Third Year (Semester Pattern)

SUBJECT - PHYSICS

Semester VI

GONDWANA UNIVERSITY, GADCHIROLI

SUBJECT - PHYSICS

(A) Teaching workload and Semester Examination Scheme for B.Sc.

Class	Semester	paper	Teaching workload per week			Examination Scheme								Total marks	Total Credits
						Theory Paper			Internal assessment			Practical			
			Theory	Total	Practical	marks		Credits	marks		Credits	marks	credits		
B.Sc.I	I	I	3	6+ 1T*	6	50	100	**12**	10	20	**2**	30	**6**	150	**20**
		II	3			50			10						
	II	I	3	6+ 1T*	6	50	100	**12**	10	20	**2**	30	**6**	150	**20**
		II	3			50			10						
B.Sc.II	III	I	3	6+ 2T*	6	50	100	**12**	10	20	**2**	30	**6**	150	**20**
		II	3			50			10						
	IV	I	3	6+ 2T*	6	50	100	**12**	10	20	**2**	30	**6**	150	**20**
		II	3			50			10						
B.Sc.III	V	I	3	6+ 2T*	6	50	100	**12**	10	20	**2**	30	**6**	150	**20**
		II	3			50			10						
	VI	I	3	6+ 2T*	6	50	100	**12**	10	20	**2**	30	**6**	150	**20**
		II	**3**			50			10						
B.Sc.	**Total marks : 900**								**Total Credits : 120**						

T* Periods for Tutorials per batch.

(B) B.Sc.Semester Pattern Examination Scheme

1. There shall be total **six** semesters.
2. Each semester shall comprise of **90** (Ninety) actual teaching days.
3. Each Semester I to VI shall be of **150** marks.

4. Every subject in each semester will comprise of two theory papers of **50** marks each. Practical/ laboratory work will be of **30** marks and Internal assessment of **10** marks for each theory paper.

i.	Paper I Theory	----	50 marks
	Internal Assessment	----	10 marks
ii.	Paper II Theory	----	50 marks
	Internal Assessment	----	10 marks
iii.	Practical	----	30 marks
Total marks		**----**	**150 marks**

5. All theory papers shall be divided into four units. Each unit shall be cover in 15 periods of 45 minutes.

6. The scope and limitations of the subject of all semester opted by the students shall be indicated in the syllabi from time to time. The medium of instruction and examination shall be English.

7. The theory question paper will be **intraunit** choice and equal weightage to all questions. Duration of each theory paper shall be **three** hours. There will be five questions each of **10** marks. All questions are compulsory. Fifth question will be on all four units with three sub-questions from each unit.

8. **Pattern of question paper: Subject - Physics**

Time: 3 Hours **Maximum marks :50**

Question No.		**Marks Allotted**
Qu. 1 Either		
(A)From Unit - I		10
Or		
(B)From Unit – II / III / IV		10
Qu. 2		
If **Qu. 1 (B)** From Unit – II	Then	
Either (A) From Unit – III **Or**	(B)From Unit - IV	10
If **Qu. 1 (B)** From Unit – III	Then	
Either (A) From Unit – II **Or**	(B)From Unit - IV	10
If **Qu. 1 (B)** From Unit – IV	Then	
Either (A) From Unit – II **Or**	(B)From Unit - III	10
Qu. 3 Either		
a) From Unit - I		2.5
b) From Unit - II		2.5
c) From Unit - III		2.5
d) From Unit - IV		2.5
Or		
e) From Unit - I		2.5
f) From Unit - II		2.5
g) From Unit - III		2.5
h) From Unit - IV		2.5

Qu. 4 Either

a)	From Unit - I	2.5
b)	From Unit - II	2.5
c)	From Unit - III	2.5
d)	From Unit - IV	2.5
	Or	
e)	From Unit - I	2.5
f)	From Unit - II	2.5
g)	From Unit - III	2.5
h)	From Unit - IV	2.5

Qu. 5 Attempt any 10 questions from the following.

(a)	Unit - I	1
(b)	Unit - I	1
(c)	Unit - I	1
(d)	Unit - II	1
(e)	Unit - II	1
(f)	Unit – II	1
(g)	Unit – III	1
(h)	Unit – III	1
(i)	Unit – III	1
(j)	Unit – IV	1
(k)	Unit – IV	1
(l)	Unit – IV	1

8. A student will have to perform at least five (**05**) experiments from each group.

9. Practical examination for all semesters shall be conducted **twice** in a year, at the end of each semester. Practical examination in odd semesters shall be conducted by **Internal examiner**, whereas practical examination in even semester shall be conducted by **Internal as well as external examiner**. Duration of practical examinations shall be of **6** hours. At the time of Practical examination every student has to perform **two** experiments **one** experiment from each group.

10. The distribution of marks for practical examination is as follows.

Record Book	----	6 marks
Viva-voce	----	6 marks
Each Experiment	(9 marks) ----	18 marks
TOTAL	**----**	**30 MARKS**

11. Evaluation of the student during the semester for internal assessment:

The University approved teacher will have to conduct a test on each unit. The test is to be carried out with the interest to make the student aware of the basics of the theory and the experiments as well. This will enhance the viva-voce competence and subject interest of the student. The record of these tests is to be maintained in the department duly signed by the teacher in-charge and head of the department. The record is to be maintained in the following format. Each unit test should be of **10** marks. Find the average and assign it to the student.

Record of marks scored in the unit tests during the semester.

Date										Average marks obtained
S.No.	Name of the Student	Paper I				Paper II				
		Test1	Test 2	Test 3	Test 4	Test1	Test 2	Test 3	Test 4	
1	ABC									
2	DEF									
3	GHI									
4	JKL									
5	MNO									
6	PQR									
7	STU									
8	VWX									
9	YZ									

Signature of teacher in-charge Head of Department

12. The internal assessment shall be done by respective college and the marks shall be sent to the university one month prior to the final examination of each semester.

13. Minimum marks for passing will be **35%** of the total marks. A candidate has to pass individuality in theory / internal assessment / practical separately. The minimum passing marks for theory **35** marks, for internal assessment **7** marks and that for practical **11** marks.

C) Grade Point Average (GPA) and Course Grade Point Average (CGPA)

In the Credit and Grade Point System, the assessment of individual Courses in the concerned examinations will be on the basis of marks only, but the marks shall later be converted into Grades wherein the overall performance of the Learners can be reflected after considering the Credit Point. The overall evaluation shall be designated in terms of Grade.

(Table No.1): Performance Grading Scale

Marks Obtained %	Grade	Grade Points
75 & above	O	6
65 to 74.99	A	5
55 to 64.99	B	4
50 to 54.99	C	3
45 to 49.99	D	2
40 to 44.99	E	1
00 to 39.99	F	0

(Table No. 2): Final Grade Points

Final Grade Points	Final grade
5.0 to 6.0	O
4.50 to 4.99	A
3.50 to 4.49	B
2.50 to 3.49	C
1.50 to 2.49	D
0.50 to 1.49	E
0.00 to 0.49	F

O: Outstanding, **A**: Very Good, **B**: Good, **C**: Average, **D**: Satisfactory, **E**: Pass, **F**: Fail

Semester Grade point average (SGPA)

SGPA: Semester Grade Point Average shall be calculated for individual semesters. It is also designated as GPA.

$$SGPA = \frac{\sum CG}{\sum C}$$

Where, ∑CG: Sum of Product of Credits & Grade points and ∑C: Sum of Credit points.

Cumulative Grade Point Average (CGPA)

CGPA: Cumulative Grade Point Average shall be calculated for the entire Program by considering all the semesters taken together. The CGPA of a student will be Average of the SGPA's of that student. A student will be allotted a cumulative Grade Point Average (**CGPA**) after clearing all the four semesters. The CGPA of a student will be Average of the four SGPA's of that student.

After calculating the SGPA for an individual semester and the CGPA for entire program, the value can be matched with the grade in the Final Grade Point table No. 2 as per the Seven (07) Points Grading System and expressed as a single designated GRADE such as O, A, B, C, D,

Syllabus for B.Sc. III Subject – Physics

The syllabus of Physics as per semester system for the B.Sc. III will be implemented from the Academic year **2014-2015**.

Name of Programme : **B.Sc. III**
Duration: **Two semesters**

Semester V: Paper I (5S-PHY 501): Statistical Physics and Relativity
Paper II (5S-PHY 502): X-rays and Solid State Physics,
Practical (5S- PHY 503)

Semester VI: Paper I (6S-PHY 601): Nuclear Physics, Nanotechnology and Biophysics
Paper II (6S-PHY 602): Fibre Optics, Communication and Digital Electronics
Practical (6S- PHY 603)

Paper I: 6S-PHY 601: Nuclear Physics, Nanotechnology and Biophysics

Unit I

Nuclear physics- Interaction of charged particles and neutrons with matter, G. M. counter, Proportional counter and scintillation counter. Nuclear reactions, Packing fraction, Mass defect and binding energy, Nuclear fission.

Numericals.

Unit II

Structure of nuclei: Liquid drop model, Chain reaction, Nuclear fusion, Cosmic ray, Elementary particles, Shell model of the nucleus. Alpha decay, Range of α particle, Geiger Nuttal law, Tunneling, Gamow's theory of α decay.

Numericals.

Unit III

Nanomaterials- Size and properties of nanomaterials, Difference between nanomaterials and bulk materials, Nano cluster, quantum dots.

Nanotechnology- Different methods of synthesis of nanomaterials (Wet chemical, Sol-gel and HCR Technique), Basic principle of characterization technique of SEM and TEM.

Unit IV

Applications of Nanotechnology: Applications in nano-medicine, nano-electronics, nano-sensing, nano-magnetics (only basic idea).

Bio-physics- Bio Potential- compound action Potentials of the human body, Electrocardiogram for heart (ECG), Electroencephalogram for brain (EEG)(Only working mechanism).

References and Text books –

1. Nuclear Physics, by- S. N. Ghoshal.
2. Atomic and Nuclear physics, by- N. Subramanyam, Brijlal.
3. Introduction to Nuclear physics, by-H. A. Enge.

4. Atomic and Nuclear physics, by- T. A. Littlefield, N. Thorley.
5. Nano Technology, by- Er. Rakesh Rathi. Publisher: S. Chand & Publication, New Delhi.
6. Introduction to Nano Technology, by- C. P. Poole, Jr. F. J. Owens.
7. Nano Technology, by- T. J. Daming.
8. Nano Structure and Nano Materials, by- M. Balkrishanarao, K. Krishana Reddy.
9. Introduction to Bio Physics, by- P. Narayanan, New Age Publications.
10. Medical Instrumentation, by- Khandpur TMH.
11. Text Book of Bio Physics, by- R. N. Roy
12. Laboratory manuals of Bio Physics Instruments, by- P. B. Vidyasagar.
13. Bio physics, by- Vatsala Piramal, Dominant Publications and Distributions, New Delhi.

Paper II: 6S-PHY 602: Fibre Optics, Communication and Digital Electronics

Unit I

Fiber optics- Importance of optical fiber, Propagation of light waves in optical fiber, Basic structure, Stepped index monomode fiber, Graded index fiber, Acceptance angle and acceptance cone, Numerical aperture, Fiber losses and their units (basic concept), Electrical and optical band width, bandwidth length product.

Numericals.

Unit II

Communication- Introduction to A.M. F.M. and P.M.

Amplitude modulation (A.M.): Frequency spectrum, Modulation factor, Percentage modulation, Expression for Power dissipation in AM wave, disadvantages.

Frequency modulation - Frequency deviation, Carrier swing, Modulation index, Deviation ratio, Expression for FM wave, Frequency spectrum, significant side band terms, FM band width, Merits and demerits.

.*Numericals*.

Unit III

Number Systems- Binary, decimal, hexadecimal and their inter-conversions, Binary coded decimal (BCD), Addition and subtraction of binary numbers, 1'S, 2'S and 9'S,10'S compliment,

Logic gates- AND,OR,NOT, NOR, NAND, Ex-OR, Ex-NOR and their truth table, Boolean equations, De Morgan's theorem and its verification. Half adder, Full adder, Half subtractor and full subtractor, Boolean equations, De Morgan's theorem and its verification.

Numericals.

Unit IV

Astable, monostable and bistable multivibrators , RS flip-flop, clock RS FF, DFF, JKFF, and JKMSFF 4-bit serial binary counter shift register (SISO and SIPO), Ring counter,

References and Text books -

1. Optical Fibres and Fibre Optic communication System, by- Subir Kumar Sarkar, S. Chand & Company,
2. An introduction to fiber optics, by-R. Allen Shotwell.
3. Optical fiber communication, by-John M. Senior.
4. Laser and Optical fiber communication, by- P.Sarah.
5. Digital and Analog Technique 1st Edition, by- Navneet, Gokhale, Kale, Kitab Mahal Nagpur.
6. Basic Electronics (Solid State), by- B. C. Therja.
7. Optoelectronics and fiber optics communication, by- C. K. Sarkar, D.C. Sarkar.
8. Communication Electronics, by- A. Kumar
9. Digital Electronics, by- V. K. Jain
10. Digital Principle and Application, by- Malvino and Leach
11. Digital Electronics and It's Application, by- R. P. Jain
12. Digital computer Electronics, II nd Edition, by- Malvino, TMH Edition.

6S-PHY 603 :(Practical)

1. Every student will have to perform at least **Five (05)** experiments from each group.

2.Every student will have to perform **two** experiments one from each group at the time of university practical examination in 6 hours.

3.The distribution of practical/laboratory work of 30 marks is-

Two experiments (9 Marks each)	- 18 Marks
Record book	- 06 Marks
Viva Voce	- 06 Marks

Total	30 Marks

List of the experiments-

Group A

1. Study of random decay of nuclear disintegration and determination of decay constant using dices.
2. To study low-pass, high-pass and band-pass filters.
3. To determine the electric charge (e) of an electron by Millikan's oil drop method.
4. To determine the value of specific charge (e/m) of an electron by Thomson method.
5. Study of RS flip-flop
6. Study of JK flip-Flop
7. Study of 4-bit binary counter.
8. o study the working of an Astable multivibrator.
9. To study the working of a Mono-stable multivibrator.
10. To study the working of a bi-stable multivibrator.

Group B

1. To determine modulation index and percentage modulation of AM modulator.
2. To study Master Oscillator Power Amplifier (MOPA)
3. To study transistor as a switch - calculation of ON and OFF state resistance.
4. Study of Characteristics of LED.
5. Study of basic gates: AND, OR and NOT gates.
6. Study of NAND gate and its use as a Universal gate.
7. Study of NOR gate and its use as a Universal gate.
8. Verification of De Morgan's theorem.
9. Simplification of logic circuits using laws and theorems of Boolean algebra.
10. Study of half adder and full adder.

References books -

1. B.Sc. Practical Physics - – Dr P.S. Hemne, Harnam Singh,
   Publisher: S. Chand & Company Ltd. New Delhi.
2. Practical Physics For B. Sc. II –Kale, Soman, Gawande & Gokhale
   Publisher: Kitab Mahal, Nagpur
3. Practical Physics For B. Sc. III –Kale, Bahekar & Gokhale
   Publisher: Kitab Mahal, Nagpur