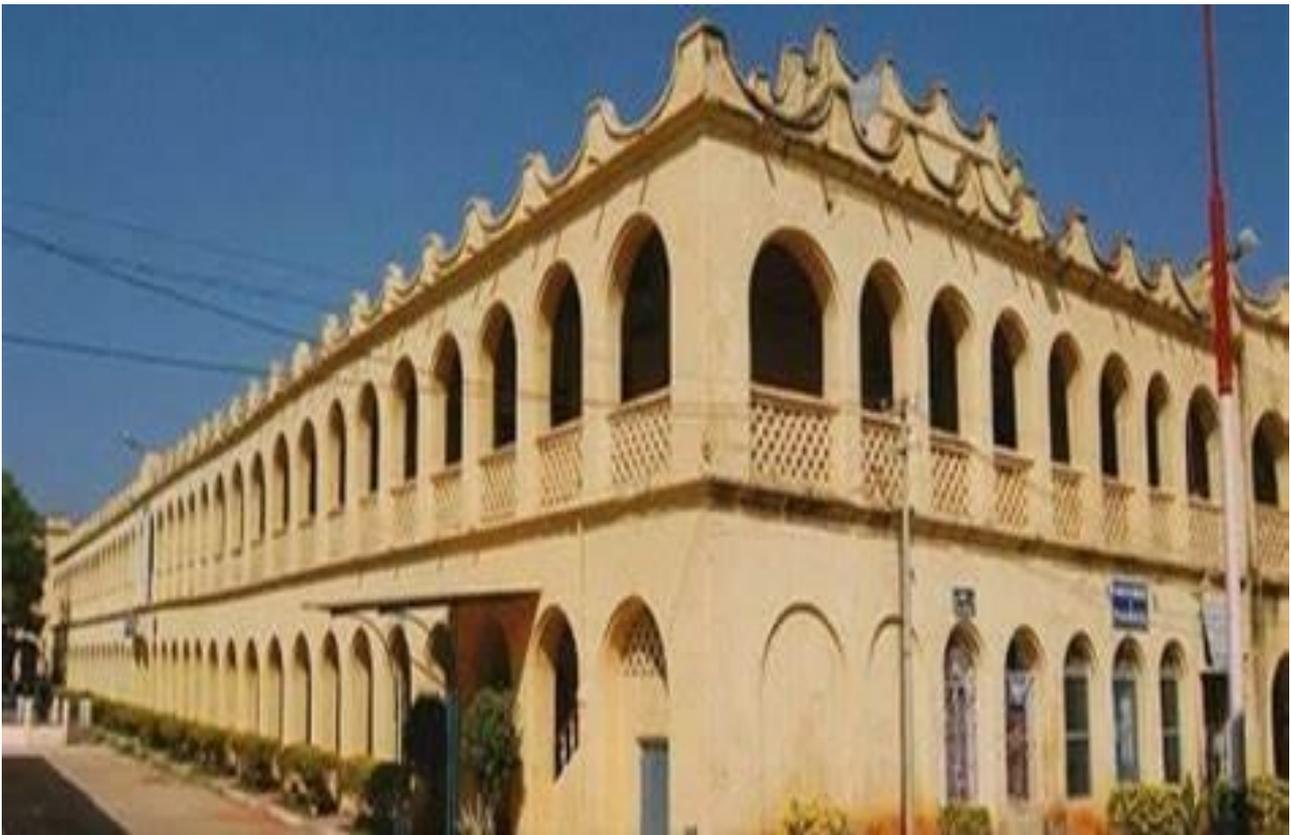




MAHARAJAH'S COLLEGE (AUTONOMOUS)



**R23 Program file
B.Sc.(Honours) PHYSICS**



DEPARTMENT OF PHYSICS

INDEX

CONTENTS

1. NAME OF THE PROGRAMME
2. ELIGIBILITY
3. ABOUT THE DEPARTMENT
 - 3.1 HISTORY
 - 3.2 VISION AND MISSION
4. ABOUT THE PROGRAMME
 - 4.1 ABOUT THE COURSES
 - 4.2 PROGRAMME NATURE, EXTENT AND AIM
 - 4.3 GRADUATE ATTRIBUTES (GAs)
5. PROGRAMME OUTCOMES
6. PROGRAMME SPECIFIC OUTCOMES (PSOS)
7. MAPPING OF PO'S WITH PSO'S
8. MAPPING OF COURSE WITH SPECIFIC OUTCOMES
9. TEACHING AND LEARNING PROCESS
10. ASSESSMENT PROCESS
11. STRUCTURE OF PROGRAMME

Programme File

1. NAME OF THE PROGRAMME: B.Sc. (Hons.) – PHYSICS

2. ELIGIBILITY :

B.Sc. Physic (Honours) eligibility needs candidates to have minimum pass in their Intermediate with Physics as one of the subjects from a recognized College by Board of Intermediate.

3. About the Department

3.1 History

The physics department has its roots in the glorious institution Maharajah's College, when the college got its affiliation from Madras University to start Science courses in the year 1881. Right from its inception up to now, faculty members of the Physics Department are consistently engaged in one form or other of research activity. During the years 1914 to 1927 the research activity in the department culminated in the award of Ph.D. to the then Professor of Physics, Dr. A. L. Narayana (Former Vice-Chancellor of Andhra University) and another Doctorate degree was awarded to one of his erstwhile students and colleague in the department Prof. K.Ranghadhama Rao. During this golden period of research activity in the department, quite a number of research papers were published in such peer review journals like "Proceedings of Physical Society of London", "Nature", "Z.PHYSICA".

Nobel Laureat Sir C. V. Raman, Famous Indian Astrophysicist Prof. Meghnadh Saha, the then vice chancellor of the Andhra University Sarvepalli Radha Krishna (Former President of India), and the then Principal of Rajah's College, Pitapuram, Raghupathi Venkata Ratnam Naidu (Former Vice-Chancellor of Madras University) visited the college and participated in seminar which was held on 21-1-1932, conducted by Physics department under able leadership of K. Janaki Rao Principal of this college. A Seismological station was established and maintained in the department from 1956 to 1961 by the "Central Seismological Observatory (Govt.of India)", Shillong in collaboration with AP. State Government to study local earth tremors and the Data collected was found to be very useful for establishing several industries in and around Vizianagaram. Students with electronics, physics background are spread far and wide all over the world. The high-end library server is an added advantage for the faculty and students for storage of learning material and accessibility. The facilities including library, class rooms and computers are available for the students. The ICT smart class rooms are developed to reach global standards.

3.2 Vision and Mission

Vision

To build a foundation for excellence and encourage the development of the students and institution as a premier institution by igniting and promoting enthusiasm, interests and passion, in the study of Physics, in professional courses, as a part of curriculum.

Mission

- To awaken the young minds and discover their talents both in theory and in practical physics, through dedication to teach, commitment towards students and innovative instructional methods like PPT & Visual Aids.
- To support the development activities of the college and make the Department vibrant.
- To encourage quality related research studies, consultancy and training programmes.
- To make vital contributions in areas such as faculty, modern labs and demonstrate a high level of competence in the study of Physics.
- To develop strategy in the Department for continuous improvement.

4. ABOUT THE PROGRAMME

4.1 About the Courses

Physics can be thought of as the science of motion. From the smallest subatomic particles to the largest, most distant galaxies, motion in nature occurs over an incredible range of length and time scales. Physics encompasses this entire domain. As such, it is regarded by many as the most basic and fundamental of the sciences, crucial for understanding the world around us, the world inside us, and the world beyond us; and the basis of many other sciences, including chemistry, oceanography, seismology, and astronomy. The ideas that Physics has generated, such as relativity, quantum physics, string theory, etc., are incredibly beautiful and captivating, and challenge our imagination. Physics underlies many great inventions of modern technology, like computers, cell phones, lasers, the internet, etc., that have changed our lives, and is indispensable for many of the future technological challenges facing us. The goal of the program is to develop both quantitative problem-solving skills and the ability to conceive experiments and analyse and interpret data. These abilities are acquired through both course work and opportunities to conduct independent research. The program prepares students for careers in fields that benefit from quantitative and analytical thinking, including physics, engineering, teaching, medicine, law, science writing, and science policy, in government or the private sector. In some cases, the path to this career will be through an advanced degree in physics or a professional program.

The physics curriculum has been designed to provide a thorough understanding of fundamentals and to enable students to cope with the challenges of modern research. The exposure to physics and inter disciplinary research is to be provided through a plethora of departmental and non-departmental optional courses pitched at the appropriate level and also by involving students in undergraduate research programs through departmental and inter-departmental projects. The four-year program facilitates the option of attaining a minor degree in addition to the basic degree which can be from a department other than the parent department or from across departments. These opportunities and flexibilities render the present program unique and attractive for the students motivated to make important contribution to research at the cutting edge not only in Physics but also in related science and engineering science disciplines.

B.Sc (Honours) with Single Major

SEMESTER	MAJOR (4 Credits)		MINOR (4 Credits)		AECC (3 Credits)		MULTI DISCIPLINARY (2 Credits)		SKILL ENH COURSE (2 Credits)		OOTC		ENVIRONMENTA L EDUCATION (2 Credits)		TOTAL					
	C	H Cr	C	H Cr	C	H Cr	C	H Cr	C	H Cr	C	H Cr	C	H Cr	C	H Cr				
SEM I	2*	10			2	8	1	2	2	4					7	24	20			
SEM II	2	6+4	1	3+2	2	8			2	4					7	27	22			
Community service project (CSP) of 180 hours with 4 credits																				
Student is eligible for EXIT option - 1 with award of certificate in respective discipline																				
SEM III	4	12+8	1	3+2			1	2	2	1	2				7	29	24			
SEM IV	3	9+6	2	6+4			1	2	2	1	2				7	29	24			
Short - term inernship/apprenticeship/OJT of 180 hours with 4 credits																				
Student is eligible for EXIT option - 2 with award of DIPLOMA in respective Major with Minor																				
SEM V	4	12+8	2	6+4									1	2	7	32	26			
SEM VI	Semester inernship/apprenticeship/OJT with 12 credits																			
Student is eligible for EXIT option - 3 with award of DEGREE in respective Major																				
IKS#																				
SEM VII	3	9+6	12						2*	6+4	8	1	2	2	1	2	0	6	29	22
SEM VIII	3	9+6	12						2*	6+4	8	1	2	2	1	2	0	6	29	22
TOTAL	21	84	6	24	4	12	6	6	10	32	28	2	4	4	4	4	0	47	160	
20 Additional Credits for 10 Months mandatory internship/apprenticeship/OJT																				
C - Courses		H - Hours		Cr - Credits		OOTC - Open Online		Transdisciplinary Course												
IKS# - Indian Knowledge System - Audit Course																				

4.2 Programme Nature, Extent and Aims

The B.Sc. (Honours) Programme will impart advanced knowledge of basic and applied physics to the under graduates. It will prepare the students for taking up challenging assignments in academia and industry and also empower them with skill and knowledge for generating employment for their own and others. The Programme introduces the students to advanced developments in physics as well as in the field of other allied sciences, by providing them multidisciplinary and interdisciplinary courses. The design of single Major & single minor curriculum can enrich students with analytical and problem-solving capabilities. It is designed to bring out the best of the abilities of each student, allow them to sharpen the scientific temper and be abreast with the contemporary developments in the area.

The programme includes a balanced combination of Core, Skill based and Skill enhanced Courses. The courses are designed in such a way to cover the entire spectrum of physics from fundamentals (that will bring admitted students from various backgrounds to a common level) to most recent advancements in the field (that will make them ready to take up challenging assignments in the real world).

The B.Sc. Physics (Honours) Programme is of four years duration which is divided into eight semesters. The teaching and learning in the Programme will involve theory (lectures), practicals, tutorial and seminar-based classes. The curriculum will be taught through formal lectures with the aid of pre-made presentations, audio and video tools whenever necessary. Other teaching aids can also be used as and when required. The additional requirements like industrial visits, Community Service Project work and Internships(long-term & Short time) are also incorporated into the curriculum.

AIMS OF THE PROGRAMME INCLUDE

- To inculcate basic and advanced knowledge of Physics among students.
- To provide higher education, disciplinary and inter/multi-disciplinary research-oriented knowledge to the students to make them lifelong learners.
- To provide a learned, skilled and creative pool of graduates who are ready to take up challenging assignments in different kinds of chemical industries, research institutions and academia.
- To mould responsible, proactive citizens who are equipped with scientific thinking and skills to address problems of their locality.
- Adequate blend of theory, computation and hands-on experiments.
- Modernized lab courses - close to recent/current research.

4.3 GRADUATE ATTRIBUTES (GAs)

The Graduate Attributes (GAs) reflect particular qualities and abilities of an individual learner including knowledge, application of knowledge, professional and life skills, attitudes and human values that are required to be acquired by the graduates of Maharajah's College (A). The graduate attributes include capabilities to strengthen one's professional abilities for widening current knowledge and industry-ready skills, undertaking future studies for global and local application, performing creatively and professionally, in a chosen career and ultimately playing a constructive role as a socially responsible global citizen. The Graduate Attributes define the characteristics of learners and describe a set of competencies that are beyond the study of a particular area and programme.

The Graduate Attributes are

- a. Continue life-long learning as an autonomous learner
- b. Continuously strive for excellence in education
- c. Apply and nurture critical and creative thinking
- d. Promote sustainable development practices

- e. Promote co-operation over competition
- f. Balance rights with responsibilities
- g. Understand and respect diversity & difference
- h. Not be prejudiced by gender, age, caste, religion, or nationality.
- i. Use education as a tool for emancipation and empowerment of humanity

5. PROGRAMME OUTCOMES (POs)

The overall aims of the programme may be achieved by addressing its various components that are incorporated into the curriculum as described below. Each of these components is designed to lead to specific outcomes that are desired after the successful completion of the programme.

PO No.	Component	Outcomes
PO1	Basic Knowledge	Capable of delivering basic disciplinary knowledge gained during the programme.
PO2	In-depth Knowledge	Capable of describing advanced knowledge gained during the programme.
PO3	Critical thinking and Problem-Solving Abilities	Capable of analysing the results critically and applying acquired knowledge to solve the problems.
PO4	Creativity and innovation	Capable to identify, formulate, investigate and analyse the scientific problems and innovatively to design and create products and solutions to real life problems.
PO5	Research aptitude and global Competency	Ability to develop a research aptitude and apply knowledge to find the solution of burning research problems in the concerned and associated fields at global level.
PO6	Holistic and Multi-disciplinary Education	Ability to gain knowledge with the holistic and multi-disciplinary approach across the fields.
PO7	Skills enhancement	Learn specific sets of disciplinary or multidisciplinary skills and advanced techniques and apply them for betterment of mankind.
PO8	Leadership and Teamwork abilities	Ability to learn and work in a group and capable of leading a team even.

6. PROGRAMME SPECIFIC OUTCOMES (PSOs) :

The under graduates shall be able to realise the following specific outcomes by the end of program studies:

PSO No.	Programme Specific Outcomes
PSO1	Apply knowledge of principles, phenomena and concepts in Physics and analyse their local, national and global impact. Develop extensive comprehension of fundamental and diverse applications of Physics. To Develop a solid understanding on the fundamental principles and major concepts in the core disciplines of physics with the ability to analyse at an advanced level.
PSO2	Provide an intellectual training to develop a rational and rigorous scientific approach in synthesizing information and concepts.
PSO3	Equip the students to perform standard laboratory procedures, monitor by observation and measurement events or changes and record data by developing independent work ability.
PSO4	Develop research and analytical skills in basic research with the ability to undertake research in multidisciplinary teams.
PSO5	Provide a detailed training in written and verbal communication of scientific information and ideas.
PSO6	To Develop entrepreneurial skills, empowered according to the professional requirement and become self-dependent.
PSO7	To develop the attitude for identifying and solving problems using physics Generate an understanding on the importance of application of Physics in academic, industrial, environmental and social context.
PSO8	To develop the skill to adopt the learned principles in various settings and innovate with the importance of sustainability in mind, if necessary

7. Mapping of programme outcomes with programme specific outcomes

S.No.	PSOs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
	POs								
1.	PO1	✓	✓	✓	✓		✓	✓	
2.	PO2	✓	✓	✓	✓	✓	✓	✓	✓
3.	PO3	✓	✓	✓	✓	✓	✓	✓	✓
4.	PO4		✓	✓	✓		✓	✓	✓
5.	PO5		✓	✓	✓	✓	✓	✓	✓
6.	PO6	✓	✓	✓	✓	✓	✓	✓	✓
7.	PO7			✓	✓	✓		✓	✓
8.	PO8		✓	✓		✓	✓	✓	✓

8. Mapping of Course with Programme Specific Outcomes (PSOs)

S.No	PSOs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
	Name of the Course								
1.	Essentials and Applications of Mathematical, Physical and Chemical Sciences	✓		✓		✓		✓	✓
2.	Advances in Mathematical, Physical and Chemical Sciences	✓		✓	✓		✓		✓
3.	Analytical Skills	✓	✓		✓	✓			
4.	Communication Skills	✓		✓		✓		✓	
5.	Principles of Psychology	✓	✓	✓		✓			✓
6.	Communication Skills	✓	✓		✓		✓		✓
7.	Sahithi Sourabham	✓	✓	✓		✓	✓	✓	
8.	Mechanics and Properties of matter	✓	✓	✓	✓	✓		✓	
9.	Waves and Oscillations	✓	✓	✓	✓	✓		✓	
10.	A Course in Reading and Writing Skills	✓	✓						
11.	Surajanatmaka Rachana	✓	✓						
12.	Business Writing		✓		✓			✓	
13.	Digital Literacy	✓	✓	✓	✓			✓	✓
10.	Wave Optics	✓	✓	✓	✓	✓		✓	
11.	Heat and Thermodynamics	✓	✓	✓	✓	✓		✓	
12.	Electronic Devices and Circuits	✓	✓	✓	✓	✓	✓	✓	✓
13.	Analog and Digital Electronics	✓	✓	✓	✓	✓	✓	✓	✓
14.	Information and Communication Technology	✓		✓	✓	✓		✓	
15.	Introduction to Public Administration	✓		✓	✓		✓		✓
16.	Electricity Magnetism and Electronics	✓	✓	✓	✓	✓	✓	✓	✓
17.	Modern Physics	✓	✓	✓		✓		✓	
18.	Introduction to Nuclear	✓	✓	✓		✓		✓	
19.	Indian Philosophy				✓			✓	✓
20.	Cyber security	✓	✓		✓		✓		✓
21.	Applications of Electricity & Electronics	✓	✓	✓		✓	✓	✓	
22.	Electronic Instrumentation	✓	✓			✓	✓	✓	
24.	Optical Instruments and Optometry		✓	✓	✓	✓	✓	✓	✓
25.	Solar Energy and Applications		✓	✓	✓	✓	✓	✓	✓

9. TEACHING AND LEARNING PROCESS

Pedagogical Approaches

Teaching learning techniques include

- (1) Lecture based teaching-learning
- (2) Group- teaching and learning
- (3) Individual learning/ self-study
- (4) Inquiry based learning;
- (5) Kinaesthetic learning
- (6) Game Based learning
- (7) Expeditionary learning
- (8) Technology based learning
- (9) Peer teaching
- (10) Learning through problem-solving

- **Lecture based teaching-learning:** It is a traditional method involving direct instruction from a teacher to students.
- **Group teaching and learning:** Students are divided into small groups to work together on learning activities.
- **Individual learning/self-study:** It involves self-paced learning where students use resources like text books, online materials etc.
- **Inquiry-based learning:** This is a student centered teaching approach where learners ask questions, conduct investigations, and develop their own understanding of concepts. It emphasizes critical thinking.
- **Peer teaching:** Students teach each other under the guidance of an instructor.
- **Learning through problem solving:** It emphasizes critical thinking, creativity, and the application of knowledge to find solutions.
- **Blended Learning:** Combining traditional face-to-face teaching with online resources for a holistic approach.
- **Flipped Classroom:** Students review materials beforehand and class room time is used for interactive problem solving.

10. ASSESSMENT:

DISTRIBUTION AND WEIGHTAGE OF MARKS:

Theory:

All Theory courses will have 5 units and assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end examination.

Internal Assessment:

Internal Assessment - 30 Marks

Assignments - 10Marks

- Two Internal Assessment shall be conducted. One on first 50% of the syllabus and second on remaining 50% of the syllabus.
- Each Internal Assessment consists Subjective test
- Each subjective test shall be conducted for 60 Minutes and assessed for 30 marks
- Assignments shall be assessed for 10 marks
- Final Internal Assessment marks can be calculated from the average of the two Internal Assessments.

Semester End Examinations:

External examination is for 60 marks (180 min). Question paper contains Essay questions and short answer questions.

Assignments:

The student has to submit 5 assignments (1 for each unit) and assessed for 10 marks. Each assignment shall consist of 4 questions (4X10 = 40 marks) and the same shall be scaled down to 10 marks. Average of 4 assignments shall be considered as final assignment marks.

Semester End Practical:

All Laboratory courses are assessed for 50 marks. Semester end practical examination shall include assessment of the student on

1. Knowledge of principles/concepts involved
2. Experimental design
3. Result interpretation and analysis
4. Experimental report

Semester end examination is for 50 marks (150 min) conducted and assessed by both external and internal examiners.

ATTENDANCE REGULATIONS:

- A student shall be eligible to appear for end semester examinations, if he or she acquires a minimum of 75% of attendance in aggregate of all the subjects (Theory&Lab) for the semester.
- Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the college academic committee.
- Shortage of attendance below 65% in aggregate of all the subjects (Theory & Lab) for the semester shall not be Condoned.
- Detained student shall seek re- admission for that semester when offered within 4 weeks from the date of commencement of class work.

PROMOTIONRULE (Based on attendance):

- A Student shall be promoted to the next semester on fulfillment of minimum attendance requirement (75%) of current semester
- A Student shall be pay examination fee for one of semester out two Semesters(one academic year)

MINIMUM ACADEMIC REQUIREMENTS (Theory/ Practical):

A student is deemed to have satisfied the minimum academic requirements for a course on securing minimum 40% of marks in the semester end exam and minimum 40% of marks in the sum total of the internal marks and semester end marks.

GRADING SYSTEM:

Semester Grade Point Average (SGPA) for the current semester which is calculated on the basis of grade points obtained in all courses.

$$\text{SGPA} = \frac{\Sigma (\text{course credits earned} \times \text{Grade points})}{\Sigma (\text{Total course credits in the semester})}$$

$$\text{CGPA} = \frac{\Sigma (\text{course credits earned} \times \text{Grade points}) \text{ up to successfully completed semesters}}{\Sigma (\text{Total course credits up to successfully completed})}$$

The UGC recommends a 10-point grading system with the following letter grades as given below:

O	10
A	9
B	8
C	7
D	6
E	5
F	0

iii. A student obtaining Grade F shall be considered failed and will be required to reappear in the examination.

Marks Range (Max – 100)	Letter Grade	Grade Point
85 and Above	0	10
75-84	A	9
66-74	B	8
57-65	C	7
47-56	D	6
40-46	E	5
Below 40	F	0

Illustration of Computation of SGPA and CGPA and Format for Transcripts

Computation of SGPA and CGPA

Illustration for SGPA

Course	Credits	Grade	Grade Point	Credit Point (Credits X Grade)
Course 1	3	A	9	3 X 9 = 27
Course 2	3	B	8	3 X 8 = 24
Course 3	2	D	6	2 X 6 = 12
Course 4	2	O	10	2 X 10 = 27
Course 5	5	C	7	5 X 7 = 35
Course 6	5	E	5	5 X 5 = 25
Course 7	5	C	7	5 X 7 = 35
				TOTAL = 178

Thus, **SGPA** = $178/25 = 7.12$

Illustration for CGPA

SEMESTER	Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6
CREDITS	25	31	27	36	30	12
SGPA	7.9	7.8	7.6	8.0	8.3	8.6

Thus,

$$\text{CGPA} = \frac{25 \times 7.9 + 31 \times 7.8 + 27 \times 7.6 + 36 \times 8.0 + 30 \times 8.3 + 12 \times 8.6}{182} = 8.07$$

ELIGIBILITY FOR AWARD OF DEGREE:

A student shall be eligible for award of the degree if he/she fulfills the following conditions:

- 1) Successfully completes all the courses prescribed for the Program.
- 2) CGPA greater than or equal to 5.0 (Minimum requirement for Pass)

AWARD OF CLASS:

Eligible Candidates for the award of Degree shall be placed in one of the following Classes based on CGPA.

CLASS	CGPA
First Class	≥ 6.5
Second Class	≥ 5.5 to < 6.5
Pass Class	≥ 5.0 to < 5.5

INSTRUCTION DAYS:

A semester shall have a minimum of 90 clear instruction days (including internal examinations).

SUPPLEMENTARY EXAMINATIONS:

Supplementary examinations shall be conducted for final year students of Vth & VIth semesters within 4 weeks from the date of announcement of results of regular examinations.

WITH HOLDING OF RESULTS: The result of a student shall be withheld

1. If any case of pending disciplinary action.
2. Involvement in any sort of malpractices etc.
3. Involvement in ragging.

10. STRUCTURE OF PROGRAMME (Instruction & Examination) :

Semester-I

S. No.	Paper Title	Course type	Instruction periods per Week	External Marks	Internal Marks	Total Marks	Credits
1.	Essentials and Applications of Mathematical, Physical and Chemical Sciences	Theory	5	60	40	100	4
2.	Advances in Mathematical, Physical and Chemical Sciences	Theory	5	60	40	100	4
3.	Analytical Skills	Theory	2	30	20	50	2
4.	Communication Skills	Theory	2	30	20	50	2
5.	Principles of Psychology	Theory	2	30	20	50	2
6.	English	Theory	4	60	40	100	3
7.	Telugu / Sanskrit	Theory	4	60	40	100	3
					Total	550	20

Semester-II

S. No.	Paper Title	Course type	Instruction periods per Week	External Marks	Internal Marks	Total Marks	Credits
1	Mechanics and Properties of Matter	Theory	3	60	40	100	3
2	Waves and Oscillations	Theory	3	60	40	100	3
3	Mechanics and Properties of Matter	Lab	2	30	20	50	1
4	Waves and Oscillations	Lab	2	30	20	50	1
5	Fundamentals of electricity and electronics (MINOR)	Theory	3	60	40	100	3
6	Fundamentals of electricity and electronics(MINOR)	Lab	2	30	20	50	1
5	English	Theory	4	60	40	100	3
6	Telugu / Sanskrit	Theory	4	60	40	100	3
7	Business Writing	Theory	2	30	20	50	2
8	Digital Literacy	Theory	2	30	20	50	2
					Total	500	22
	Community service project		4 weeks				4

SEMESTER-III

S. No.	Paper Title	Course type	Instruction periods per Week	External Marks	Internal Marks	Total Marks	Credits
1	Wave Optics	Theory	3	60	40	100	3
2	Heat and Thermodynamics	Theory	3	60	40	100	3
3	Electronic Devices and Circuits	Theory	3	60	40	100	3
4	Analog and Digital Electronics	Theory	3	60	40	100	3
5	Semi conductor devices and materials	Theory	3	60	40	100	3
6	Semi conductor devices and materials	Lab	2	30	20	50	1
7	Wave Optics	Lab	2	30	20	50	1
8	Heat and Thermodynamics	Lab	3	30	20	50	1
9	Electronic Devices and Circuits	Lab	2	30	20	50	1
10	Analog and Digital Electronics	Lab	2	30	20	50	1
11	Information and Communication Technology	Theory	2	30	20	50	2

12.	Introduction to Public Administration	Theory	2	30	20	50	2
					Total	650	24

Semester-IV

S. No.	Paper Title	Coursetype	Instruction periods per Week	External Marks	Internal Marks	Total Marks	Credits
1	Electricity and Magnetism	Theory	3	60	40	100	3
2	Modern Physics	Theory	3	60	40	100	3
3	Introduction to Nuclear and Particle Physics	Theory	3	60	40	100	3
4	Electricity and Magnetism	Lab	2	30	20	50	1
5	Modern Physics	Lab	2	30	20	50	1
6	Introduction to Nuclear and Particle Physics	Lab	2	30	20	50	1
7	Electrical and electronic instrumentation	Theory	3	60	40	100	3
8	Electrical and electronic instrumentation	Lab	2	30	20	50	1
9	Microprocessor system	Theory	3	60	40	100	3
10	Microprocessor system	Lab	2	30	20	50	1
11	Indian Philosophy	Theory	2	30	20	50	2
12	Cyber security	Theory	2	30	20	50	2
					Total	550	24
	Short term internship	Project	8 weeks	75	25	100	4

Semester-V

S. No.	Paper Title	Course type	Instruction periods per Week	External Marks	Internal Marks	Total Marks	Credits
1	Applications of Electricity & Electronics	Theory	3	60	40	100	3
2	Electronic Instrumentation	Theory	3	60	40	100	3
3	Optical Instruments and Optometry	Theory	3	60	40	100	3
4	Solar Energy and Applications	Theory	3	60	40	100	3
5	Applications of Electricity & Electronics	Lab	2	30	20	50	1
6	Electronic Instrumentation	Lab	2	30	20	50	1
7	Optical Instruments and Optometry	Lab	2	30	20	50	1

8	Solar Energy and Applications	Lab	2	30	20	50	1
9	Cellular mobile communication	Theory	3	60	40	100	3
10	Cellular mobile communication	Lab	2	30	20	50	1
11	Computer network	Theory	3	60	40	100	3
12	Computer network	Lab	2	30	20	50	1
13	Environmental Education	Theory	2	30	20	50	2
					Total	650	26

Semester 6: Long-term Internship (4Months)

INTERNSHIP FOR A PERIOD OF 16 WEEKS FOR 12 CREDITS

SEMESTER – VI

S. No.	Paper Title	Course type	Instruction periods per Week	External Marks	Internal Marks	Total Marks	Credits
	Long Internship		16	150	50	200	12

Assessment model for the semester long apprenticeship / on the job training / internships during the VI Semester: The assessment for the V / VI Semester long apprenticeship is for 200 marks and credits assigned are 12. A monthly report is to be submitted to the teacher guide online within 15 days after the completion of every month up to four months. The last two months of internship period shall be used for preparation of final project report simultaneously undergoing on the job training / internship / apprenticeship. The assessment for this internship / on the job training will be both internal and external assessment. The internal assessment will be for 25% of marks which will be continuous and the assessment by the industry / enterprise / organization where the student does his/her internship will be indicated in grades.