



स्वामी रामानंद तीर्थ
मराठवाडा विद्यापीठ, नांदेड

॥ मा विद्या या विमुक्तये ॥

परिपत्रक - ७७ (१) ST

स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड

'ज्ञानतीर्थ', विष्णुपुरी, नांदेड - ४३१ ६०६ (महाराष्ट्र राज्य) भारत

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

'Dnyanteerth', Vishnupuri, Nanded - 431 606 (Maharashtra State) INDIA

Established on 17th September, 1994, Recognized By the UGC U/S 2(F) and 12(B), NAAC Re-accredited with 'B++' grade

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विज्ञान व तंत्रज्ञान विद्याशाखे अंतर्गत राष्ट्रीय
शैक्षणिक धोरण २०२० नुसार पदवी प्रथम
वर्षाचे अभ्यासक्रम (Syllabus) शैक्षणिक
वर्ष २०२४-२५ पासून लागू करण्याबाबत.

परिपत्रक

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, या विद्यापीठा अंतर्गत येणा-या सर्व संलग्नित महाविद्यालयामध्ये शैक्षणिक वर्ष २०२४-२५ पासून पदवीस्तरावर राष्ट्रीय शैक्षणिक धोरण -२०२० लागू करण्याच्या दृष्टीकोनातून विज्ञान व तंत्रज्ञान विद्याशाखे अंतर्गत येणा-या अभ्यासमंडळांनी तयार केलेल्या पदवी प्रथम वर्षाचे अभ्यासक्रमांना मा. विद्यापरिषदेने दिनांक १५ मे २०२४ रोजी संपन्न झालेल्या बैठकीतील विषय क्रमांक १५/५९-२०२४ च्या ठरावाअन्वये मान्यता प्रदान केली आहे. त्यानुसार विज्ञान व तंत्रज्ञान विद्याशाखेतील खालील बी. एस्सी प्रथम वर्षाचे अभ्यासक्रम (Syllabus) लागू करण्यात येत आहेत.

- 1) B. Sc. I year - Botany
- 2) B. Sc. I year - Seed Technology
- 3) B. Sc. I year - Horticulture
- 4) B. Sc. I year - Geology
- 5) B. Sc. I year - Dairy Science
- 6) B. Sc. I year -Electronics
- 7) B. Sc. I year - Environmental Science
- 8) B. Sc. I year - Fishery Science
- 9) B. Sc. I year - Mathematics
- 10) B. Sc. I year - Microbiology
- 11) B. Sc. I year - Agricultural Microbiology
- 12) B. Sc. I year - Physics
- 13) B. Sc. I year - Food Science
- 14) B. Sc. I year - Computer Science (N M D College Hingoli)

सदरील परिपत्रक व अभ्यासक्रम प्रस्तुत विद्यापीठाच्या www.srtmun.ac.in या संकेतस्थळावर उपलब्ध आहेत. तरी सदरील बाब ही सर्व संबंधितांच्या निदर्शनास आणून द्यावी, ही विनंती.

'ज्ञानतीर्थ' परिसर,

विष्णुपुरी, नांदेड - ४३१ ६०६.

जा.क्र.:शौ-१/एनइपी/विवत्रविपदवी/२०२४-२५/१११

दिनांक १२.०६.२०२४

प्रत : १) मा. आधिष्ठाता, विज्ञान व तंत्रज्ञान विद्याशाखा, प्रस्तुत विद्यापीठ.

२) मा. संचालक, परीक्षा व मुल्यमापन मंडळ, प्रस्तुत विद्यापीठ.

३) मा. प्राचार्य, सर्व संबंधित संलग्नित महाविद्यालये, प्रस्तुत विद्यापीठ.

४) मा. संचालक, सर्व संकुले परिसर व उपपरिसर, प्रस्तुत विद्यापीठ

५) मा. प्राचार्य, न्यू मॉडल डिग्री कॉलेज हिंगोली.

६) सिस्टीम एक्सपर्ट, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ. याना देवून कळविण्यात येते की, सदर परिपत्रक संकेतस्थळावर

प्रसिध्द करण्यात यावे.

डॉ. सरिता लोसरवार

सहा.कुलसचिव

शैक्षणिक (१-अभ्यासमंडळ) विभाग

**SWAMI RAMANAND TEERTH
MARATHWADA UNIVERSITY,
NANDED - 431 606 (MS)**



**(Credit Framework and Structure of Four Year UG Program with
Multiple Entry and Exit Option as per NEP-2020)**

**UNDERGRADUATE PROGRAMME OF
SCIENCE & TECHNOLOGY**

Major in **PHY (Physics)** and Minor in **DSM** (Subject)

Under the Faculty of Science & Technology

(Revised as per the Govt. of Maharashtra circular dt. 13th March 2024)

From the Desk of the Dean, Faculty of Science and Technology

Swami Ramanand Teerth Marathwada University, Nanded, enduring to its vision statement “*Enlightened Student: A Source of Immense Power*”, is trying hard consistently to enrich the quality of science education in its jurisdiction by implementing several quality initiatives. Revision and updating curriculum to meet the standard of the courses at national and international level, implementing innovative methods of teaching-learning, improvisation in the examination and evaluation processes are some of the important measures that enabled the University to achieve *the 3Es, the equity, the efficiency and the excellence* in higher education of this region. To overcome the difficulty of comparing the performances of the graduating students and also to provide mobility to them to join other institutions the University has adopted the cumulative grade point average (CGPA) system in the year 2014-2015. Further, following the suggestions by the UGC and looking at the better employability, entrepreneurship possibilities and to enhance the latent skills of the stakeholders the University has adopted the Choice Based Credit System (CBCS) in the year 2018-2019 at graduate and post-graduate level. This provided flexibility to the students to choose courses of their own interests. To encourage the students to opt the world-class courses offered on the online platforms like, NPTEL, SWAYM, and other MOOCS platforms the University has implemented the credit transfer policy approved by its Academic Council and also has made a provision of reimbursing registration fees of the successful students completing such courses.

SRTM University has been producing a good number of high calibre graduates; however, it is necessary to ensure that our aspiring students are able to pursue the right education. Like the engineering students, the youngsters pursuing science education need to be equipped and trained as per the requirements of the R&D institutes and industries. This would become possible only when the students undergo studies with an updated and evolving curriculum to match global scenario.

Higher education is a dynamic process and in the present era the stakeholders need to be educated and trained in view of the self-employment and self-sustaining skills like start-ups. Revision of the curriculum alone is not the measure for bringing reforms in the higher education, but invite several other initiatives. Establishing industry-institute linkages and initiating internship, on job training for the graduates in reputed industries are some of the important steps that the

University would like to take in the coming time. As a result, revision of the curriculum was the need of the hour and such an opportunity was provided by the New Education Policy 2020. National Education Policy 2020 (NEP 2020) aims at equipping students with knowledge, skills, values, leadership qualities and initiates them for lifelong learning. As a result the students will acquire expertise in specialized areas of interest, kindle their intellectual curiosity and scientific temper, and create imaginative individuals.

The curriculum given in this document has been developed following the guidelines of NEP-2020 and is crucial as well as challenging due to the reason that it is a transition from general science based to the discipline-specific-based curriculum. All the recommendations of the *Sukanu Samiti* given in the **NEP Curriculum Framework-2023** have been followed, keeping the disciplinary approach with rigor and depth, appropriate to the comprehension level of learners. All the Board of Studies (BoS) under the Faculty of Science and Technology of this university have put in their tremendous efforts in making this curriculum of international standard. They have taken care of maintaining logical sequencing of the subject matter with proper placement of concepts with their linkages for better understanding of the students. We take this opportunity to congratulate the Chairman(s) and all the members of various Boards of Studies for their immense contributions in preparing the revised curriculum for the benefits of the stakeholders in line with the guidelines of the **Government of Maharashtra regarding NEP-2020**. We also acknowledge the suggestions and contributions of the academic and industry experts of various disciplines.

We are sure that the adoption of the revised curriculum will be advantageous for the students to enhance their skills and employability. Introduction of the mandatory ***On Job Training, Internship program*** for science background students is praise worthy and certainly help the students to imbibe firsthand work experience, team work management. These initiatives will also help the students to inculcate the workmanship spirit and explore the possibilities of setting up of their own enterprises.

Dr. M. K. Patil

Dean

Faculty of Science and Technology

From Desk of Chairman, Board of Studies of the Subject Physics

Preamble:

The education system in India has acquired a new form with inclusion of job oriented work skill in combination with traditional fundamental core subjects along with multiple entries and choice based exit system. The development of vocational work skill amongst the aspirants being one of the major goal for seeking the livelihood in short span while competing with the world class education systems. Inclusion of multifold courses as clubbing of majors, minors, electives with skills must take cognizant for following the education quality mandates too. To achieve this, the thrust of quality needs to be addressed, discussed and carried forward in a systemic manner. Accreditation is the principal means of quality assurance in higher education and reflects the fact that in achieving recognition, the institution or program of study is committed and open for external review to meet certain minimum specified standards. The major emphasis of this accreditation process is to measure the outcomes of the program that is being accredited. Program outcomes are essentially a range of skills and knowledge that a student will have at the time of graduation from the program. A graduate program must ensure that, the passing students understand the basic concepts of Physics, have gone through one field in department of appreciate and use its methodologies of analyses and design, and have acquired skills for life-long learning. The transformation of students from one program to other at any level of education exit must make him/her self reliable. UG program in Physics program must therefore have a mission statement which is in conformity with program objectives and program outcomes that are expected for specific educational process. The outcomes of a program must be measureable and must be assessed regularly through proper feedback for improvement of the program. There must be a quality assurance process in place within the Institute to make use of the feedback for improvement of the program. The curriculum must be constantly refined and updated to ensure that the defined objectives and outcomes are achieved. Students must be encouraged to comment on the objectives and outcomes and the role played by the individual courses in achieving them. In line with this Faculty of Science and Technology of Swami Ramanand Teerth Marathwada University, Nanded has taken lead in incorporating philosophy of outcome based education in the process of curriculum development. I, as Chairman, Board of Studies in Physics Swami Ramanand Teerth Marathwada University, Nanded, happy to state that, course objectives, expected outcomes were finalized in a meeting and are stated as below:

- To provide students with a strong foundation in the mathematical, scientific and physical science fundamentals necessary to formulate, solve and analyze problems and to prepare them for graduate studies.
- To prepare students to demonstrate an ability to identify, formulate and solve problems pertaining to physical science concepts and fundamentals.
- To prepare students to demonstrate ability to understand the responsibility towards energy conservation and utilization of renewable energy sources.
- To promote awareness among students for the life-long learning and to introduce them to professional ethics and codes of professional practice.
- To develop ability for resolving the fundamental aspects relating to general physical concepts and theories.
- To develop ability in identifications of physical qualities and their measurements techniques too.
- To make them aware about working of different physical instruments and gadgets and capability to increase the working efficiency of the same.

In addition to Program Objectives, for each course of undergraduate program, objectives and expected outcomes from learner's point of view are also included in the curriculum to support the philosophy of outcome based education. I believe strongly that small step taken in right direction will definitely help in providing quality education to the stake holders.

Dr. K. S. Kanse
Chairman,
Board of Studies of the Physics
Swami Ramanand Teerth Marathwada
University, Nanded



Details of the Board of Studies Members in the subject Physics under the faculty of Science & Technology of S.R.T.M. University, Nanded

<i>Sr. No</i>	<i>Name of the Member</i>	<i>Designation</i>	<i>Address</i>	<i>Contact No.</i>
1.	Dr. K. S. Kanse	Chairman	Department of Physics, Lal Bahadur Shastri Mahavidyalaya, Dharmabad, Dist. Nanded	Mob: 09850924426 Email: kskanse@gmail.com
2.	Dr. M. K. Patil	Professor	School of Physical Sciences, S.R.T.M. University, Nanded	Mob: 08308298063 Email: patil@associates.iucaa.in
3.	Dr. Ms. M. P. Mahabole	Professor	School of Physical Sciences, S.R.T.M. University, Nanded	Mob: 9421850549 Email: mpmsrtmunsp@gmail.com
4.	Dr. S. N. Keshatti,	Professor	Department of Physics, Shivaji Mahavidyalaya, Parbhani	Mob: 9422743448 Email: keshatti.shrinivas@gmail.com
5.	Dr. C. T. Londhe	Assistant Professor	Department of Physics, Mahatma Gandhi Mahavidyalaya, Ahmedpur Dist. Latur	Mob: 9850136648 Email: londhct@gmail.com
6.	Dr. M. A. Giri	Associate Professor	Department of Physics, Gramin (ACS) Mahavidyalaya, Vasantnagar Kotygal Tq. Mukhed Dist Nanded	Mob: 9423440996 Email: drmadangiri@gmail.com
7.	Dr. V. D. Mote	Assistant Professor	Department of Physics, Dayanand Science College, Latur	Mob: 9960639169 Email: vmote.physics@gmail.com
8.	Dr. A. A. Yadav	Associate Professor	Department of Physics, Rajarshi Shahu Mahavidyalaya (Autonomous), Latur Tq. Dist. Latur	Mob: 9975213852 Email: aay_physics@yahoo.co.in
9.	Dr. R. A. Joshi	Assistant Professor	Department of Physics, Toshniwal Arts, Commerce and Science	Mob.: 9096655278 Email: urajoshi@gmail.com

			College, Sengaon Dist Hingoli	
10.	Dr. S. S. Jadhav	Associate Professor	Department of Physics, D.S.M. Arts, Commerce and Science College, Jintur Dist Parbhani	Mob: 9405209939 Email: santosh.jadhav28@yahoo.com
11.	Dr. M. D. Shirsat	Professor	Department of Physics Dr. Babasaheb Ambedkar Marathwada University, Aurangabad	Mob: 9422291987 Email: mdshirsat.phy@bamu.ac.in
12.	Dr. S. P. Yawale	Professor	Department of Physics, Govt. Vidarbha Institute of Science and Humanities, Amravati	Mob: 9423125231 Email: spyawale@rediffmail.com
13.	Dr. C. H. Ishwara Chandra	Professor	National Centre for Radio Astrophysics, TIFR, Pune	Mob: 9403136630 Email: ishwarx@gmail.com
14.	Dr. Ram Chitalkar	Industry expert	Morganite crucible (India) Ltd. Morganite crucible (India)	Mob: 9325078845 Email: ram_chitalkar@yahoo.com
15.	Dr. Pramod Watekar	Chief Manager	Sterlite Technologies Ltd., Pune	Mob: 9168187110 Email: pramodwatekar@sterlite.com



Swami Ramanand Teerth Marathwada University, Nanded
Faculty of Science and Technology (Three Optional in the First Year)

Credit Framework for Four Year Multidisciplinary Degree Program

with Multiple Entry and Exit

Subject: **DSC** (Major) /**DSM** (Minor 1 and Minor 2)

(For illustration **PHY**, **CHE** and **ELE** combinations are considered, which may change for different combinations)

Year & Level	Sem ester	Optional 1 (Major) <i>(From the same Faculty)</i>	Optional 2 (Minor 1) <i>(From the same Faculty)</i>	Optional 3 (Minor 2) <i>(From the same Faculty)</i>	Generic Elective (GE) <i>(select from Basket 3 of Faculties other than Science and Technology)</i>	Vocational & Skill Enhancement Course	Ability Enhancement Course (AEC) (Basket 4) Value Education Courses (VEC) / Indian Knowledge System (IKS) (Basket 5) <i>(Common across all faculties)</i>	Field Work / Project/Internship/ OJT/ Apprenticeship / Case Study Or Co-curricular Courses (CCC) (Basket 6 for CCC) <i>(Common across all faculties)</i>	Credits	Total Credits
1	2	3	4	5	6	7	8	9	10	11
1 (4.5)	I	SPHYCT1101 (T 2Cr) SPHYCP1101 (P 2Cr) 4 Credits	SCHECT1101 (T 2Cr) SCHECP1101 (P 2Cr) 4 Credits	SELECT1101 (T 2Cr) SELECP1101 (P 2Cr) 4 Credits	SPHYGE1101 2 Credits	SPHYSC1101 2 Credits	AECENG1101 (2Cr) ACEMIL1101 (2Cr) IKSXXX1101 (2Cr) 6 Credits		22	44
	II	SPHYCT1151 (T 2Cr) SPHYCP1151 (P 2Cr) 4 Credits	SCHECT1151 (T 2Cr) SCHECP1151 (P 2Cr) 4 Credits	SELECT1151 (T 2Cr) SELECP1151 (P 2Cr) 4 Credits	SPHYGE1151 2 Credits	SPHYSC1151 2 Credits	AECENG1151 (2Cr) ACEMIL1151 (2Cr) VECCOI1151 (2Cr) Constitution of India 6 Credits		22	
	Cum. Cr.	08	08	08	04	04	12		44	

Exit option: UG Certificate in Opt 1, Opt 2 and Opt 3 on completion of 44 credits and additional 4 credits from NSQF / Internship										
2 (5.0)	III	SPHYCT1201 (2cr) SPHYCT1202 (2cr) SPHYCP1203 (2cr) SPHYCP1204 (2cr) 8 Credits	SCHEMT1201 SCHEMP1201 (1T+1P) 2 Credits		SPHYGE1201 (2cr) SPHYGE1202 (2cr) 4 Credits	SPHYSC1201 2 Credits	ACEXXX1201 (MAR/HIN/URD /KAN/PAL) (2Cr) 2 Credits	SPHYFP1201 (2Cr) CCCXXX1201 (2Cr) 4Credits	22	88
	IV	SPHYCT1251 (2cr) SPHYCT1252 (2cr) SPHYCP1253 (2cr) SPHYCP1254 (2cr) 8 Credits	SCHEMT1251 SCHEMP1251 (1T+1P) 2 Credits		SPHYGE1251 2 Credits	SPHYVC1251 2 Credits	ACEXXX1251 (MAR/HIN/URD /KAN/PAL) (2Cr) VECEVS1251 (2Cr) 4 Credits	SPHYFP1351 (2Cr) CCCXXX1151(2Cr) 4 Credits	22	
	Cum. Cr.	24	12	08	10	06	14	12	88	
Exit option: UG Diploma in Major <u>DSC</u> and Minor <u>DSM</u> on completion of 88 credits and additional 4 credits NSQF / internship in <u>DSC</u>										
3 (5.5)	V	SPHYCT1301 (T 3Cr) SPHYCT1302 (T 3Cr) SPHYIK1303 (T 2Cr) SPHYCP1304 (P 2Cr) SPHYCP1305 (P 2Cr) 12 Credits	SPHYET1301 (T 3Cr) SPHYEP1301 (P 1Cr) 4 Cr	--	--	SPHYVC1301 4 Credits	--	SPHYFP1301 (2 Cr) 2 Credits	22	132
	VI	SPHYCT1351 (T 3Cr) SPHYCT1352 (T 3Cr) SPHYCT1353 (T 2Cr) SPHYCP1354 (P 2Cr) SPHYCP1355 (P 2Cr) 12 Credits	SPHYET1351 (T 3Cr) SPHYEP1351 (P 1Cr) 4 Cr	--	--	SPHYVC1351 2 Credits	--	SPHYOJ1351 4 Credits	22	
	Cum. Cr.	56	12	08	10	6 + 8 =14	14	18	132	

Exit option: B. Sc. (Bachelor in Science) with Major in <u>DSC</u> and Minor in <u>DSM</u>										
4 (6.0)	VII	SPHYCT1401 (T 4Cr) SPHYCT1402 (T 4Cr) SPHYCT1403 (T 2Cr) SPHYCP1404 (P 4Cr) 14 Credits	SPHYET1401 (T 3Cr) SPHYEP1401 (P 1Cr) 4 Cr	<i>Research Methodology</i> SPHYRM1401 4 Credits		--	--	--	--	22
	VIII	SPHYCT1451 (T 4Cr) SPHYCT1452 (T 4Cr) SPHYCT1453 (T 2Cr) SPHYCP1454 (P 4Cr) 14 Credits	SPHYET1401 (T 3Cr) SPHYEP1401 (P 1Cr) 4 Cr	--		--	--	--	SPHYOJ1451 4 Credits	22
Cum Cr	Honours: 92		18+4	08	10	V-08 + S-06	AEC-4+MIL-4 +VEC-4 +IKS-2	22		176
Exit option: B. Sc. (Hons) with Major in <u>DSC</u> and Minor in <u>DSM</u>										
4 (6.0)	VII	SPHYCH1401 (T 3Cr) SPHYCH1402 (T 3Cr) SPHYCH1403 (T 4Cr) (H- Honours) 10 Credits	SPHYET1401 (T 3Cr) SPHYEP1401 (P 1Cr) 4 Cr	<i>Research Methodology</i> SPHYRM1401 4 Credits		--	--	--	<i>Research Project</i> SPHYRP1401 4 Credits	22
	VIII	SPHYCH1451 (T 3Cr) SPHYCH1452 (T 3Cr) SPHYCH1453 (T 4Cr) (H- Honours) 10 Credits	SPHYET1451 (T 3Cr) SPHYEP1451 (P 1Cr) 4 Cr	--		--	--	--	<i>Research Project</i> SPHYRP1451 8 Credits	22
Exit option: B. Sc. (Hons with Research) in <u>DSC</u> and Minor in <u>DSM</u>										
Total Credits	Major – 92 / 84		Minor 1 -18 + RM - 04	Minor 2 08	GE/OE - 10	(V-08 + S-06) 14	(AEC-8 + VEC-4 + IKS-2)14	(CC-08+FP/CS- 06+OJT-04+RP- 12) 30		176

Abbreviations:

1. **DSC:** Department/Discipline Specific Core (Major)
 2. **DSE:** Department/Discipline Specific Elective (Major)
 3. **DSM:** Discipline Specific Minor
 4. **GE/OE:** Generic/Open Elective
 5. **VSEC:** Vocational Skill and Skill Enhancement Course
 6. **VSC:** Vocational Skill Courses
 7. **SEC:** Skill Enhancement Courses
 8. **AEC:** Ability Enhancement courses
 9. **MIL:** Modern Indian languages
 10. **IKS:** Indian Knowledge System
 11. **VEC:** Value Education Courses
 12. **OJT:** On Job Training: (Internship/Apprenticeship)
 13. **FP:** Field Projects
 14. **CEP:** Community Engagement and Service
 15. **CC:** Co-Curricular Courses
 16. **RM:** Research Methodology
 17. **RP:** Research Project/Dissertation
-



B. Sc. First Year Semester I (Level 4.5)

Teaching Scheme

	Course Code	Course Name	Credits Assigned			Teaching Scheme (Hrs/ week)	
			Theory	Practical	Total	Theory	Practical
Optional 1	SPHYCT1101	Fundamental of Physics- I	02	--	04	02	--
	SPHYCP1101	Practical –I	-	02			04
Optional 2	SDSCMT1101	--	02	--	04	02	--
	SDSCMP1101	Title of paper 2 (practical)	-	02			04
Optional 3	SDSCMT1101	--	02	--	04	02	--
	SDSCMP1101	Title of paper 2 (practical)	-	02			04
Generic Electives <i>(from other Faculty)</i>	SDSCGE1101	Renewable Energy (Basket 3 of respective Faculty)	02	--	02	02	--
Skill Based Course <i>(related to Major)</i>	SPHYSC1101	Computational Physics	--	02	02	--	04
Ability Enhancement Course	AECENG1101	L1 – Compulsory English	02	--	02	02	--
Indian Knowledge System (IKS)	IKSXXX1101	Select from Basket 5	02	--	02	02	--
Language	ACEMIL1101		02	--	02	02	
Total Credits			14	08	22	14	16



B. Sc. First Year Semester I (Level 4.5)

Examination Scheme

[20% Continuous Assessment (CA) and 80% End Semester Assessment (ESA)]

(For illustration we have considered a paper of 02 credits, 50 marks, need to be modified depending on credits assigned to individual paper)

Subject (1)	Course Code (2)	CourseName (3)	Theory				Practical		Total Col (6+7) / Col (8+9) (10)
			Continuous Assessment (CA)			ESA	CA (8)	ESA (9)	
			Test I (4)	Test II (5)	Average of T1 & T2 (6)	Total (7)			
Optional 1	SPHYCT1101	Fundamental of Physics-I	10	10	10	40	--	--	50
	SPHYCP1101	Practical I	--	--	--	--	20	30	50
Optional 2	SDSCMT1101	--	10	10	10	40	--	--	50
	SDSCMP1101	Title of paper 2 Practical	--	--	--	--	20	30	50
Optional 3	SDSCMT1101	--	10	10	10	40	--	--	50
	SDSCMP1101	Title of paper 2 practical	--	--	--	--	20	30	50
Generic Elective	SDSCGE1101	Renewable Energy (Basket 3)	10	10	10	40	--	--	50
Skill Based Course	SPHYSC1101	Computational Physics	--	--	--	--	20	30	50
Ability Enhancement Course	AECENG1101	L1 – Compulsory English	10	10	10	40	--	--	50
Indian Knowledge System	IKSXXX1101	Title (Basket 5)	10	10	10	40	--	--	50
Language	ACEMIL1101		10	10	10	40	--	--	50



B. Sc. First Year Semester II (Level 4.5)

Teaching Scheme

	Course Code	CourseName	CreditsAssigned			TeachingScheme (Hrs/ week)	
			Theory	Practical	Total	Theory	Practical
Optional 1	SPHYCT1151	Fundamental of Physics- II	02	--	04	02	--
	SPHYCP1151	Practical –II	-	02			04
Optional 2	SDSCMT1151	--	02	--	04	02	--
	SDSCMP1151	Title of paper 2 (practical)	-	02			04
Optional 3	SDSCMT1151	--	02	--	04	02	--
	SDSCMP1151	Title of paper 2 (practical)	-	02			04
Generic Electives <i>(from other Faculty)</i>	SDSCGE1151	Wonders in the sky (Basket 3 of respective Faculty)	02	--	02	02	--
Skill Based Course <i>(related to Major)</i>	SDSCSC1151	Electrical Measurements	--	02	02	--	04
Ability Enhancement Course	AECENG1151	L1 – Compulsory English	02	--	02	02	--
Indian Knowledge System (IKS)	IKSXXX1151	Select from Basket 5	02	--	02	02	--
Constitution of India	VECCOI1151		02	--	02	02	
Total Credits			14	08	22	14	16



B. Sc. First Year Semester II (Level 4.5)

Examination Scheme

[20% Continuous Assessment (CA) and 80% End Semester Assessment (ESA)]

(For illustration we have considered a paper of 02 credits, 50 marks, need to be modified depending on credits assigned to individual paper)

Subject (1)	Course Code (2)	Course Name (3)	Theory				Practical		Total Col (6+7) / Col (8+9) (10)
			Continuous Assessment (CA)			ESA	CA (8)	ESA (9)	
			Test I (4)	Test II (5)	Average of T1 & T2 (6)	Total (7)			
Optional 1	SPHYCT1151	Fundamental of Physics II	10	10	10	40	--	--	50
	SPHYCP1151	Practical II	--	--	--	--	20	30	50
Optional 2	SDSCMT1151	--	10	10	10	40	--	--	50
	SDSCMP1151	Title of paper 2 Practical	--	--	--	--	20	30	50
Optional 3	SDSCMT1151	--	10	10	10	40	--	--	50
	SDSCMP1151	Title of paper 2 practical	--	--	--	--	20	30	50
Generic Elective	SDSCGE1151	Wonders in the sky (Basket 3)	10	10	10	40	--	--	50
Skill Based Course	SPHYSC1151	Electrical Measurements	--	--	--	--	20	30	50
Ability Enhancement Course	AECENG1151	L1 – Compulsory English	10	10	10	40	--	--	50
Indian Knowledge System	IKSXXX1151	Title (Basket 5)	10	10	10	40	--	--	50
Constitution of India	VECCOI1151		10	10	10	40	--	--	50

SPHYCT1101 *Fundamentals of Physics-I*
Teaching Scheme

Course Code	Course Name (Paper Title)	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SPHYCT1101	Fundamentals of Physics-I	02	--	02	--	02

Major 1 -Assessment Scheme

Course Code (2)	Course Name (3)	Theory				Practical		Total [Col (6+7) or Col (8+9)] (10)
		CA			ESA (7)	CA (8)	ESA (9)	
		Test I (4)	Test II (5)	Avg of T1 & T2 (6)				
SPHYCT1101	Fundamentals of Physics-I	10	10	10	40	--	--	50

SPHYCT1101: *Fundamentals of Physics I*

Course pre-requisite:

1. Aspirant should have basic knowledge of Physics and properties of materials.
2. Should be able to understand the terminologies of physical sciences and its applications in everyday life.
3. The pre-requisite for this course is knowledge of gravitations, fluid, sound and semiconductors.

Course Objectives:

- To introduce students with concepts of fundamentals of physics in brief and properties of materials that exists in different phases i.e., solid, liquid and gas.
- To make students understand laws of motion and its applications to various systems.
- To enable students with physical properties depending on aspects of temperature, pressure etc. on fluid, sound etc

Course Outcomes:

- Students will be able to understand the fundamental nature of Physics.
- Students will be enabled to handle different types of problems and other advanced courses in Physics and Chemistry.

SPHYCT1101: Fundamentals of Physics-I

Module No.	Unit No.	Topic	Hrs. Required to cover contents
1.0	Unit I: Gravitation		07
	1.1	Newton's law of gravitation – statement and derivation.	
	1.2	Motion of a particle in a central force field (motion is in a plane, angular momentum is conserved, areal velocity is constant),	
	1.3	Gravitational Field and Gravitational potential.	
	1.4	Gravitational potential due to spherical shell.	
	1.5	Kepler's Laws (statement only).	
2.0	Unit II: Fluids		08
	2.1	Fluids, Density, and Pressure, Measuring Pressure	
	2.2	Pascal's Principle and Hydraulics	
	2.3	Archimedes' Principle and Buoyancy	
	2.4	Fluid Dynamics, Bernoulli's Equation, Viscosity and Turbulence	
3.0	Unit III: Sound		08
	3.1	Introduction: Origin of Sound, Types of sound waves	
	3.2	Velocity of sound in Air and water	
	3.3	Newton's formula for velocity of sound	
	3.4	Laplace correction	
	3.5	Sound Intensity	
	3.6	Effect of Temperature, Pressure, Humidity on the velocity of sound	
4.0	Unit IV: Semiconductor Physics		07
	4.1	Introduction, Intrinsic semiconductor	
	4.2	Extrinsic semiconductors: P-type, and N-type	
	4.3	P-N junction diode and V-I characteristics	
	4.4	Zener diode, its characteristics, reverse breakdowns, Zener diode as a voltage regulator	
	4.5	LED (V-I characteristics), photodiode (operation and characteristics)	
		Total	30

SPHYCP1101: Practical- I (based on Fundamentals of Physics I)

Teaching Scheme

Course Code	Course Name (Paper Title)	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SPHYCP1101	Practical I	--	04 (60 Hr)	--	02	02

Assessment Scheme

Course Code (2)	Course Name (3)	Theory				Practical		Total [Col (6+7)/ Col (8+9)] (10)
		CA			ESA (7)	CA (8)	ESA (9)	
		Test I (4)	Test II (5)	Avg (T1+T2)/2 (6)				
SPHYCP1101	Practical	--	--	--	--	20	30	50

Course pre-requisite:

1. Knowledge of Principles of work
2. Basic information about instruments, gadgets etc.
3. Knowledge of precautionary measures.

Course objectives:

- The main objective of practical course is to engage the student in the subject and help them get a better understanding of the topic studies in Physics lesson.
- To allow hand on experiments to learn and understand fundamental principle of operation.
- To develop the scientific attitude amongst student.

Course outcomes:

- ✓ Students will be able to understand different concepts and principles of Physical instrumentations.
- ✓ Student will learn about validity of concepts by doing the experiment.

SPHYCP1101: *Practical- I (based on Fundamentals of Physics I)*

Experiments based on Unit I:

1. Moment of inertia of flywheel.
2. To determine 'g' by Kater's Pendulum.
3. Bar pendulum
4. Spiral spring – determination of 'g' and unknown mass.
5. Tensional pendulum
6. Study of compound pendulum

Experiments based on Unit II:

7. Coefficient of viscosity by Searls viscometer
8. Coefficient of viscosity by Poissuli's method
9. S.T. by Jagger's method

Experiments based on Unit III:

10. Resonance tube
11. Helmholtz resonator
12. Velocity of sound wave in air with Kundt's tube
13. Velocity of sound in air by Resonating bottle

Experiments based on Unit IV:

14. P-N junction diode V-I characteristics
15. Zener diode Reverse bias characteristics
16. Zener diode as a voltage regulator
17. Photo diode Current Voltage characteristics
18. LED V-I characteristics

****STUDENT SHOULD PERFORM AT LEAST 12 (TWELVE)
EXPERIMENTS FROM THE ABOVE LIST***

Books Recommended:

1. Mechanics by D.S Mathur.
2. Mechanics by J.C. Upadhaya.
3. Properties of matter by D.S. Mathur
4. Properties of matter by Brijilal and Subramanyam.
5. Waves and Oscillations – N. Subrahmanyam, Brij Lal, Second Edition, Vikas Publishing House Pvt Ltd.
6. Sound - Khanna and Bedi.
7. University Physics Volume 1- Samuel J. Ling, William Moebs, Jeff Sanny , 2016
8. Basic Electronics by V. K. Mehta
9. Basic Electronics: Solid state by B. L. Theraja

SPHYSC1101 (Skill): Computational Physics

Teaching Scheme

Course Code	Course Name (Paper Title)	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SPHYSC 1101	Computational Physics	--	04	--	02	02

Assessment Scheme

Course Code (2)	Course Name (3)	Theory				Practical		Total [Col (6+7)/ Col (8+9)] (10)
		CA			ESA (7)	CA (8)	ESA (9)	
		Test I (4)	Test II (5)	Avg (T1+T2)/2 (6)				
SPHYSC 1101	Computational Physics	--	--	--	--	20	30	50

Course pre-requisite:

Prerequisite for this course is the knowledge of elementary mathematics, calculus and computer.

Course objectives:

- To impart skills related to the use of computer and allied software and encourage them to employ that software as a part of the Physics Learning.
- To introduce the students to perform their own algorithms and flow chart, write computer programs to solve mathematical expressions using computers, make decisions, etc.

Course outcomes:

- ✓ This course being pre requisite for many advance courses hence students will be able to learn hand on experiments, program designing.
- ✓ Students will be made aware with computer systems and its functioning.

SPHYSC1101 (Skill): Computational Physics

Module No.	Unit No.	Topic	Hrs. Required
1.0	Algorithms and Flowcharts		15
	1.1	Algorithm- definition and development	
	1.2	Flowchart Concept, Symbols, Algorithm and Flowcharts for roots of quadratic equation	
	1.3	sum of two matrices, sum and product of finite series	
	1.4	calculation of Sin (x) as series	
2.0	Scientific Programming		15
	2.1	Fortran: character set, Constants, Variables	
	2.2	Arithmetic expressions, Library functions, Arithmetic statements	
	2.3	Structure of program	
	2.4	FORMAT specification, READ, WRITE	
	2.5	Terminating a program, programming style, Unformatted I/O statements	
3.0	Control Statements		15
	3.1	Unconditional GOTO, Computed GOTO	
	3.2	Arithmetic IF, Logical if, IF-THEN-ELSE, Nested IF-THENELSE, ELSE-IF-THEN	
	3.3	Rules for DO loops, CONTINUE, Nested Do loops, DATA Statement	
	3.4	Double precision, Logical data, CPMPLEX data, String manipulation, WHILE structure, Array declarative statements	
	3.5	Implied Do loops, One & multidimensional array, Function subprograms, Subroutine subprograms	
	3.6	COMMON, EQUIVALENCE, Data file organization	
	3.7	OPEN a file, READ from a file, WRITE in a file, Closing a file, File creation programs, File processing programs.	
4.0	Hands on Experiments		15
	4.1	Centigrade to Fahrenheit conversion.	
	4.2	Area of a triangle.	
	4.3	Velocity and acceleration.	
	4.4	Fibonacci Numbers	
	4.5	Quadratic equation.	
	4.6	Sum of series.	
	4.7	Sum of sine series.	
	4.8	Greatest common divisor.	
	4.9	Matrix addition.	
	5.0	Matrix multiplication.	
Total			60

Reference Books:

1. Introduction to Numerical Analysis, S S Sastry, 5th edition, 2012, PHI Learning Pvt. Ltd.
2. Computer programming in Fortran 77, V. Rajaraman, PHI Publisher
3. Computational Physics: An Introduction, R. C. Verma, New Age International Publisher, New Delhi.

Course Structure:

SPHYGE1101 (Elective): Renewable Energy

Teaching Scheme

Course Code	Course Name (Paper Title)	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SPHYGE1101	Renewable Energy	02	--	02	--	02

Assessment Scheme

Course Code (2)	Course Name (3)	Theory				Practical		Total [Col (6+7)/ Col (8+9)] (10)
		CA			ESA (7)	CA (8)	ESA (9)	
		Test I (4)	Test II (5)	Avg (T1+T2)/2 (6)				
SPHYGE1101	Renewable Energy	10	10	10	40	--	--	50

SPHYGE1101 (Generic Elective): Renewable Energy

Course pre-requisite:

1. Knowledge of environment and energy requirements.
2. Introductory idea of renewable energy sources.
3. Aware about the light, energy requirements for household applications.

Course objective:

- To provide knowledge and awareness amongst students about need of energy conservation and make them environment consciousness.
- To introduce and create awareness among the students about use of the non-conventional energy sources such as solar energy, wind energy, tidal energy, biomass, etc.

Course outcome:

- ✓ After completing this course the students will gain knowledge of various non-conventional energy sources.
- ✓ Students will be able to understand use of renewable energy sources in day to life.
- ✓ Hand on experiments will provide them an expertise to resolve the basic issues of functioning of renewable energy source.
- ✓ Students will be trained to harvest non-conventional energy sources and design their own gadgets to convert and use them for their house hold purposes.

Curriculum Details:

SPHYGE1101 (Generic Elective): Renewable Energy

Module No.	Unit No.	Topic	Hrs. Required to cover contents
1.0	Fossil Fuels and Alternate Sources of Energy		07
	1.1	Fossil fuels, Need of renewable energy	
	1.2	Non-conventional energy sources	
	1.3	Wind Energy, Tidal Energy	
	1.4	Solar Energy, Biomass Energy	
2.0	Solar Energy and Harvesting		08
	2.1	Importance, Storage of Solar Energy	
	2.2	Applications of Solar Energy	
	2.3	Solar Water Heater, Solar Distillation, Solar Cooker, Solar Greenhouses	
	2.4	Solar cell characteristics of Photovoltaic (PV) Systems	
3.0	Wind Energy Harvesting		08
	3.1	Fundamentals of Wind Energy	
	3.2	Wind Turbines and Electrical Machines in Wind Turbines	
	3.3	Power Electronic, Interfaces and Grid Interconnection Technologies	
4.0	Ocean Energy		07
	4.1	Ocean Energy, Potential against Wind and Solar Energy	
	4.2	Wave Energy Devices, Geothermal Energy Technologies	
	4.3	Hydropower Technologies	
		Total	30

Reference Books:

1. Non-conventional energy sources - G.D Rai - Khanna Publishers, New Delhi
2. Solar energy - M P Agarwal - S Chand and Co. Ltd.
3. Solar energy - Suhas P Sukhative Tata McGraw - Hill Publishing Company Ltd.
4. Godfrey Boyle, "Renewable Energy, Power for a sustainable future", 2004, Oxford University Press, in association with The Open University.
5. Dr. P Jayakumar, Solar Energy: Resource Assesment Handbook, 2009
6. J.Balfour, M.Shaw and S. Jarosek, Photovoltaics, Lawrence J Goodrich (USA).

SPHYCT1151: Fundamentals of Physics II
Teaching Scheme

Course Code	Course Name (Paper Title)	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SPHYCT1151	Fundamentals of Physics-I I	02	--	02	--	02

Major 1 -Assessment Scheme

Course Code (2)	Course Name (3)	Theory				Practical		Total [Col (6+7) or Col (8+9)] (10)
		CA			ESA (7)	CA (8)	ESA (9)	
		Test I (4)	Test II (5)	Avg of T1 & T2 (6)				
SPHYCT1151	Fundamentals of Physics-II	10	10	10	40	--	--	50

SPHYCT1151: *Fundamentals of Physics II*

Course pre-requisite:

1. Aspirant should have basic knowledge of Physics and properties of materials.
2. Should be able to understand the terminologies of physical sciences and its applications in everyday life.
3. The pre-requisite for this course is knowledge of Optics, electromagnetic, electrical circuit analysis and kinetic theory of matters.

Course Objectives:

- To introduce students with concepts of fundamentals of physics in brief and properties of materials that includes optics, electromagnetic properties and kinetic theory of matters.
- To make students understand laws of light interactions, and electronic motion and its applications to various systems.

Course Outcomes:

- Students will be able to understand the fundamental nature of Physics.
- Students will be enabled to handle different types of problems and other advanced courses in Physics.

SPHYCT1151: *Fundamentals of Physics II*

Module No.	Unit No.	Topic	Hrs. Required to cover contents
1.0	Unit I: Optical Instruments		07
	1.1	Introduction, the eye, camera, size of object, the simple magnifier, field of view, stops and pupils	
	1.2	objective and eyepieces, Huygens eyepiece, Ramsden eyepiece (Cardinal points omitted), comparison of Huygens eyepiece and Ramsden eyepiece	
	1.3	compound microscope, telescope	
	1.4	reflecting telescope, constant deviation spectrometer	
2.0	Unit II: Electromagnetism		08
	2.1	Introduction	
	2.2	Faraday's law, Lenz's law	
	2.3	Self-induction and self-inductance	
	2.4	Self-inductance of a coil, self-inductance of a solenoid	
	2.5	Mutual induction and mutual inductance	
	2.6	Mutual inductance of a pair of co-axial coils, mutual inductance of a pair of co-axial solenoids	
3.0	Unit III: Electrical Circuit Analysis		08
	3.1	Concepts of R, L and C elements	
	3.2	Ohm's Law	
	3.3	Kirchhoff's Laws	
	3.4	Resistors in series and parallel circuits	
	3.5	Superposition theorem	
	3.6	Thevenin's theorem	
	3.7	Norton's Theorem	
	3.8	Maximum power transfer theorem	
4.0	Unit IV: Kinetic Theory of Matter		07
	4.1	Introduction, Three states of matter, Ideal gas, Kinetic model	
	4.2	Pressure exerted by gas, r.m.s. speeds of molecules	
	4.3	Deduction of Boyle's law,	
	4.4	Derivation of gas equation	
	4.5	Derivation of gas laws	
		Total	30

SPHYCP1151: Practical-II (based on Fundamentals of Physics II)
Teaching scheme

Course Code	Course Name (Paper Title)	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SPHYCP1151	Practical II	--	04 (60 Hr)	--	02	02

Assessment Scheme

Course Code (1)	Course Name (2)	Theory				Practical		Total [Col (5+6)/ Col (7+8)] (9)
		CA			ESA (6)	CA (7)	ESA (8)	
		Test I (3)	Test II (4)	Avg (T1+T2)/2 (5)				
SPHYCP1151	Practical II	--	--	--	--	20	30	50

Course pre-requisite:

1. Knowledge of Principles of work
2. Basic information about instruments, gadgets etc.
3. Knowledge of precautionary measures.

Course objectives:

- The main objective of practical course is to engage the student in the subject and help them get a better understudying of the topic studies in Physics lesson.
- To allow hand on experiments to learn and understand fundamental principle of operation.
- To develop the scientific attitude amongst student.

Course outcomes:

- ✓ Students will be able to understand different concepts and principles of Physical instrumentations.
- ✓ Student will learn about validity of concepts by doing the experiment.

SPHYCP1151: *Practical- II (based on Fundamentals of Physics II)*

Experiments based on Unit I:

1. Introduction spectrometer, spherometer and travelling microscope
2. Calibration of spectrometer
3. Determination of angle of prism.
4. Refractive index of prism
5. λ -by diffraction grating using LASER diode

Experiments based on Unit II:

6. Low resistance by potentiometer
7. Resistivity by Carry-Foster's bridge
8. Field along axis of circular coil.
9. C1/C2 by proportional kick method
10. C1/C2 by Desauty's method
11. Owen's bridge

Experiments based on Unit III:

12. Verification of KIRCHHOFF'S current and voltage laws
13. Verification of THEVENIN's Theorem
14. Verification of NORTON's Theorems.
15. Verification of Superposition Theorems
16. Verification of the maximum power transfer theorem

Experiments based on Unit IV:

17. Thermal conductivity by Lees disc method
18. Verification of Boyle's law

****STUDENT SHOULD PERFORM AT LEAST 12 (TWELVE)
EXPERIMENTS FROM THE ABOVE LIST***

Recommended list of Books:

1. Basic Electronics- Bernard Grob, International student edition, Fourth Edition, Fourth edition, McGraw Hill, 1977

2. Charles K. Alexander, Mathew N.O. Sadiku, "Fundamentals of Electric Circuits", Second Edition, McGraw Hill, 2019.
3. Electric Circuits, S. A. Nasar, Schaum's outline series, Tata McGraw Hill (2004)
4. Electrical Circuits, M. Nahvi and J. Edminister, Schaum's Outline Series, Tata McGrawHill (2005)
5. A textbook of optics by N. Subrahmanyam, Brijlal, M. N. Avadhanulu S. Chand Publications.
6. University Physics Volume 2 by Samuel J. Ling, Jeff Sanny, William Moebs, OpenStax, Rice University.
7. Heat, Thermodynamics and statistical Physics Revised Edition (Multicolour), by Brijlal, N. Subrahmanyam and P.S. Hemne, S. Chand and Company Ltd.

SPHYSC1151 (Skill): Electrical Measurements

Teaching Scheme

Course Code	Course Name (Paper Title)	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SPHYSC1151	Electrical Measurement	02	--	02	--	02

Assessment Scheme

Course Code (2)	Course Name (3)	Theory				Practical		Total [Col (6+7)/ Col (8+9)] (10)
		CA			ESA (7)	CA (8)	ESA (9)	
		Test I (4)	Test II (5)	Avg (T1+T2)/2 (6)				
SPHYSC1151	Electrical Measurement	10	10	10	40	--	--	50

Course pre-requisite:

1. Knowledge of basic electrical working principles and symbols.
2. Wiring principles and connections including phases.
3. Aware about the safety measures and handling of tools.

Learning objectives:

- To provide knowledge about the electrical gadgets and their working principles.
- To introduce about the electrical wiring systems at domestic and household appliances.
- To provide hand on experiments for electrical installations, maintenance and wiring repairs.

Learning outcome:

- After completing this course the students will gain knowledge of various electrical gadget installations at domestic levels. .
- Students will be able to understand wiring systems and electrical connections of different phases at house hold appliances.
- Hand on experiments will provide them an expertise for electrical installations, maintenance and wiring repairs.

SPHYSC1151 (Skill): Electrical Measurements

Module No.	Unit No.	Topic	Hrs. Required to cover contents
1.0	Types of Wires and Protective Devices		15
	1.1	Types of wires, size of wire, Concept of gauge of wire, current carrying capacity, comparison between copper and aluminium wire, Choice of conductor material.	
	1.2	Different types of switches for electrical purposes.	
	1.3	Ordinary fuse, cartridge fuse, HRC fuse, cut out, Determination of Fuse size according to the load of circuit and its location, Use of Miniature circuit breaker (MCB), Earth leakage circuit breaker (ELCB).	
2.0	Domestic Wiring Installation		15
	2.1	Wiring accessories, Main switch, Distribution board, Junction box, Switch board, Sub circuit	
	2.2	Positioning of wiring accessories, Simple light & Fan circuit	
	2.3	Power circuit, Staircase lighting circuits, Electrical wiring installation in buildings.	
3.0	Testing of Installation		15
	3.1	Insulation resistance test between installation & earth	
	3.2	Insulation resistance test between conductors.	
	3.3	Polarity test of single pole switch, Earth continuity test, Earth resistance test. Use of test lamp and meggar in fault location	
4.0	Electrical Installation of Motors		15
	4.1	Rules for installation of power circuit, Guidelines for power circuit wiring in small industries. Concept of three phase supply, Phase voltage, line voltage, testing of three phase voltage with test lamp and multimeter.	
	4.2	Wiring diagram and single line diagram for A.C. motor installation, Materials required for single phase & 3- phase A.C. motor installation.	
	4.3	Leakage current, Cause of earthing. Resistance of earth conductor. Pipe earthing, Plate earthing	
		Total	60

Reference Books:

1. Electrical Estimating & costing – J.B.Gupta- S.K.Kataria Publication
2. Electrical Estimating & costing – S.R.Chakraborty
3. Electrical Estimating & costing – S.Singh- Dhanpat Rai Publication
4. Installation Commissioning & Maintenance of Electrical equipment – Tarlok singh - S.K.Kataria Publication

Course Structure:

SPHYGE1151 (Elective): Wonders in the Sky

Teaching Scheme

Course Code	Course Name (Paper Title)	Teaching Scheme (Hrs.)		Credits Assigned		
		Theory	Practical	Theory	Practical	Total
SPHYGE 1151	Wonders in the Sky	02	--	02	--	02

Assessment Scheme

Course Code (2)	Course Name (3)	Theory				Practical		Total [Col (6+7)/ Col (8+9)] (10)
		CA			ESA (7)	CA (8)	ESA (9)	
		Test I (4)	Test II (5)	Avg (T1+T2)/2 (6)				
SPHYGE 1151	Wonders in the Sky	10	10	10	40	--	--	50

SPHYGE1151 (Elective): Wonders in the Sky

Course pre-requisite:

None this course is open to all the students, hence have no pre-requisite

Course objective:

- To inculcate the scientific awareness about the vastness of the space
- To introduce the learners about the world of astronomy
- To explore and compare the properties of planets in solar system
- To understand the structure of universe and our position in it

Course outcome:

- ✓ Identify the objects visible to the unaided eye in the night sky
- ✓ Explain the phenomenon like seasons on earth, solar and lunar eclipse
- ✓ Explain the dynamics of planet in solar system, use the orbital properties to estimate mass of the sun
- ✓ Compare and contrast the terrestrial planets and the Jovian planets
- ✓ Derive the scientific understanding and explain the observed properties of stars and estimate their temperature, mass, size etc
- ✓ Describe the scale of universe and relative sizes of the different objects within the Universe
- ✓ Describe the Earth's place in the solar system, Galaxy and Universe

SPHYGE1151 (Elective): Wonders in the Sky

Module No.	Unit No.	Topic	Hrs. Required
1.0	Observational Astronomy		07
	1.1	Contribution of Ptolemy, Copernicus, Tycho Brahe, Johannes Kepler, Galileo Galilei	
	1.2	Concept of positional astronomy: celestial sphere, cardinal points, circle of celestial sphere, alt azimuth, equatorial coordinate system (Introduction)	
	1.3	Sidereal, Apparent and Mean solar time and their relations	
	1.4	Constellation and nomenclature of stars: Aries, Pisces, Orion, Canis major, Taurus, Leo, Summer Triangle and Big Dipper (Saptarsi)	
2.0	The Solar Family		08
	2.1	Sun and its atmosphere, planetary system, elliptical orbits and keplers laws	
	2.2	Terrestrial laws Jovian planets, characteristics of Terrestrial laws Jovian planets, asteroids, meteors and meteorites, comets (elementary ideas)	
	2.3	Phases and motion of moon, solar and lunar eclipses, seasons	
	2.4	Origin of the solar system-the nebular model	
3.0	The World of Stars		08
	3.1	Stellar distance scale, distance of stars by trigonometric parallax	
	3.2	Brightness and luminosities- innerves square laws, apperent magnitude, relation between brightness and apperant magnitude, absolute magnitude	
	3.3	Black bodey approximation to the continuous radiations, planks laws	
	3.4	Color index and temperature of stars, classification of stars, H-R diagram and silent features	
4.0	Vastness of the Universe		07
	4.1	Milky ways shape, size and structure, our position in it, rotation of the milky ways (elementary ides)	
	4.2	Other galaxies in the universe- type and properties	
	4.3	The concept of red shift and Hubble laws of expanding universe, age of universe	
	4.4	Origin of the universe-the big bang theory (elementary ides)	
Total			30

Text Books:

1. **V. B. Bhatia** , *Textbook of Astronomy and Astrophysics with Elements of Cosmology*, Narosa Publishing House, New Delhi.
2. **K. D. Abhyankar**, *Astrophysics: Stars and Galaxies*, Tata McGraw Hill Publication
3. **Baidyanath Basu**, *An Introduction to astrophysics*, PHI Learning Pvt. Ltd.
4. **Frank H. Shu**, *The Physical Universe*, University of California, Berkeley

Reference Books:

1. **Jayant Vishnu Narlikar**, *Seven Wonders of the Sky*, Cambridge University Press
2. **A. Unsold and B. Boscchek**, *The New Cosmos: An Introduction to Astronomy and Astrophysics*, 5th ed. Springer-Verlag, Berling
3. **Bardley W. Caroll and Dale A Ostlie**, *An Introduction to Modern Astrophysics*, 2nd Edition, Pearson Publishers

Guidelines for the Course Assessment:

A. Continuous Assessment (CA) (20% of the Maximum Marks) of theory and practical courses:

- i. **For Theory Course:** CA shall form 20% of the Maximum Marks and shall be carried out over the entire semester. It shall be done by conducting **Two Tests** (Test I on 40% curriculum) and **Test II** (on remaining 40% syllabus) and average of the marks scored by a student in these two tests of a particular paper shall be taken as the **CA** score.
- ii. **For Practical Course:** CA score of the practical course shall be marks scored by a student in the internal practical examination conducted by the concerned teacher.

B. End Semester Assessment (80% of the Maximum Marks) of theory and practical courses:

(For illustration a paper of 02 credits, 50 marks has been considered and shall be modified appropriately depending upon credits of the individual paper)

Question Paper Pattern of the ESA:

- i. **ESA Question paper shall consist 6 questions, each of 10 marks**
- ii. **Question No.1 shall be compulsory and shall be based on the entire syllabus**
- iii. **Students shall have to solve ANY THREE of the remaining Five Questions (i.e. from question 2 to 6)**
Students shall have to solve a TOTAL of 4 Questions.

C. Syllabi, Teaching and Examination Scheme for the courses in Column 7 and Column 8 (AEC, VEC, IKS, CI, EVS, CCCs, etc.) shall be common for all the students from different faculties.

Note: Number of lectures required to cover syllabus of a course depends on the number of credits assigned to a particular course. One credit of theory corresponds to 15 Hours lecturing and for practical course one credit corresponds to 30 Hours. For example, for a course of two credits 30 lectures of one hour duration are assigned, while that for a three credit course 45 lectures.

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