

**PG & RESEARCH DEPARTMENT
OF
PHYSICS**

**NATIONAL COLLEGE
(AUTONOMOUS)**

TIRUCHIRAPPALLI

B. Sc. – MAJOR-SYLLABUS

FROM JUNE 2019 ONWARDS

VISION

- ❖ To be the pinnacle of academic and research excellence in **PHYSICS**
(Learn Physics and Stay as a Physicist)

MISSION

As a Department, We are committed to achieve academic excellence through innovative teaching and learning processes.

- ❖ To prepare the students to be professionally competent to face the challenges in the industry.
- ❖ To promote quality and ethics among the students.

PROGRAMME EDUCATIONAL OBJECTIVES

- PEO1:** To provide students with a strong foundation in the fundamentals of Physics to formulate, solve and analyze Physics problems and to prepare them for Post Graduate studies and higher learning.
- PEO2:** To develop an ability to analyze the requirements to work as teams with effective communication skills and leadership qualities.
- PEO3:** To prepare the students for a successful career and work with values for social concern.
- PEO4:** To promote student awareness on the life-long learning and to introduce them to professional ethics and codes of professional practice.

PROGRAMME OUTCOMES

- PO1:** Choose teaching and research as a career with the skills acquired.
- PO2:** Create confidence to become an entrepreneur by providing entrepreneurial skills and technical skills.
- PO3:** Get through successfully in the competitive examinations conducted at the state level and national level for employment.
- PO4:** Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.
- PO5:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

B.Sc. (PHYSICS) – SCHEME AND SYLLABUS – CBCS SYSTEM

(Applicable to the candidates admitted from the academic year 2019-20 onwards)

| Semester | Part | Course Title | Title | Instr. Hours/ week | Credit | Exam Hours | Marks | | | Total | |
|--|-----------------------------------|--|---|--|-----------|------------|-------|------|-----|------------|-----|
| | | | | | | | Int | Ext | | | |
| | | | | | | | | Oral | W | | |
| I | I | Language Course-I (LC - I) | Tamil-I/Hindi-I/Sanskrit-I U19T1, U19H1, U19S1 | 6 | 3 | 3 | 25 | | 75 | 100 | |
| | II | English Language Course-I (ELC-I) | English-I U19E1 | 6 | 3 | 3 | 25 | | 75 | 100 | |
| | III | Core Course – I (CC-I) | | Properties of Matter and Sound U19PH1 | 5 | 5 | 3 | 25 | | 75 | 100 |
| | | Core Course – II (CC-II) | | Physics Major Practical –I U19PH 2P | 3 | - | - | - | | - | - |
| | | First Allied Course-I (1AC-I) | | Allied Mathematics I (U19IAC1) | 5 | 3 | 3 | 25 | | 75 | 100 |
| | First Allied Course – II (1AC-II) | | Allied Mathematics II (U19IAC2) | 3 | - | - | - | | - | - | |
| | IV | Environmental Studies | | Environmental Studies (U19ES) | 2 | 2 | 3 | 25 | | 75 | 100 |
| Total | | | Papers: 7 | 30 | 16 | | | | | 500 | |
| II | I | Language Course-I (LC -I I) | Tamil-II/Hindi-II/Sanskrit-II U19T1, U19H1, U19S1 | 6 | 3 | 3 | 25 | | 75 | 100 | |
| | II | English Language Course – II (ELC-II) | | English-II U19E2 | 4 | 2 | 3 | 25 | | 75 | 100 |
| | | Communicative English –I (CEC-I) | | Communicative English –I U19CE1 | 2 | 1 | 3 | 25 | 5 | 70 | 100 |
| | III | Core Course – II (CC-II) | | Physics Major Practical –I U19PH2P | 3 | 6 | 3 | 25 | 5 | 70 | 100 |
| | | Core Course – III (CC-III) | | Mechanics and Relativity U19PH3 | 5 | 5 | 3 | 25 | | 75 | 100 |
| | | First Allied Course – II (1AC-II) | | Allied Mathematics II (U19IAC2) | 3 | 3 | 3 | 25 | 5 | 70 | 100 |
| | | First Allied Course – III (1AC-III) | | Allied Mathematics III (U19IAC3) | 5 | 3 | 3 | 25 | | 75 | 100 |
| | IV | Skill Based Elective-I (SBE-I) | | Office Automation U19SBE:1 | 2 | 2 | 3 | 25 | | 75 | 100 |
| Total | | | Papers: 8 | 30 | 25 | | | | | 800 | |
| III | I | Language Course – III (LC-III) | Tamil-III/Hindi-III/Sanskrit-III U19T3, U19H3, U19S3 | 6 | 3 | 3 | 25 | | 75 | 100 | |
| | II | English Language Course-IV (ELC-IV) | | English-III U19E3 | 6 | 3 | 3 | 25 | | 75 | 100 |
| | III | Core Course – IV (CC-IV) | | Thermal Physics U19PH4 | 4 | 4 | 3 | 25 | | 75 | 100 |
| | | Core Course – V (CC-V) | | Major Practicals-II U19PH5P | 3 | - | - | - | | - | - |
| | | Second Allied Course-I (2AC-I) | | Allied Chemistry I U192AC1 | 4 | 3 | 3 | 25 | | 75 | 100 |
| | | Second Allied Course – II (2AC-II) | | Allied Chemistry Practical U192AC2 | 3 | - | - | - | | - | - |
| | IV | Skill Based Elective Course II – (SBEC-II) | | Desk Top Publishing U19SBE:2 | 2 | 2 | 3 | 25 | | 75 | 100 |
| Skill Based Elective Course III – (SBEC-III) | | Office Automation & Desk Top Publishing Lab U19SBE:3P | 2 | 2 | 3 | 25 | | 75 | 100 | | |
| Total | | | Papers: 8 | 30 | 17 | | | | | 600 | |
| IV | I | Language Course – IV (LC-IV) | Tamil-IV/Hindi-IV/Sanskrit-IV U19T4, U19H4, U19S4 | 6 | 3 | 3 | 25 | | 75 | 100 | |
| | II | English Language Course-IV(ELC-IV) | | English-IV U19E4 | 4 | 2 | 3 | 25 | | 75 | 100 |
| | | Communicative English – V (ELC-V) | | Communicative English –II U19CE2 | 2 | 1 | 3 | 25 | 5 | 70 | 100 |
| | III | Core Course – V (CC-V) | | Major Practicals-II U19PH5P | 3 | 5 | 3 | 25 | | 75 | 100 |
| | | Core Course – VI (CC-VI) | | Basic Electronics U19PH6 | 4 | 4 | 3 | 25 | | 75 | 100 |
| | | Second Allied Course – II (2AC-II) | | Allied Chemistry Practical U192AC2 | 3 | 3 | 3 | 25 | 5 | 70 | 100 |
| | IV | Second Allied Course – III (2AC-III) | | Allied Chemistry II U192AC3 | 5 | 3 | 3 | 25 | | 75 | 100 |
| | | Non Major Elective Course-I (NMEC-I) | | U19NME:1 | 2 | 2 | 3 | 25 | | 75 | 100 |
| Value Education Course – VEC | | Value Education U19VE | 1 | 2 | 3 | 25 | | 75 | 100 | | |
| Total | | | Papers: 9 | 30 | 25 | | | | | 900 | |

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|----|--------------|---|---|------------|------------|----|----|----|------------|-------------|
| V | III | Core Course – VII (CC-VII) | Optics U19PH7 | 5 | 5 | 3 | 25 | | 75 | 100 |
| | | Core Course – VIII (CC-VIII) | Electricity, Magnetism and Electromagnetism U19PH8 | 5 | 5 | 3 | 25 | | 75 | 100 |
| | | Elective Course – I (EC-I) | Digital Electronics and Microprocessor U19PH9E | 5 | 4 | 3 | 25 | | 75 | 100 |
| | | Elective Course–II (EC-II) | Computer Programming – C Language U19PH10E | 5 | 4 | 3 | 25 | | 75 | 100 |
| | | Core Course – IX (CC-IX) | Major Practical – III U19PH11P | 3 | - | - | - | | - | - |
| | | Core Course – X (CC-X) | Major Practical – IV U19PH12P | 3 | - | - | - | | - | - |
| | IV | Non Major Elective Course –II (NMEC-II) | U19NME: II | 2 | 2 | 3 | 25 | | 75 | 100 |
| | | Soft Skills | U19SS | 2 | 2 | 3 | 25 | | 75 | 100 |
| | Total | Papers: 8 | 30 | 22 | | | | | 600 | |
| VI | III | Core Course – IX (CC-IX) | Major Practical – III U19PH11P | 3 | 5 | 3 | 25 | | 75 | 100 |
| | | Core Course – X (CC-X) | Major Practical – IV U19PH12P | 3 | 6 | 3 | 25 | | 75 | 100 |
| | | Core Course – XI (CC-XI) | Atomic and Nuclear Physics U19PH13 | 6 | 6 | 3 | 25 | | 75 | 100 |
| | | Core Course – XII (CC-XII) | Elements of Theoretical Physics U19PH14 | 6 | 6 | 3 | 25 | | 75 | 100 |
| | | Core Course – XIII (CC-XIII) | Solid State and Materials Science U19PH15 | 6 | 6 | 3 | 25 | | 75 | 100 |
| | | Elective Course– III (EC-III) | Opto Electronics and Fiber Optic Communication U19PH16E | 5 | 4 | 3 | 25 | | 75 | 100 |
| | | Gender Studies | U19GS | 1 | 1 | 3 | 25 | | 75 | 100 |
| | | Extension Activities | EA | -- | 1 | -- | -- | -- | -- | -- |
| | | Total | Papers: 8 | 30 | 35 | | | | | 700 |
| | | Total | Total | 180 | 140 | | | | | 4100 |

There will be oral test for all practical examinations and Communicative English Course. The oral test will carry 5 marks in the external component.

தேசியக்கல்லூரி (தன்னாட்சி), திருச்சிராப்பள்ளி - 620 001.
தமிழாய்வுத்துறை

இளநிலை - தமிழ் - முதற் பருவம்
தாள்: மொழிப்பாடம்-1 செய்யுள் (கவிதை), உரைநடை, சிறுகதை,
இலக்கிய வரலாறு, இலக்கணம்

U19T1

கற்பிக்கும் காலம்: 6 மணி
கற்பித்தலின் நோக்கங்கள்

தரப்புள்ளிகள்: 3

1. இக்கால மரபுக்கவிதை, புதுக்கவிதை, சிறுகதை, உரைநடைக்கட்டுரைகளை அறிமுகம் செய்தல்.
2. நாட்டுப்புறப்பாடல்களைப் புலப்படுத்துதல்.
3. எழுத்துக்களின் வேறுபாட்டால் பொருள் மாறுபடலை எடுத்துரைத்தல்.

அலகு - 1: மரபுக்கவிதை

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|-------------------|---|
| பாரதியார் | - கண்ணன் என் சேவகன், கண்ணன் என் விளையாட்டுப் பிள்ளை. |
| பாரதிதாசன் | - அழகின் சிரிப்பு |
| கவிமணி | - வாழ்க்கைத் தத்துவங்கள், இயற்கை வாழ்வு |
| பட்டுக்கோட்டையார் | - படிப்பும் உழைப்பும், நேர்மை வளையுது |
| நாமக்கல்லார் | - படிப்பினை |
| கண்ணதாசன் | - காலக்கணிதம், ஒரு கந்தல் துணியின் கதை |
| சுரதா | - நீர் |

அலகு - 2: புதுக்கவிதை, நாட்டுப்புறப்பாடல்கள்,

| | |
|-------------------|--------------------------------------|
| வாலி | - ஒரு கௌதமன் வாரானோ!, புன்னகை மன்னன் |
| மு.மேத்தா | - ஒரு கிராமத்தின் கதையல்ல |
| அப்துல் ரகுமான் | - சிறகுகள், சுயப்பிரசவம் |
| ஈரோடு தமிழன்பன் | - மின்மினிக்காடு |
| அறிவுச்செல்வன் | - நமக்குத் தொழில் மனிதம் |
| விக்ரமாதியன் | - நிகழ்வுகள் |
| பொன்மணி வைரமுத்து | - வாழ்க்கை தொடங்குகிறது |

நாட்டுப்புறப் பாடல்கள்:

- (1) தாலாட்டு
- (2) கும்மிப்பாடல்
- (3) வேளாண்மை

அலகு - 3: உரைநடைக் கட்டுரைகள்

1. டிங்கினானே - உ.வே.சாமிநாத ஐயர்
2. கடற்கரையிலே - சிதம்பரனார் - ரா.பி.சேதுப்பிள்ளை
3. கம்பரும் நாடகப் பண்பும் - ரசிகமணி டி.கே.சிதம்பரநாத முதலியார்
4. முடத்தெங்கு - கி.ஆ.பெ. விசுவநாதம்
5. இராமன் எத்தனை இராமனடி - முனைவர் சோ.சத்தியசீலன்
6. உரைநடையின் அணிநலன்கள் - முனைவர் மா.இராமலிங்கம்
7. திருவள்ளுவர் குறிப்பிடும் மென்திறன்கள் - முனைவர் ம.திருமலை

அலகு - 4: சிறுகதைகள்

- | | |
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| 1. கவர்னர் வண்டி | - கல்கி |
| 2. நினைவுப்பாதை | - புதுமைப்பித்தன் |
| 3. சோற்றுச்சமை | - ஜெயகாந்தன் |
| 4. முள்முடி | - தி.ஜானகிராமன் |
| 5. காற்று | - கு.அழகிரிசாமி |
| 6. ஆயுள் | - பிரபஞ்சன் |
| 7. அசலும் நகலும் | - இந்திரா பார்த்தசாரதி |
| 8. மாத்திரை | - ஆண்டாள் பிரியதர்ினி |

அலகு - 5: இலக்கிய வரலாறு, இலக்கணம்

இலக்கிய வரலாறு. (மரபுக்கவிதை, புதுக்கவிதை, உரைநடை, சிறுகதை மட்டும்) - மயங்கொலிச்சொற்கள், ல,ள,ழ, ர,ற, ன,ண,ந வேறுபாடுகளால் பொருள் மாறுபடுதல்.

குறிப்பு: ஐந்து அலகுகளிலும் சம அளவில் வினாக்கள் அமைதல் வேண்டும்.

பாடநூல்

1. தமிழ் - முதற் பருவம் - தேசியக்கல்லூரி வெளியீடு.
2. இலக்கிய வரலாறு - தேசியக்கல்லூரி வெளியீடு.

கற்பித்தலின் பயன்கள்

1. இக்காலத் தமிழை உணர்வர்.
2. கவிதை, சிறுகதை படைக்கும் ஆற்றல்களை வளர்த்துக் கொள்வர்.
3. இலக்கணப் பிழையின்றி எழுத முயற்சிப்பர்.

தேசியக்கல்லூரி (தன்னாட்சி), திருச்சிராப்பள்ளி - 620 001.
தமிழாய்வுத்துறை
இளநிலை - தமிழ் - இரண்டாம் பருவம்
தாள்: மொழிப்பாடம்-2 செய்யுள் (பக்தி இலக்கியம்), புதினம்,
இலக்கிய வரலாறு

U19T2

கற்பிக்கும் காலம்: 6 மணி
கற்பித்தலின் நோக்கங்கள்

தரப்புள்ளிகள்: 3

1. பல்வேறு சமய நெறிமுறைகளை உணர்த்துதல்.
2. பக்தி இலக்கிய மாண்பினைப் புலப்படுத்துதல்.
3. புதின இலக்கிய வகையை அறிமுகம் செய்தல்.

அலகு - 1: சைவ இலக்கியம்

திருஞானசம்பந்தர் - திருச்சிராப்பள்ளி - நன்றுடையானை தீயதிலானை.
திருநாவுக்கரசர் - தில்லைப் பெருங்கோயில் - கருநட்ட கண்டனை.
சுந்தரர் - திருமழபாடி - பொன்னார் மேனியனே
மாணிக்கவாசகர் - திருச்சாழல் - பூசுவதும் வெண்ணீறு.

அலகு - 2: வைணவ இலக்கியம்

திருப்பாணாழ்வார் - அமலனாதிபிரான் - அமலனாதிபிரான் அடியார்க்கு
தொண்டரடிப்பொடியாழ்வார் - திருமாலை - பச்சைமாமலை போல் மேனி
ஆண்டாள் - நாச்சியார் திருமொழி - வாரணம் ஆயிரம் சூழ
நம்மாழ்வார் - திருவாய்மொழி - உயர்வற உயர்நலம்

அலகு - 3: பிற சமய இலக்கியங்கள்

சமண சமயப் பாடல்கள் - 10
பௌத்த சமயப் பாடல்கள் - 10
காசீம் புலவர் - முனாஜாத்துப் பதிகம் -10
ஹெச்.ஏ.கிருஷ்ணபிள்ளை - இரட்சணிய மனோகரம் தோத்திரப்பதிகம் - 10

அலகு - 4: புதினம்

துளசிமாடம் - நா.பார்த்தசாரதி.

அலகு - 5: இலக்கிய வரலாறு, இலக்கணம்

இலக்கிய வரலாறு (சைவம், வைணவம், சமணம், பௌத்தம், இசுலாம், கிறித்தவம் மற்றும் புதினம் பற்றியன மட்டும்), வல்லினம் மிகும் இடங்கள், வல்லினம் மிகா இடங்கள்.

குறிப்பு: ஐந்து அலகுகளிலும் சம அளவில் வினாக்கள் அமைதல் வேண்டும்.

பாடநூல்

1. தமிழ் - இரண்டாம் பருவம் - தேசியக்கல்லூரி வெளியீடு.
2. இலக்கிய வரலாறு - தேசியக்கல்லூரி வெளியீடு.
3. புதினம் - துளசிமாடம் - நா.பார்த்தசாரதி - தேசியக்கல்லூரி வெளியீடு.

கற்பித்தலின் பயன்கள்

1. வேறுபட்ட சமய வழக்காறுகளை அறிவர்.
2. பிற சமயத்தார்களிடம் அன்பு பாராட்டுவர்.
3. புனைகதை வடிவங்களில் புதினம் பற்றி அறிவர்.

தேசியக்கல்லூரி (தன்னாட்சி), திருச்சிராப்பள்ளி - 620 001.
தமிழாய்வுத்துறை

இளநிலை - தமிழ் - மூன்றாம் பருவம்
தாள்: மொழிப்பாடம்-3 செய்யுள் (காப்பியம்), நாடகம்,
இலக்கிய வரலாறு, பொதுக்கட்டுரை

U19T3

கற்பிக்கும் காலம்: 6 மணி

தரப்புள்ளிகள்: 3

கற்பித்தலின் நோக்கங்கள்

1. காப்பிய இலக்கியத்தின் செழுமையை உணர்த்துதல்.
2. காப்பியங்களின் உட்பொருளையும் கவியழகையும் புகட்டுதல்.
3. நாடகத்தின் மேன்மையை உணரச் செய்தல்.

அலகு - 1:

சிலப்பதிகாரம் - அடைக்கலக்காதை
மணிமேகலை - ஆதிரை பிச்சையிட்ட காதை.

அலகு - 2:

கம்பராமாயணம் - கும்பகர்ணன் வதைப்படலம்
பெரியபுராணம் - மெய்ப்பொருள் நாயனார் புராணம்

அலகு - 3:

தேம்பாவணி - வளன் சனித்த படலம்
சீறாப்புராணம் - மானுக்குப் பிணை நின்ற படலம்.

அலகு - 4:

நாடகங்கள்:
1. விசுவநாதன் அல்லது கடமை முரண்.
2. மௌனதேசிகர் - பண்டித ம.கோபாலகிருணய்யர்

அலகு - 5:

இலக்கிய வரலாறு (காப்பியம், புராணம், நாடகம் பற்றியன மட்டும்),
பொதுக்கட்டுரை.

குறிப்பு: ஐந்து அலகுகளிலும் சம அளவில் வினாக்கள் அமைதல் வேண்டும்.

பாடநூல்கள்

1. தமிழ் - மூன்றாம் பருவம், தேசியக்கல்லூரி வெளியீடு.
2. இலக்கிய வரலாறு - தேசியக்கல்லூரி வெளியீடு.
3. நாடகங்கள் - தேசியக்கல்லூரி வெளியீடு.

கற்பித்தலின் பயன்கள்

1. தமிழ்க் காப்பியப் பரப்பினை அறிவர்.
2. காப்பியங்களின் வழிநின்று புதிய முறையில் கற்பனையாற்றலைப் பெறுவர்.
3. நாடகத்தை உருவாக்கவும் நடிக்கவும் பழகுவர்.

தேசியக்கல்லூரி (தன்னாட்சி), திருச்சிராப்பள்ளி - 620 001.

தமிழாய்வுத்துறை

இளநிலை - தமிழ் - நான்காம் பருவம்
தாள்: மொழிப்பாடம் - 4 : செய்யுள் (பண்டைய இலக்கியம்),
இலக்கிய வரலாறு, மொழிபெயர்ப்பு

U19T4

கற்பிக்கும் காலம்: 6 மணி

தரப்புள்ளிகள்: 3

கற்பித்தலின் நோக்கங்கள்

1. அக, புற இலக்கியங்கள் பற்றி விளக்குதல்.
2. சங்கப் புலவர்களின் புலமைச், சிறப்பை எடுத்துரைத்தல்.
3. சங்ககால மக்களின் இல்லற மாண்பினை உணர்த்துதல்.

அலகு - 1:

நற்றிணை (5 பாடல்கள் - 242, 333, 353, 375, 380)

1. இலையில் பிடவம் ஈர்மலர் அரும்பப் - விழிக்கட் பேதைப் பெருங்கண்ணனார் - முல்லை.
2. மழைதொழில் உலந்து மாவிகம்பு கந்தெனக் - கள்ளிக்குடி பூதம் புல்லனார் - பாலை
3. ஆளில் பெண்டிர் தாளின் செய்த - கபிலர் - குறிஞ்சி.
4. நீடுசினைப் புன்னை நறுந்தாது உதிரக் - பொதும்பில் கிழார் - நெய்தல்.
5. நெய்யும் குய்யும் ஆடி மையொடு - கடலூர்ப் பல்கண்ணனார் - மருதம்.

குறுந்தொகை - (5 பாடல்கள் - 3, 27, 38, 135, 186)

1. நிலத்தினும் பெரிதே வானினும் உயர்ந்தன்று - தேவகுலத்தார் - குறிஞ்சி
2. கன்றும் உண்ணாது கலத்தினும் படாது - வெள்ளிவீதியர் - பாலை
3. கான மஞ்சை அறையின் முட்டை - கபிலர் - குறிஞ்சி
4. வினையே ஆடவர்க்குயிரே வானுதல் - பாலை பாடிய பெருங்கடுங்கோ - பாலை
5. ஆர்கலி ஏற்றொடு கார்தலை மணந்த - ஒக்கூர் மாசாத்தியார் - முல்லை

அலகு - 2:

அகநானூறு - (3 பாடல்கள் - 40, 48, 53)

1. கானல் மாலைக் கழிப்பூக் கூம்ப - குன்றியனார் - நெய்தல்
2. அன்னாய்! வாழி! வேண்டு அன்னை! நின்மகள் - தங்கால் முடக்கொற்றனார் - குறிஞ்சி
3. அறியாய், வாழி, தோழி! இருள்அற - சீத்தலைச்சாத்தனார் - பாலை

கலித்தொகை - 2 பாடல்கள்

1. எறிதரு கதிர் தாங்கி ஏந்திய குடை நிழல் - பாலைக்கலி : 8
2. முறம் செவி மறைப் பாய்பு முரண் செய்த புலி செற்று - குறிஞ்சிக்கலி : 16

அலகு - 3:

புறநானூறு (5 பாடல்கள் - 9, 45, 74, 101, 112,)

1. ஆவும் ஆனியற் பார்ப்பன மாக்களும் - நெட்டிமையார்
2. இரும்பனை வெண்தோடு மலைந்தோன் அல்லன் - கோவூர்க்கிழார்
3. குழவி இறப்பினும் ஊன்தடி பிறப்பினும் - சேரன் கணைக்காலிரும்பொறை
4. ஒருநாள் செல்லலம் இருநாள் செல்லலம் - ஓளவையார்
5. அற்றைத் திங்கள் அவ்வெண் நிலவில் - பாரி மகளிர்

திருக்குறள் - 3 அதிகாரங்கள் - 1. கல்வி, 2. ஈகை, 3. அன்புடைமை.

நாலடியார் (5 பாடல்கள் - 8, 19, 21, 36, 65)

1. செல்வம் நிலையாமை - செல்வர்யாம் என்றுதாம் செல்வுழி எண்ணாத
2. இளமை நிலையாமை - மற்றறிவாம் நல்வினை யாம்இளையம் என்னாது
3. யாக்கை நிலையாமை - மலைமிசைத் தோன்றும் மதியம்போல் யானை
4. அறன் வலியுறுத்தல் - இன்றுகொல் அன்றுகொல் என்றுகொல் என்னாது
5. சினமின்மை - இளையான் அடக்கம் அடக்கம் கிளைபொருள்

அலகு - 4:

நெடுநல்வாடை (முழுவதும்).

அலகு - 5:

இலக்கிய வரலாறு - எட்டுத்தொகை, பத்துப்பாட்டு நூல்கள், பதினெண் கீழ்க்கணக்கு நூல்கள், மொழிபெயர்ப்பு.

குறிப்பு: ஐந்து அலகுகளிலும் சம அளவில் வினாக்கள் அமைதல் வேண்டும்.

பகுதி 'அ, ஆ'வில் இலக்கிய வரலாறும், பகுதி 'இ'யில் 5-வது வினா மொழிபெயர்ப்புப் பகுதியினைத் தந்து எழுதக் கூறுதல் வேண்டும்.

(வினாத்தாளில் பகுதி 'இ'யில் கட்டாயம் மொழிபெயர்ப்புப் பகுதி இடம்பெறல் வேண்டும்.)

பகுதி அ - $20 \times 1 = 20$

பகுதி ஆ - $5 - 5 \times 5 = 25$

பகுதி இ - $5 - 3 \times 10 = 30$ (5-ஆவது வினாவில் மொழிபெயர்ப்புப்பகுதி வினாவாகக் கேட்கப்பெறல் வேண்டும்.)

பாடநூல்

1. தமிழ் - நான்காம் பருவம் - தேசியக்கல்லூரி வெளியீடு.
2. இலக்கிய வரலாறு - தேசியக்கல்லூரி வெளியீடு.

கற்பித்தலின் பயன்கள்

1. ஐவகை நில அமைப்புகளைப் பற்றிய அறிவினைப் பெறுவர்.
2. சங்க கால மக்களின் வாழ்வியல் பற்றி அறிவர்.
3. மன்னர்களின் ஆட்சிச்சிறப்பு, கொடைச்சிறப்பு, வீரம் பற்றி உணர்வர்.

ENGLISH FOR COMMUNICATION – U19E1

Semester: I

English Language Course I

Instruction Hours/Week: 6

Credit: 3

COURSE OBJECTIVES

The Learner will be able to

- a. communicate effectively and appropriately in real life situation;
- b. use English effectively for study purpose across the curriculum;
- c. develop interest in and appreciation of Literature;
- d. develop and integrate the use of the four language skills i.e. Reading, Listening, Speaking and Writing;
- e. revise and reinforce structure already learnt.

UNIT I:

1. At the College
2. On the Campus
3. Outside the Class
4. At the Post office
5. For Business and Pleasure
6. Review

UNIT II:

7. Are you Smart ?
8. Are You Creative?
9. Is it too hard to improve?
10. How to win ?
11. View Points
12. Snakes and Ladders
13. Yourself

UNIT III:

1. Birbal story- The loyal gardener
2. Hindu mythological story- The origin of coconut tree
3. A chinese story: The generous student
4. An African Story ; The Three Runners

UNIT IV:

5. The Golden place
6. The one – hundreth prince
7. The mouse Merchand

UNIT V:

8. When wishes come true – Rabindranath Tagore
9. The World and after
10. Julius Caesar

Text Books: 1. A Collection of Short stories, Department of English, National College, Trichy.

2. Creative English for Communication (2nd edition) by Krishnasamy and Sriraman. Published by Macmillan

ENGLISH THROUGH EXTENSIVE READING – U19E2

SEMESTER : II

ENGLISH LANGUAGE COURSE : II

INSTRUCTION HOURS/WEEK : 4

CREDIT : 2

Course objectives:

The learner will be able to

1. develop interest in and appreciation of Literature;
2. develop and integrate the use of the four language skills i.e. Reading, Listening, Speaking and Writing;
3. integrate the skill of Reading a variety of texts.
4. use English effectively for study purpose across the curriculum

UNIT I

Excitement : Mack R. Douglas

Tight Corners : E.V. Lucas

UNIT II

Water – The Elixir of Life : C.V. Raman

Tree Speaks : C. Rajagopalachari

UNIT III

The Art of Telling Tales : April Hersey

A Job Well Done : Ruskin Bond

UNIT IV

The Panorama of India's Past : Jawaharlal Nehru

The Origin of Grammar : Margaret Bryant & Janet

UNIT V

Dangers of Drug Abuse : Hardin B. Jones

Crime and Punishment : R.K. Narayan

Text Book : Dr. Ananthan , R. Effective Communication. Ed. Chennai : Anu Chithra Pub.2010.

COMMUNICATIVE ENGLISH I – U19CE1

Semester : II
Instruction Hours/ Week : 2

Communicative English Course : I
Credit : 1

COURSE OBJECTIVES:

The Learner will be able to

1. communicate, to define, classify, and understand the methods of communication,
2. improve their LSRW skills,
3. enable them to practice those skills in their daily life by identifying instances of communication in the circumstances of their own.

UNIT I

Writing Stories

Grammar Components : Articles, Prepositions and Tenses

UNIT II

Precis Writing

Grammar Components : Non- Finite Verbs and Phrasal Verbs

UNIT III

Writing Letters

Grammar Components : Conjunctions and Interjections and Punctuation

UNIT IV

Reporting

Grammar Components : Reported Speech and Transformation of Sentences

UNIT V

Writing an Essay

Grammar Components : Sentence structure (S/V/O/C/A) and Simple, Compound and Complex Sentences

Text book : Pillai, Radhakrishna G. English Grammar & Composition Ed. Chennai : Emerald Pub.2016

ENGLISH FOR COMPETITIVE EXAMINATIONS – U19E3

SEMESTER : III

ENGLISH LANGUAGE COURSE : III

INSTRUCTION HOURS/WEEK : 6

CREDIT : 3

COURSE OBJECTIVES:

The Learner will be able to

1. have a knowledge in basic grammatical units of English
2. have a depth of knowledge in Concord, reconstructing passages and précis writing.
3. comprehend the given passage and understand it.
4. gain a good knowledge and understanding in vocabulary
5. write on his/her own on a given topic and gain a good skill in letter/report writing.

UNIT I:

Basics of English(Revision)

- (a)Parts of speech and Articles
- (b)Active and passive voice
- (c)Framing Questions
- (d)Tag questions
- (e)Indirect speech
- (f)Tenses

UNIT II:

- (a)Errors and how to avoid them
- (b)Spotting errors
- (c)Reconstructing passages
- (d)Précis writing

UNIT III:

Reading comprehension

UNIT IV:

- (a)Sentence completion,
- (b) Spelling
- (c)Vocabulary – Words often confused or Misused, Synonyms, Antonyms.

UNIT V:

Letter writing , Report writing ,Paragraph writing, Essay writing

Text book : English for Competitive Examinations by R.P.Bhatnagar&Rajul Bhargava
macmillanIndia ltd. Delhi.

READING POETRY AND DRAMA – U19E4

SEMESTER : IV

ENGLISH LANGUAGE COURSE : IV

INSTRUCTION HOURS/WEEK : 6

CREDIT : 2

COURSE OBJECTIVE:

The Learner will be able to

- a. appreciate a piece of poem and analyze it
- b. appreciate and interpret an one act play.
- c. use English effectively for study purpose across the curriculum;
- d. develop and integrate the use of the four language skills i.e. Reading, Listening, Speaking and Writing;
- e. revise and reinforce structure already learnt.

POETRY:

UNIT I : John Milton : On His Blindness

Oliver Goldsmith : The Village School Master

William Wordsworth : The Solitary Reaper

UNIT II : P.B.Shelly : Ozymandias

John Keats : La Belle Dame Sans Merci

Robert Browning : Incident of the French camp

UNIT III : John Masefield : Laugh and Be Merry

Robert Frost : Stopping by Woods On a Snowy Evening

John Drinkwater : The Vagabond

DRAMA:

UNIT IV: Anton Chekov : A Marriage Proposal

Lady Gregory : The Rising of the Moon

UNIT V: W.St. John Tayleur : Reunion

William Shakespeare : Othello, The Moor of Venice – Act V

Text Books : 1)**An Introduction to Poetry** edited by A.G.Xavier; [Macmillan]

2)**A Book Plays:** A Group of Editors, Published by Orient Blackswan

COMMUNICATIVE ENGLISH II – U19CE2

SEMESTER : IV
INSTRUCTION HOURS/WEEK : 2

COMMUNICATIVE ENGLISH COURSE : II
CREDIT : 1

The learner will be able to

1. develop interest in and appreciation of Literature;
2. develop and integrate the use of the four language skills i.e. Reading, Listening, Speaking and Writing;
3. integrate the skill of Reading a variety of texts.
4. use English effectively for study purpose across the curriculum

UNIT I:

Enriching Vocabulary – Register Development; who is who; Synonyms, Proverbs

UNIT II:

Tense Forms with emphasis on differences between Present and Present Continuous; Past and Present Perfect , Framing questions, Auxiliaries, if clauses; conjunctions and linkers; Prepositions

UNIT III

Pronunciation, Good Pronunciation habits, Phonetic Transcription, Greetings, Farewells commands etc.,

UNIT IV:

Conversational Skills – Affirmative or Negative Language – idiomatic expressions, Phrases, Dialogue Writing,

UNIT V:

- Writing Skills – Note- taking, note- making, e-mail, Describing an object, narrating a story.
- Circulars
- Notes - reminders, warnings, farewells, apology.
- Draft invitations – marriage, annual day, inaugural functions of associations, valediction, seminar, workshop.
- Draft Short messages- compliments, birthday wishes, notifications
- Draft Posters- Slogans, Announcements
- Draft Advertisements
- Dialogue writing

Text Book

1. Communicative English by Department of English, National College(Autonomous), Trichy.

SYLLABUS
UG Part I – Hindi
Semester – 1

U19H1: Functional Hindi-1, Prose, Grammar And Translation – 1

Objectives :

Unit I : The Objective of teaching functional Hindi is to encourage the students to learn the functional words.

Unit II : The Objective of teaching grammar is to teach the basic grammatical structures.

Unit III : The Objective of teaching prose is to develop their language ability.

Unit IV : The Objective of teaching translation is to convey the original tone and meaning.

Unit V : The Objective of teaching short stories is to enhance their creative writing and spoken skills through story telling/story writing and story reading mode.

Program Outcome :

The learners will acquire the knowledge of basic letters and functional hindi words. They understand the grammatical structures and able to translate the sentences from source to target language. The learners can read and understand the prose and stories.

SEMESTER – I

COURSE CODE : U19H1

6hrs/wk

**Paper I – FUNCTIONAL HINDI-1, PROSE, GRAMMAR AND
TRANSLATION – 1**

Unit – 1 Functional Hindi

1. Directions, Seasons, Days, Colours
2. Fruits, Vegetables, Flowers, Numbers
3. Groceries, Grains, Taste, Cardinals
4. Domestic Animals, Wild Animals, Relatives, English Month
5. Occupation, Parts of Body, Numbers and Tamil Months

Unit – II Grammar

1. Noun
2. Verb
3. Pronoun
4. Vachan
5. Gender

Unit – III Prose

1. Challis karod kurta kaha se....
2. Bhojan Aur Vigyan
3. Dr. Abdul Kalam

Unit – IV Translation

1. (Hindi to English Lesson -1 to 5)

Unit – V Story

4. Raja Ka Chunaav – Ashok Kumar Kantha Bhatiya
5. Poos Ki Raat – Premchand

DEPARTMENT OF HINDI

For Candidates admitted from the Academic Year 2019 onwards

SEMESTER – 1

Course Code U19H1

Credits – 3

Paper I – FUNCTIONAL HINDI-1, PROSE, GRAMMAR AND TRANSLATION – 1

PROSE

Prescribed Text Book

Bharat – Madhyama Patya Samgiri

O.No.1619 Hindi Prachar Pushtakmala, Madras.

Prescribed Lessons

1. Challis karod kurta kaha se....
2. Bhojan Aur Vigyan
3. Dr. Abdul Kalam

STORY

Vaani Hindi Patmala – Ashok kumar , kanta Bhatya

Oxford University Press ISBN-10:0-19-9469687

1. Raja Ka Chunaav – Ashok Kumar Kantha Bhatiya

Poos Ki Raat – Premchand

Grammar

Reference Book

Sugam Hindi Vyakaran - Prof.Vanshi Dhar and Dharmapal Shastri

Siksha Bharathi, New Delhi

ISBN-10:81-7483-037-5

Prescribed Portion

Noun, Verb, Pronoun, Vachan, Gender

Functional Hindi

Hindi Vataayan – Dr. K.M.Chandra Mohan

ISBN : 81-7124-223-5, Vishwa Vidhyalay Prakashan, Varanasi

Semester – II

U19H2 : Comprehension, Grammar – 2, Drama And Hindi Literature-1

Objectives :

- Unit I :** The Objective of teaching comprehension is to incorporate self-reading and understanding.
- Unit II :** The Objective of teaching grammar is to acknowledge the basic rules of the grammatical structures.
- Unit III :** The Objective of teaching Literature is to acquire the knowledge of the origin of Hindi in literature.
- Unit IV :** The Objective of teaching one act play is to help the learners to understand the method of acting and writing a play.
- Unit V :** The Objective of teaching Drama is to acknowledge the basic dramatic structures.

Program Outcome :

The Learners will be able to comprehend on their own and to improve their reading skills. The learners will be able to communicate accurately free of grammatical errors. The learners will get a wider knowledge of Hindi literature. The learners will understand various genres of literary works. The learners will get deep and broad vision of drama.

SEMESTER - II

COURSE CODE : U19H2

6hrs/wk

**PAPER II – COMPREHENSION, GRAMMAR – 2, DRAMA AND HINDI
LITERATURE-1**

Unit – 1 Comprehension

1. Discipline
2. Humanity
3. Coeducation
4. Student Life
5. Importance of Hard work

Unit – II Grammar

1. Adjective
2. Adverb
3. Conjunction
4. Tense

Unit – III Hindi Literature

1. Aadi kaal (Introduction, Specialities, Famous Poets)

Unit – IV One act play

1. Reed ki Hadhi (Jagdeesh Chandra Mathur)
2. Andheri Nagari (Bharathendu Harischandra)

Unit – V Drama

1. Swarg ke Jalak (Upendranath Ashak)

DEPARTMENT OF HINDI

For Candidates admitted from the Academic Year 2019 onwards

U19H2

SEMESTER – II

PAPER II – COMPREHENSION, GRAMMAR – 2, DRAMA AND HINDI LITERATURE-1

Comprehension

Prescribed Text Book

**Adhunik Hindi Nibandhavali - Praveshika Book
Hindi Prachar Pushtakmala, Madras.**

Prescribed Lessons

1. Discipline
2. Humanity
3. Coeducation
4. Student Life
5. Importance of Hard work

One Act Play

Hindi Sahith Rastrabhasha patya saamgri

O.No.1636 Hindi Prachar Pushtakmala, Pushpa-507

1. Andheri Nagari – Bharatendu Harishchandra
2. Reed ki Haddi – Jagdish Chandra Mathur

Drama

Swarg ki Jalak – Upendranath Ashk

Grammar

Sugam Hindi Vyakaran - Prof.Vanshi Dhar and Dharmapal Shastri

Siksha Bharathi, New Delhi

ISBN-10:81-7483-037-5

Prescribed Portion

Adjective, Adverb, Conjunction, Tense

Hindi Literature

Aadi kaal (Introduction, Specialities, Famous Poets)

Prescribed Book

1. **Hindi Sahithya ki Pravirthiya – Dr. Jaykisan Prasad**

Semester – III

U19H3 : Dialogue Writing, Poetry, Translation -2 Hindi Literature-2

Objectives :

Unit I : The Objective of teaching couplet will give learners confidence and energetic.

Unit II : The Objective of teaching dialogue writing is to teach the learners about appropriate words and style in appropriate place.

Unit III : The Objective of teaching Bhakthi Literature is to acquire the knowledge of the origin of Bhakthi and its movement in Hindi literature.

Unit IV : The Objective of teaching Poetry is to make the learners to acquire the knowledge of the poets and their writings.

Unit V : The Objective of teaching Translation to the learners to get knowledge of translation from the source to target language. They also gain the knowledge of homonyms and synonyms in Hindi.

Program Outcome :

The Learners will understand the couplets and poetry by the prescribed units. The learners will come to know about the dialogue delivery and their usage in their daily life also they can translate from source to target language. They can understand the Bhakthi movement through Hindi Literature.

SEMESTER - III

COURSE CODE : U19H3

6hrs/wk

**PAPER – III DIALOGUE WRITING, POETRY, TRANSLATION -2
HINDI LITERATURE-2**

Unit – I Couplets

1. Couplets of Kabir
2. Couplets of Tulshi
3. Couplets of Rahim

Unit –II Dialogue Writing

1. Mother and Daughter
2. Teacher and Student
3. Between Two Friends
4. Brother and Sister
5. Customer and Shopkeeper

Unit – III Hindi Literature

1. Bhakthi Kaal (Introduction, Specialities, Famous Poets)

Unit – IV Poetry

1. Baghavan ke Dakiye (Ramdhari singh Dinakar)
2. Tera Sneh na kovoona (Sumitranandan Pant)
3. Kilona (Chiyaram Saran Gupta)

Unit – V Translation

1. English to Hindi (Lesson 1 to 5)
2. Homonyms
3. Synonyms

DEPARTMENT OF HINDI

For Candidates admitted from the Academic Year 2019 onwards

U19H3

SEMESTER – III

**PAPER – III DIALOGUE WRITING, POETRY, TRANSLATION -2
HINDI LITERATURE-2**

Couplets

Prescribed Text Book

Kavya Sourab - Hindi Prachar Pushtakmala, Pushpa- 437

O.No. 1242, Dakshin Hindi Prachar Sabha, Madras.

Prescribed couplet

- 1. Kabir – 5 dohas**
- 2. Tulsi – 5 dohas**
- 3. Rahim – 5 dohas**

Poetry

Prescribed Book

Vasanth III

Subodh Hindi Patmala – 3, Hindi Prachar Pushtakmala, Pushpa – 507, O.No.1636

Prescribed Poem

- 4. Baghavan ke Dakiye - Ramdhari singh Dinakar**
- 5. Tera Sneh na kovoona - Sumitranandan Pant**
- 6. Kilouna - Chiyaram Saran Gupta**

Dialogue Writing

Hindi Vataayan – Dr. K.M.Chandra Mohan

ISBN : 81-7124-223-5, Vishwa Vidhyalay Prakashan, Varanasi

Hindi Literature

Bhakthi Kaal (Introduction, Specialities, Famous Poets)

Prescribed Book

Hindi Sahithya ki Pravirthiya – Dr. Jaykisan Prasad

Translation

Subodh Hindi Patmala – 1

Hindi Prachar Sabha, Madras.

Prescribed Lessons

Lesson 6 to 10

Homonyms

Synonyms

Semester – IV

U19H4 : Letter Writing, General Essay, Hindi Literature-3

Objectives :

- Unit I :** The Objective of teaching letter writing is to improve their communication skills through writing letters in formal and informal way.
- Unit II :** The Objective of teaching Modern Era in Hindi literature to acquire the knowledge of various subjects which was used in pre independence and post independence and also in recent years.
- Unit III :** The Objective of teaching Street play is to introduce theatre arts and the origin of today's theatre.
- Unit IV :** The Objective of teaching Technical words and phrases is to develop their writing skill. Writing essay will develop their creativity. The learners were encouraged to summarise a passage through precise writing.
- Unit V :** The Objective of teaching Fiction is to acquire knowledge of a long story and their characteristics.

Program Outcome :

The Learners will able to draft and structure letters on their own. They come to know about the modern era in Hindi literature. They understand the role of street play in recent times. They can be aware of using technical words and phrases. Now they can understand the role of fiction by reading and get the knowledge of authors vision.

IV SEMESTER

Course Code: U19H4

6hrs/wk

PAPER IV- LETTER WRITING, GENERAL ESSAY,HINDI LITERATURE-3

Unit – I Letter Writing

1. Leave Letter
2. Placing Order for Books
3. Complaint Letter

Unit – II Hindi Literature

1. Modern Era (Introduction, Specialities, Famous Poets)

Unit – III Street Play

1. Aurat

Unit – IV

1. Technical Words
2. Technical Phrases
3. General Essay
4. General Essay
5. Precise Writing

Unit – V Novel

1. Kadiyan (Bhisma Sahani)

DEPARTMENT OF HINDI

For Candidates admitted from the Academic Year 2019 onwards

U19H4

SEMESTER – IV

PAPER IV- LETTER WRITING, GENERAL ESSAY, HINDI LITERATURE-3

Letter Writing

Prescribed Letters

6. Leave Letter
7. Placing Order for Books
8. Complaint Letter

Street Play

Prescribed Book

Indra Gandhi Rashtriya Mukta Vishva Vidhyalay, New Delhi.

ISBN – 81-7605-844-0

Prescribed Play

Aurat

Hindi Literature

Modern Era (Introduction, Specialities, Famous Poets)

Prescribed Book

Hindi Sahithya ki Pravirthiya – Dr. Jaykisan Prasad

Prescribed Book

Hindi Vataayan – Dr. K.M.Chandra Mohan

ISBN : 81-7124-223-5, Vishwa Vidhyalay Prakashan, Varanasi

Prescribed Portion

4. Technical Words
5. Technical Phrases
6. General Essay
9. General Essay
10. Precise Writing



NATIONAL COLLEGE (AUTONOMOUS)
LANGUAGE COURSE PART I SANSKRIT SEMESTER I PAPER I SANSKRIT I
(For the candidates admitted from June 2019 onwards)

SYLLABUS

SUBJECT CODE:U19S1

Unit I

संस्कृतभाषा देवनागरीलिपि: च - परिचयः
कर्तृपद-परिचयः

- १। संस्कृत भाषा - प्रास्ताविकम्
- २। अक्षराभ्यासः, वर्णाः,
- ३। स्वराः, व्यञ्जननि, संयुक्ताक्षराणि, लेखनप्रकारः च
- ४। अकारन्त-शब्दाः
- ५। लिङ्गत्रयम्
- ६। वचनत्रयम्
- ७। विभक्तयः
- ८। अनुवाद-अभ्यासः
- ९। आङ्गल/तमिल् भाषायां संस्कृतात्
- १०। संस्कृते आङ्गल/तमिल् भाषातः

Unit II

क्रियापदानि (परिचयः)

1. वर्तमानकाले (लट्) धातवः

- १। अन्यपुरुष/प्रथमपुरुष;मध्यमपुरुष;उत्तमपुरुषः च
- २। एकवचनम्, बहवचनं च
- ३। क्रियापदानि - गम् (गच्छ), पिब्,पठ्, क्रीड्, वद्

2. पुल्लिङ्ग-कर्तृपदानि
सर्वनामपदानि च

- १। बालकः, शिक्षकः, अध्यापकः, नृपः, देवः, मनुष्यः,
हस्तः अलसः कुशलः, अहम् ,त्वं, सः।

3. नपुंसक-लिङ्ग-कर्तृपदानि

- १। पुस्तकम्, फलम्, दुग्धम्, घृतम्, उद्यानम्, पुष्पम्,
जलम्, मधुरम्, कन्दुकम्, भोजनम्।

4. अव्ययानि

- १। तत्र, कुत्र, यत्र, अत्र, न, तदा, कदा, यदा-तदा,
शीघ्रं, द्रुतम्, सत्त्वरम्, पश्चात्, अपि, सह, अतः
साकम्, सार्धम्, समं, एव, तावत्, तु, यदि-तर्हि,
सदा।

5. अन्ये अकारान्त-कर्तृपदानि

- १। सूर्यः, सायंकालः, प्रकाशः, वृद्धः, सत्यं, असत्यं,
विद्यालयः, गृहम्, जलम्, दुग्धम्, मधुरम्, भोजनम्

Unit III

1. अनुवाद-अभ्यासः

2. विभक्तीनां परिचयः

3. प्रश्न-निर्माण-पदानि

4. क्रियापदानि(लट्)

5. अनुवाद-अभ्यासः

उपर्युक्त-कर्तृ-क्रियापदानि वाक्येषु उपयोगः,
अनुवाद-अभ्यासः च।

१। प्रथमा विभक्तिः - संबोधनप्रथमा-विभक्तिपर्यन्तं
विभक्ति-अन्तानां परिचयः ,

२। विभक्ति-अन्तानां प्रत्ययैः आदेशाः

३। तृतीया विभक्तिः - सह, साकं सार्धम्, समं

४। चतुर्थी विभक्तिः - षष्ठ्याः विभक्तेः कृते प्रत्ययः

५। विना इत्यादीनां अव्ययानां उपयोगः।

किम्, कुत्र, कथं, किमर्थम्, कुतः, कदा।

वर्तमानकाले

भू (भव्) अस्, धाव् , कृ (कर्) अस्, धाव्,

पत्, आ-गम् (गच्छ्)।

आङ्गलात् संस्कृते/ संस्कृतात् आङ्गले

Unit IV

1. विशेषण-विशेष्यौ

2. संख्यावाचकपदानि

3. सर्वनामपदानि

4. भविष्यत्काले क्रियापदानि (लृट् लकारः)

5. भोज्यपदार्थनामानि

१। रङ्गाः -शुक्ल-नील-पीत-रक्त-हरित-कपिश-
चित्र-भेदाः। तथा अन्यानि सरलपदानि

२। तेषां विशेषणेषु उपयोगः

१। संस्कृते संख्यावाचकपदानि (0 त। १०
पर्यन्तम्।

१। तद् शब्दः - पुल्लिङ्ग-स्त्रीलिङ्ग-
नपुंसकलिङ्गाः

२। अस्मद् - युष्मद् शब्दौ।

३। एतद् शब्दः - त्रिषु लिङ्गेषु

१। गम् (गच्छ्), पठ्, वद, पत्, लिख्, क्रीड्,
आ-गम्(गच्छ्), भू (भव्), धाव्, पा(पिब्),
दृश्(पश्य्), कृ (कर्)।

१। तेषां वाक्येषु उपयोगः।

२। अनुवाद-अभ्यासः।

३। वार्तालापः

Unit V

1. प्रत्ययाः
 - १। क्त-प्रत्ययः
 - २। तुमुन्नन्तः
 - ३। क्त्वा प्रत्ययः
 - १। अट्, भक्ष्, अर्च्, खेल्, चल्, धार्, कथ्, क्षाल्, पाल्, तुल्, मार्, घर्ष्, तोष्, गण्, ।
 - १। कृषीवलः इति पाठः।
 - २। नूतन-क्रियापदानि -क्री, वि-क्री, सिच्, रुह्, वर्ष्, रुह्, रच्, निस्ज्-कस्, वस्, कृष्, मुच् ।
2. क्रियापदानि (लट् लकारे)
3. कृषि-संबन्धीनि पदानि
4. आकारान्त-स्त्रीलिङ्गः
 - १। आकारान्तः स्त्रीलिङ्गः माला शब्दः
 - २। समानान्त-पदानि।
 - ३। पदानां वाक्येषु उपयोगः
 - १। सवर्णदीर्घ-सन्धिः
 - २। गुणसन्धिः
 - ३। वृद्धिसन्धिः
 - ४। सन्धीनां वाक्येषु उपयोगः
 - ५। सन्धीनां अभ्यासः
5. सन्धिः (स्वरः)

Prescribed Book: Saral Sanskrit Sikshak Part I, Bharatiya Vidya Bhavan, Mumbai, 400007.

(Omitted portions: Lesson 1: Passage starting: रामो राजमणिः with the meaning.

Lesson 6,7: Passage for memory (Memorise) at the end.

Lesson 10 and Lesson 12: Full)

References:

Sanskrita Bodhini (Prathama), Sanskrita Bhasha Pracharini Sabha, Chittoor, Andhra Pradesh, 2011।

NATIONAL COLLEGE (AUTONOMOUS)
LANGUAGE COURSE PART I SANSKRIT SEMESTER II PAPER II SANSKRIT II
(For the candidates admitted from June 2019 onwards)

SYLLABUS
SUBJECT CODE: U19S2

Unit I

1. पुनश्चर्या

गतषाणंमासे अभ्यस्तानाम्

2. कर्तृपदानां परिचयः

१। इकारान्तः पुल्लिङ्गः कविशब्दः
केचन समानान्त-शब्दः च।

२। सर्वनामशब्दः - तद् - स्त्रीलिङ्गे

३। इकारान्तः स्त्रीलिङ्गः मतिशब्दः,
केचन समानान्त-शब्दाः च।

४। एतेषां वाक्येषु उपयोगः, अनुवाद-अभ्यासः च।

3. क्रियापदानि

वर्तमानकालः (लट्)

१। जप्, चर, रक्ष, हस्, वम्, नम्, दह, तप्, वस्,
इच्छ, वाञ्छ, शंस्, त्यज्, जल्प, निन्द, क्षिप्।

२। वाक्येषु उपयोगः, अनुवाद-अभ्यासः च।

Unit II

1. भविष्यत्कालः (लृट्) नूतनक्रियापदानि

१। अर्ज्, दण्ड्, चिन्त्, ज्वल्, तर्ज्, तर्क्, तप्,
नट्।

1. नूतनकर्तृपद-परिचयः

१। इकारान्त पुल्लिङ्गः तथा स्त्रीलिङ्गपदानि
उपर्युक्त-क्रियापदानि च मिलित्वा वाक्येषु
उपयोगः

2. आत्मनेपदिनः धातवः (क्रियापदानि)

वर्तमानकाले (लट्)

१। यत्, लभ्, रम्, क्षम्, त्रप् सह, स्वद्, बाध्,
भाष्, भास्

२। पूर्वोक्त-कर्तृपदानि क्रियापदानि च वाक्येषु
उपयोगः

३। अनुवाद-अभ्यासः

3. आत्मनेपदिनः धातवः (लट् क्रियापदानि)

१। भाष्, यत्, लभ्, रम्, क्षम्, त्रप्, सह, स्वद्,
भास्

२। संवादः - अभ्यासः



Unit III

1. भूतकालः (लङ्)

- १। सर्वेऽपि धातवः वर्तमानकाले कृताः।
- २। भूतकालक्रियापदानि वाक्येषु उपयोगः।
- ३। वर्तमानकालं भूतकालं च मिश्रित्य वाक्येषु उपयोगः।
- ४। वाक्येषु उपयोगः अनुवाद-अभ्यासः च।

2. प्रेरणार्थकं क्रियापदम् (भविष्यत्) लोट्

- १। सर्वेऽपि धातवः ये वर्तमानकाले तथा भूतकाले कृताः।
- २। प्रेरणार्थकक्रियापदानि च वाक्येषु उपयोगः पूर्ववत् (मध्यमपुरुष-एकवचनमात्रम्)
- ३। अनुवाद-अभ्यासः

Unit IV

1. सन्धिप्रकरणम्

- १। यण् सन्धिः
- २। अयादिसन्धिः

2. नूतन-कर्तृपदानि (पुल्लिङ्गः)

- १। उकारान्तः पुल्लिङ्गः गुरु शब्दः
- २। समानान्त-शब्दा केचन।
- ३। उकारान्त-पदानि वाक्येषु उपयोगः
- ४। अनुवाद-अभ्यासः
- ५। संख्यावाचकपदानि १ - २५ संस्कृते।

३। नूतन-कर्तृपदानि (स्त्रीलिङ्गः)

- १। उकारान्तः स्त्रीलिङ्गः धेनु शब्दः
- २। समानान्तक-शब्दाः केचन।
- ३। उकारान्त-पदानि स्त्रीलिङ्गे उपयोगः
- ४। अनुवाद-अभ्यासः
- ५। पुल्लिङ्ग-स्त्रीलिङ्ग-पदानि मिश्रित्य वाक्येषु उपयोगः ।

4. कथालेखनम्

१। पाठ्यक्रम-अन्तर्गत-कथा

२। नूतन-कर्तृपदानि (कथा-अन्तर्गतानि)

Unit V

1. नूतन-प्रत्ययाः

१। क्तवतु प्रत्ययः- क्तप्रत्ययः

२। कर्तरि प्रयोगः कर्मणि प्रयोगः च

३। सन्नन्ताः - इच्छाप्रकृतिः(Desiderative)

2. नूतन-क्रियापदानि

१। प्रथ्, प्री, बन्द्, भूष्, मृज् (मार्ज्), युज्,

रच्, स्निह्, हिंस् (लट् परस्मैपदि, आत्मनेपदि)

२। उपरि अभ्यसित-धातु तथा प्रत्ययान् वाक्येषु
उपयोगः

३। संभाषणम् - कालिदासकृतं अभिज्ञानशाकुन्तलम्।

Prescribed Book: Sarala Sanskrit Sikshak Part II, Bharatiya Vidya Bhavan,
Mumbai 400007.

(Omitted portions: 1. Lesson 2: श्लोकाः (pages 14, 15)

2. Lesson 4, श्लोकः (page 23)

3. Lesson 10, सुभाषितानि, संस्कृत-लोकोक्तयः)

References:

1. संस्कृत-व्यवहार-साहस्री, Samskrita Bharati, Bengaluru 560085.

2. संस्कृतबोधिनी, प्रथमा, संस्कृतभाषाप्रचारिणि सभा, चित्तूर, आन्ध्रप्रदेश ५०७५०९

संवत्सरः - २०११

NATIONAL COLLEGE (AUTONOMOUS)
LANGUAGE COURSE PART I SANSKRIT SEMESTER III PAPER III SANSKRIT III
SYLLABUS
SUBJECT CODE: U19S3

Unit I

- १। पुनश्चर्या
- २। पशु-पक्षि-वृक्ष-वर्ग-शलाटुका-फल-नामानि
- ३। वाणिज्य-उपयोगि-पदानि
मापनं तोलनं च
- ५। संख्यावाचकपदानि
- ६। संवत्सरनामानि
- ७। सस्यादि नामानि
- ८। धन/धनपत्र/नाणक नामानि
- ९। इदं शब्दः - पुंनपुंस्त्रीषु।
- १०। अनुवाद अभ्यासः

Unit II

- १। क्रियापदानि
लोट् लकारे परस्मैपदि, आत्मनेपदि च
- २। इतोऽपि अव्ययानि
- ३। कथालेखनप्रकारः
- ४। अनुवादः
- ५। उपसर्गाः
- ६। तेषां वाक्येषु उपयोगः

Unit III

- १। ईकारान्त-स्त्रीलिङ्गपदानि
नदी, अटवी, कौमुदी, वाहिनी, नगरी
इत्येतानि पदानि, तेषां शब्दरूपानि च
- २। क्रियापदानि, परस्मैपदिनः
- ३। आत्मनेपदिनः
- ४। उभयपदिनः
- ५। शरीर-अङ्गनामानि, भूषण-नामानि
- ६। ऋकारान्तःपुल्लिङ्ग-शब्दाः कर्तृ, पितृ,
इत्यादयः
- ७। क्रियापदानि
- ८। अनुवाद-अभ्यासः



Unit IV

- १। कृषिकर्म
- २। कृषिसंबन्धीनि उपकरणानि
- ३। अनुवाद-अभ्यासः
- ४। ल्यबन्ताः
- ५। वाक्येषु उपयोगः
- ७। विधिलिङ् (optative/potential mood)-1
- ८। परस्मैपदि आत्मनेपदि च

Unit V

- १। नकारान्तः पुल्लिङ्गः राजन् शब्दः
- २। सन्धिप्रकरणम् - पुनश्चर्या
- ३। विसर्गसन्धिः
- ४। नूतन-अव्यय-पदानि
- ५। अनुवाद-अभ्यासः
- ६। विधिलिङ् (optative/potential mood)-2
- ७। भोजनवेला - संवादः
- ८। नूतन-कर्तृ-क्रिया-अव्यय-विविध-प्रत्यय-पदानि ।
- ९। शब्दरूपाणि, धातुरूपाणि च पुनश्चर्या ।

Prescribed books: 1. Saral Sanskrit Sikshak, Part III, Bharatiya Vidya Bhavan, Mumbai 400007.

Omitted portions: 1. Lesson 9 सीतायाः स्वयंवरः

2. Lesson 11, सुभाषितानि, संस्कृत-लोकोक्तयः

References:

1. Samskrita-vyavaharasahasri, Samskrita Bharati, Bengaluru 85
2. Anjala-samskrita kosha, Samskrita Bharati, Bengaluru 85.

NATIONAL COLLEGE (AUTONOMOUS)
LANGUAGE COURSE PART I SANSKRIT SEMESTER IV PAPER IV SANSKRIT IV
SYLLABUS
SUBJECT CODE: U19S4

Unit I

- १। प्रथम-षाण्मासिक, द्वितीय-षाण्मासिक, तृतीय-षाण्मासिक-अभ्यस्तानां विषयाणां पुनश्चर्या
- २। सर्व-शब्दः त्रिषु लिङ्गेषु।
- ३। वाच् शब्दः स्त्रीलिङ्गेषु
- ४। अनुवाद-अभ्यासः
- ५। हिमालयः - रचनालेखनम्

Unit II

- १। ओकारान्तः स्त्रीलिङ्गः गो शब्दः
- २। गो-संबन्धीनि पदानि
- ३। गां अधिकृत्य लेखः
- ४। नूतन-कर्तृ-क्रियापदानि - शब्दसंग्रहः
- ५। अनुवाद-अभ्यासः
- ६। पदानां वाक्येषु उपयोगः

Unit III

- १। समासः - उपोद्घातः
- २। तत्पुरुष-समासः
- ३। कर्मधारय-समासः
- ४। बहुव्रीहि-समासः
- ५। द्वन्द्व-समासः
- ६। द्विगु-समासः
- ७। अव्ययीभाव-समासः
- ८। एकशेषसमासः

संस्कृतम् - दैनन्दिनव्यवहारः

1. संस्कृत-व्यवहारः

- १। संख्यावाचकपदानि २५ तः ५० पर्यन्तम्।
- २। बन्धुवर्गनामानि
- ३। गृहे उपयुक्तानां वस्तूनां नामानि
- ४। वासर-तिथि-पक्ष-मास-नामानि
- ५। दैवत-ग्रहाणां नामानि

UNIT IV

1. रचनात्मकं कार्यम्

- १। पत्रलेखन- उपोद्घातः, उदाहरणानि च
- २। पिता/माता - पुत्राय/पुत्र्यै
- ३। पितरं/मातरं प्रति - पुत्रः/पुत्री
- ४। मित्राय पत्रम्
- ५। पतिः/पत्नी - पत्न्यै/पत्ये

2. अनुच्छेदः

- १। दत्तं अनुच्छेदं पठित्वा उत्तरलेखनम् - प्रकारः
- २। सरल-कथायुक्तम्, सरल-गद्यांशयुक्तम् च।

3. अनुच्छेदलेखनम्

- १। दत्तानि पदानि विचित्य पञ्चवाक्येषु एकम् अनुच्छेद-लेखनम्।
- २। सरलकथा अथवा गद्यांशयुक्तम्।

4. रचनालेखनम् (पाठ्यपुस्तक-अन्तर्गतम्)

- १। सरलकथा
- २। गद्यांशः

UNIT V

1. श्रेष्ठभाषा द्रविडभाषा - अस्याः ऐतिहासिकं स्थानम्।

- १। भाषायाः स्थापनम्
- २। भाषा-समूहः
- ३। श्रेष्ठभाषायाः गुणानि।
- ४। श्रेष्ठभाषाः
- ५। भारतीय-श्रेष्ठ-भाषे - द्रविड-संस्कृते
- ६। द्रविडभाषायाः पुराणत्वम्।
- ७। द्रविडभाषां श्रेष्ठभाषा-समूहे योजयितुमान्दोलनम्।
- ८। विश्व-श्रेष्ठद्रविडभाषा सम्मेलनम् २०१०

Prescribed Book: Sarala Sanskrit Sikshak Part IV, Bharatiya Vidya Bhavan,
Mumbai 400007.

(Omitted portions:

Lesson 2: विद्याप्रशंसा, Lesson 7: लङ्कातः यदा हनूमान् प्रतिनिवृत्तः Lesson 8: रामस्य वनगमनम्
Lesson 12: नलदमयन्ती-वर्णनम् Lesson 13: किङ्करैः पश्य किं कृतम् Lesson 14: रूपाणि
Lesson 15: सुभाषितानि Lesson 17: लोकोक्तयः।)

References:

1. संस्कृतव्यवहारसाहस्री, संस्कृतभारती, बेङ्गलूरु ५६००८५।

2. संस्कृतबोधिनी (द्वितीया), संस्कृतभाषाप्रचारिणी सभा, चित्तूर, आन्ध्रप्रदेशः ५१७५०१।

CORE COURSE-I PROPERTIES OF MATTER AND SOUND (U19PH1)

Semester - I

Instruction hours/week: 5

Core Course: I

Credit: 5

Course Objectives:

CO1: Brief about the basics of elasticity

CO2: Explaining the concept of bending of beams and its various experiments

CO3: Review the elementary ideas and theory of surface tension and its experimental determination

CO4: Giving the elementary ideas and theory of viscosity and its experimental method

CO5: Outline the ideas of acoustics, production and detection of ultrasonics.

Syllabus

UNIT- I: ELASTICITY

Elasticity-Stress-Strain- Hooke's law - Modulus of elasticity- Poisson's ratio- Work done in a strain- Relation between elastic constants and Poisson's ratio-Energy stored- Twisting couple on a cylinder- Torsional pendulum (with and without weights)- Determination of rigidity modulus and moment of inertia - Determination of rigidity modulus by Searle's static torsion method(scale and telescope).

UNIT- II: BENDING OF BEAMS

Bending moment- Cantilever- Depression for loaded end of a cantilever-Experiment to find the Young's modulus by cantilever depression method-Oscillations of a cantilever- Measurement of Young's modulus- Non-uniform bending (pin and microscope method)- Uniform bending(mirror and telescope method)- Non-uniform and uniform bending of a beam-Koenig's method.

UNIT- III: SURFACE TENSION

Surface tension – Definition – Molecular forces – Explanation of surface tension on kinetic theory – Surface energy – Work done in increasing the area of a surface – Excess pressure inside a curved liquid surface – Excess pressure inside a spherical and cylindrical drops and bubbles- Drop weight method-Capillary rise method-variation of surface tension with temperature- Experimental determination-Jaegar's method.

UNIT -IV: VISCOSITY

Viscosity – Co efficient of viscosity – Streamlined and turbulent motion – Critical velocity – Rate of flow of liquid in a capillary tube – Poiseuille's formula and its corrections –Viscosity of highly viscous liquid-Terminal velocity-Stokes formula-Viscosity of gas-Mayer's formula-Stoke's method for coefficient of viscosity-Searle's viscometer.

UNIT- V: SOUND

Acoustics- Reverberation- Reverberation time-Sabine's formula for reverberation time-Absorption coefficient and its measurement-Factors affecting the architectural acoustics and

their remedy-Sound distribution in auditorium-Requisites for good acoustics- Noise and its measurement- Noise reduction sound insulation.

Ultrasonics: -Production of ultrasonics (Piezoelectric oscillator method)- Detection of ultrasonic waves- Applications of ultrasonics.

BOOKS FOR STUDY:

1. R.Murugesan, Properties of Matter, S.Chand & Co, New Delhi (2008).
2. Brijlal, N.Subrahmanyam, Text book of Sound, Vikas Publishing Co, New Delhi (1983).

BOOKS FOR REFERENCE:

1. Brijlal and N.Subrahmanyam, Properties of Matter, S. Chand and Co. Ltd. New Delhi (1999).
2. SubramaniaIyer, Jeyaraman and Rangarajan, Properties of Matter, S.Chand Publications, New Delhi (1978).
3. D.S.Mathur, Elements of Properties of Matter, S.Chand and Co. Ltd., New Delhi (2010).
4. R.C.Brown, Mechanics and Properties of Matter, Longmans Green and company (2005).

COURSE OUTCOME

| S.No | Outcome | Cognitive level |
|-------------|---|------------------------|
| 1 | Explain the three types of moduli, experiment to determine the rigidity modulus. | U |
| 2 | Describes the bending of a beam, experiment to determine Young's modulus. | U |
| 3 | Discuss the surface tension its theory and experiment to verify. | U,Ap |
| 4 | Explain the coefficient of viscosity, types of flow and experiment to determine the coefficient of viscosity. | U,Ap |
| 5 | Explain the reverberation, production, detection and applications of ultrasonics. | U |

CORE COURSE - (CC-II): Physics Major Practical –I(U19PH2P)
(At the end of the SECOND Semester-Any Fourteen expts.)

Instruction hrs.3 hrs. /week

Credit: 5

Course Objectives:

CO1: Understanding the concept of Young’s modulus and laws of transverse vibrations.

CO2: Study the concept specific heat and Wheatstone’s bridge.

CO3: Understand the concept of convex, concave lens.

CO4: Understanding the concept of air wedge, spectrometer.

CO5: Study the concept of surface tension experimentally.

Experiments

1. Non-uniform bending – Pin and microscope method.
2. Uniform bending – Optic lever method.
3. Sonometer – Verification of laws of transverse vibrations.
4. Specific heat capacity of a liquid – Newton’s law of cooling method.
5. Meter Bridge – Specific resistance of a material of a coil.
6. Compound pendulum–Determination of acceleration due to gravity (g) &Radius of gyration (k).
7. Sonometer- Determination of A.C frequency.
8. Potentiometer-Internal resistance of a cell.
9. Thermal conductivity of a bad conductor – Lee’s disc.
10. Long focus convex lens – Determination of focal length (f) .
11. Long focus concave lens – Determination of focal length (f).
12. Newton’s rings-Determination of radius of curvature of a convex lens(R).
13. Spectrometer – Determination of refractive index (μ) of solid prism.
14. Air wedge – Thickness of insulation of a wire.
15. P.O.Box – Determination of temperature coefficient of a wire.
16. Surface tension and interfacial tension-By drop weight method.
17. Uniform bending- Pin and microscope method.
18. Junction diode characteristics.
19. Meter bridge-series and parallel resistance.
20. Uniform bending- Scale and telescope method.
21. CRO-simple applications.

COURSE OUTCOME

| S.No | Outcome | Cognitive level |
|------|---|-----------------|
| 1 | Understands the concept of Y-modulus, sound | U |
| 2 | Explains the concept of lens, spectrometer | U |
| 3 | Explains the concept of heat | U |
| 4 | Understands the concept of simple electricity experiments | U |

CORE COURSE - III MECHANICS AND RELATIVITY (U19PH3)

Semester - II
Instruction hours/week: 5

Core Course: III
Credit: 5

Course Objectives:

- CO1:** Study the concept of projectile, impulse and friction.
- CO2:** Understand the dynamics of rigid bodies.
- CO3:** Outline about centre of Gravity of different shapes and Gravitation.
- CO4:** Explain about hydrodynamics and atmospheric pressure.
- CO5:** Understand about elementary ideas on relativity.

Syllabus

UNIT -I: PROJECTILE, IMPULSE, IMPACT AND FRICTION

Projectile – Range on an inclined plane – Range and time of flight down and inclined plane - Impulse – Impact – Impulsive force–Collision- Fundamental principles of impact - Direct impact of a smooth sphere on a smooth horizontal plane-Loss in kinetic energy due to direct impact- Oblique impact of two smooth spheres.
Friction- Laws of static friction-Angle of friction-Experimental method for determining coefficient of friction.

UNIT- II: DYNAMICS OF RIGID BODIES

Moment of inertia-K.E of a rigid body-Angular momentum of a rotating body-Compound Pendulum- Centre of suspension and centre of oscillation- Centre of percussion-Kater's pendulum- Bessel's modification-Torsion pendulum-Parallel and perpendicular axis theorem-Calculation of M.I for - Rectangular lamina about an axis perpendicular to its plane -Uniform circular disc – Sphere about a diameter-Moment of inertia of a spherical shell about a diameter.

UNIT -III: GRAVITATION AND CENTRE OF GRAVITY

Newton's Law of Gravitation-Definition of G- Boy's method of determination of G -Gravitation potential and gravitational field due to spherical shell- -Centre of gravity-C.G of a right circular cone- C.G of a solid hemisphere- C.G of a hollow hemisphere- C.G of a solid tetrahedron.

UNIT -IV: HYDROSTATICS AND ATMOSPHERIC PRESSURE

Centre of pressure: Definition – CP general case- CP of a rectangular lamina vertically in a liquid with one edge in the surface of the liquid- CP of triangular lamina immersed in a liquid with its vertex in the surface and base horizontal- Laws of floatation-Experimental determination of the metacentric height of a ship – Atmospheric pressure – Fortin's Barometer – Variation of atmospheric pressure with altitude.

UNIT- V: RELATIVITY

Frame of reference-- Galilean transformation equation - Michelson Morley experiment-Special theory of relativity- Lorentz transformation equation- Length contraction – Time dilation- Variation of mass with velocity-Einstein’s postulates-Einstein’s mass-energy relation.

BOOKS FOR STUDY

1. R.Murugesan, Mechanics and Mathematical Methods, S.Chand and New Delhi (2008).
2. M.Narayanamurti, Dynamics, National Publishing Company (1996).
3. R. Murugesan, Kiruthiga Sivaprasath, Modern Physics, S. Chand and New Delhi (2007).

BOOKS FOR REFERENCE

1. D.S.Mathur, Mechanics –S Chand and Co., Delhi (2007).
2. Brijlal N.Subrahmanyam , Jivan Seshan, Mechanics and Electrodynamics, S.Chand – (2008).
3. M.Narayanamurti, N.Nagaratnam, Statics, Hydrostatics and Hydrodynamics, National Publisher.

COURSE OUTCOME

| S.No | Outcome | Cognitive level |
|------|--|-----------------|
| 1 | Describe the ideas of impulse, impact and friction | U |
| 2 | Discuss the types of pendulum, list the moment of inertia of various objects | U,E |
| 3 | Explain the law of gravitation its experiment and list the centre of gravity of many solid objects | U,E |
| 4 | Understands hydrostatics, atmospheric pressure | U,Ap |
| 5 | Understand about relativity and its elementary ideas | U,E |

CORE COURSE - IV THERMAL PHYSICS (U19PH4)

Semester- III

Instruction hrs. /week: 4

Core Course : IV

Credit : 4

Course Objectives:

CO1: Study the idea about laws of thermodynamics

CO2: Understand entropy, relation between temperature-entropy

CO3: Discuss about the concept of low temperature and its instruments

CO4: Bringing the idea about laws of radiation

CO5: Study about laws of specific heat capacity

Syllabus

UNIT- I: THERMODYNAMICS

Zeroth law of thermodynamics – Concept of heat- Internal energy - First law of thermodynamics – Reversible and irreversible process–Carnot’s reversible engine - Carnot’s engine and refrigerator – Mean free path – Viscosity of gases – Thermal conductivity of gases – Transport of thermal energy – Self diffusion.

UNIT -II: ENTROPY

Second law of thermodynamics - Concept of entropy –Change of entropy in reversible and irreversible processes – Temperature – Entropy diagram (T.S.) – Entropy of a perfect gas - Principle of increase of entropy – Third law of thermodynamics - Zero point energy-Negative temperature –Maxwell’s thermo dynamical relations.

UNIT- III: LOW TEMPERATURE

Joule – Thomson effect - Porous plug experiment–Theory of porous plug- Liquefaction of gases –Liquefaction of Helium-Helium I and II- Adiabatic demagnetization –Refrigeration cycle- Electrolux refrigerator –Air conditioning system-Equipments used-Classification-Summer- Air conditioning system.

UNIT -IV: RADIATION

Stefan’s law and its derivation- Derivation of Newton’s law from Stefan’s law-Stefan’s constant by laboratory method- Black body radiation – Distribution of energy in black body spectrum – Planck’s law –Rayleigh Jean’s law – Pyrometry – Angstrom’s pyroheliometer - Solar constant-Temperature of the sun – Some everyday applications of solar energy.

UNIT -V: SPECIFIC HEAT AND BASIC IDEAS ON SUPER CONDUCTIVITY

Specific heat of solids – Dulong and Petit’s law – Einstein’s theory of specific heat – Debye’s theory of specific heat -Calorific value of fuels-Bomb calorimeter-Bell calorimeter- Ideas on super conductivity – Critical field and critical temperature - High temperature ceramic superconductors.

BOOK FOR STUDY

1. Brijlal, N. Subrahmanyam and P.S. Hemne, Heat, Thermodynamics and Statistical Physics, S. Chand and Co., New Delhi (2007).

BOOKS FOR REFERENCE

1. J.B. Rajam and C.L. Arora, Heat and Thermodynamics S Chand and Co., New Delhi (2004).
2. Sharma JK, Sarkar KK, Thermodynamics and Statistical Physics, Himalaya Publishing House (1991).
3. Roy. S.K, Thermal Physics and Statistical Mechanics, Wiley Eastern Publishers, New Delhi Ltd. (2000).
4. R.K. Rajput, A Text book of Engineering Thermodynamics, Firewall Media publications (2010).

COURSE OUTCOME

| S.No. | Outcome | Cognitive level |
|-------|---|-----------------|
| 1 | List the various Laws of Thermodynamics | U |
| 2 | Explains Entropy, Temperature and its relation | U |
| 3 | Explain about Low temperature and its properties | U |
| 4 | Discuss about the various Laws of Radiation | U,Ap |
| 5 | Describe specific heat and basic ideas of superconductivity | U,Ap |

CORE COURSE - V: Physics Major Practical –II(U19PH5P)
(At the end of the FORTH Semester-Any Fourteen expts.)

Instruction hrs.3 hrs. /week

Credit: 5

Course Objectives:

CO1: Study the concept of Rigidity modulus of a given material experimentally.

CO2: Understand the viscosity, surface tension of a given liquid experimentally.

CO3: Study the calibration of a Voltmeter and Ammeter using potentiometer.

CO4: Study about idea of zener diode characteristics.

CO5: Understand about spectrometer, Table galvanometer, Rectifier

List of Experiments

1. Static torsion – Determination of rigidity modulus (n).
2. Torsional pendulum- Determination of rigidity modulus (n) and moment of inertia (I).
3. Coefficient of viscosity of a liquid- Poiseuille’s method.
4. Stoke’s method – Viscosity of highly viscous liquid.
5. Characteristics of a zener diode.
6. Emissive power of a surface – Spherical calorimeter.
7. Joule’s calorimeter – Specific heat capacity of liquid (Barton’s correction).
8. Carey Foster’s bridge-Determination of resistance(R) and specific resistance (ρ).
9. Potentiometer – Ammeter calibration.
10. Potentiometer – Temperature coefficient (α).
11. Potentiometer – Calibration of low range voltmeter.
12. Figure of merit – Mirror galvanometer.
13. Figure of merit – Table galvanometer.
14. Transistor characteristics – CE – configuration.
15. Spectrometer – Refractive index (μ) of a liquid.
16. Spectrometer – i-d curve.
17. CRO – Study of wave forms – Lissajou’s figures – Frequency determination.
18. Construction of full wave rectifier.
19. Surface tension of a liquid- Capillary rise method.
20. Surface tension of a liquid- Drop weight method.

COURSE OUTCOME

| S.No | Outcome | Cognitive level |
|-------------|--|------------------------|
| 1 | Understands the concept of R.Modulus | U |
| 2 | Explains the concept of potentiometer | U |
| 3 | Explains the concept of Transistor | U |
| 4 | Understands the concept of CRO | U |
| 5 | Explains the concept of Table galvanometer | U |

CORE COURSE – VI BASIC ELECTRONICS (U19PH6)

Semester- IV

Core Course : VI

Instruction hrs. /week : 4

Credit : 5

Course Objectives:

CO1: Bring out the ideas of semiconductors, diodes and its various types.

CO2: Explaining the working of transistor by various characteristics and methods of biasing

CO3: Explaining the concept of amplifier, oscillator and various semiconductor devices.

CO4: Inculcate the concept of modulation, its types and demodulation

CO5: Outline the idea about OP amp its characteristics and its applications

Syllabus

UNIT- I: SEMICONDUCTORS AND DIODES

Intrinsic and extrinsic semiconductor-V-I characteristics of P-N junction diode-Resistance of a crystal Diode-Half wave rectifier-Full wave bridge rectifier-Zener diode characteristics-Zener diode as a voltage stabiliser-Tunnel diode and its characteristics-Varactor diode.

UNIT- II: TRANSISTORS

Transistor terminals-Transistor action-Transistor as an amplifier-Characteristic curve of transistor-CB, CE and CC mode-Comparison of transistor connections-Load line-operating point-Faithful simplification-Transistor biasing-Feedback resistor-Voltage divider method of transistor biasing.

UNIT- III: AMPLIFIERS, OSCILLATORS AND SPECIAL SEMICONDUCTOR DEVICES

Single stage CE amplifier-RC coupled transistor amplifier-Power amplifier-classification of power amplifier- -Essentials of transistor oscillator-Barkhausen criterion-Types of transistor oscillators- -Hartley- and Wein bridge oscillator- JFET-Working and characteristics - Difference between JFET and bipolar transistor-JFET parameters- V-I characteristics of UJT-UJT as relaxation oscillator.

UNIT- IV: MODULATION AND DEMODULATION

Modulation-Need for modulation-Amplitude modulation-Modulation factor-Analysis of modulated wave-Power in AM wave- Limitations of AM-Frequency modulation-Theory of FM-Comparison between FM and AM-Demodulation and its essentials-AM diode detector-Superhetrodyne radio receiver and its advantages-FM receiver.

UNIT V: OPERATIONAL AMPLIFIERS

Symbol of Op-Amp-Parameters of Op-Amp-CMRR-Slew rate-Inverting amplifier-Non-inverting amplifier-Applications: Inverting adder and Non-inverting adder- Subtractor-Integrator-Differentiator-Comparator.

BOOK FOR STUDY:

1. V.K.Metha, Rohit Metha, Principles of Electronics, S. Chand and company Ltd (2011).

BOOKS FOR REFERENCE:

1. B.L. Theraja, Basic Electronics solid state, S. Chand and Company Ltd (2005).
2. R.S. Sedha, A textbook of Applied Electronics, S. Chand and company Ltd (2009).
3. Subramanyam. A, Applied Electronics, National Publishing Company (1999).
4. Garg, Rakesh Kumar, Basic Electronics, New Delhi (2009).
5. Muthu Subramanian. R, Basic Electronics Engineering, TMH, New Delhi (2000).

COURSE OUTCOME

| S.No | Outcome | Cognitive level |
|-------------|---|------------------------|
| 1 | Explain about diodes, rectifier and its efficiency | U,E |
| 2 | Describe the action of a Transistor and its configuration types | U |
| 3 | Discuss about oscillator and its types, amplifier | U |
| 4 | Understand about modulation techniques | U,E |
| 5 | List the characteristics of Op amp and its applications | U,AP |

CORE COURSE - VII OPTICS (U19PH7)

Semester- V

Instruction hrs. /week : 4

Core Course : VII

Credit : 6

Course Objectives:

CO1: Discuss the concept of aberrations its types

CO2: Outline the idea about Interference, its experimental method to determine the wavelength of source.

CO3: Giving the elementary ideas and theory about diffraction

CO4: Explaining the construction of eyepiece and its types also determine the resolving power of various instruments

CO5: Brief about the basic idea of polarization, its production and detection

Syllabus

UNIT- I: ABERRATIONS

Aberration-Spherical aberration in a lens-Reducing spherical aberration- Curvature of the field - Distortion- Dispersion by a prism - Chromatic aberration - Achromatic lenses and condition for achromatism when two lenses are in contact – Achromatism of a camera Lens.

UNIT- II: INTERFERENCE

Colour of thin films-Air wedge-Testing the plainness of the surface- Theory of Newton's rings - Wavelength of monochromatic light using Newton's rings – Haidinger fringes-Michelson interferometer working -Determination of wavelength and determination of neighboring wavelength using Michelson interferometer - Interference filter.

UNIT -III: DIFFRACTION

Fresnel's diffraction – Diffraction at a (i) circular aperture (ii) Opaque circular disc. Fraunhofer diffraction at a single slit –Double slit-missing orders in a doublet grating with theory –Oblique incidence – Determination of wavelength using grating.

UNIT- IV: EYEPIECE AND RESOLVING POWER OF OPTICAL INSTRUMENTS

Field lens - Ramsden's eye piece - Huygen's eye piece and its cardinal points – Comparison between Hygen's and Ramsden Eyepiece-Resolving power – Rayleigh's criterion of resolution- . Resolving power of a (i) telescope (ii) Prism (iii) Grating – Dispersive power of a prism and grating.

UNIT- V: POLARIZATION

Nicol prism – Nicol prism as an analyzer and polarizer – Huygens's explanation of double refraction in uniaxial crystals- Quarter wave and half wave plate- Production and detection of elliptical, circular and plane polarized light-Optical activity- Specific rotation - Laurent's half shade polarimeter.

BOOK FOR STUDY

1. Brijlal, N.Subrahmanyam, Optics, S.Chand and Co., New Delhi (2006).
2. R.Murugesan, Optics, S.Chand and Co., New Delhi (2011).

BOOKS FOR REFERENCE

1. Khanna and Gulati- Optics. R.Chand and Co. New Delhi (2007).
2. Ajoy Ghatak, Optics, Tata McGraw Hill Publications (2004).
3. R.Murugesan, E,Kiruthiga Sivaprasath, Optics and Spectroscopy – S.Chand and Co., New Delhi (2011).
4. S.K. Aggarwal, A text book of Optics, Wisdom Press (2008).

COURSE OUTCOME

| S.No | Outcome | Cognitive level |
|-------------|--|------------------------|
| 1 | Explain about different aberrations and how to reduce it | U |
| 2 | Understand about the theory of Interference and its experimental determination | U,Ap |
| 3 | Discuss about the Fresnel and Fraunhofer diffraction | U,Ap |
| 4 | Describes the two eyepiece and Resolving power of optical instruments | U,Ap |
| 5 | Explains the theory of Polarization and its experiment | U |

CORE COURSE - VIII ELECTRICITY, MAGNETISM AND ELECTROMAGNETISM (U19PH8)

Semester- V
Instruction hrs. /week: 4

Core Course : VIII
Credit : 6

Course Objectives:

- CO1:** Discuss Gauss law and its applications, types of capacitors, capacity of different capacitors.
- CO2:** Understand the basic concept of current electricity.
- CO3:** Study the basic properties of magnetism and magnetic effect.
- CO4:** Remember the basic ideas of electromagnetism and determination of self inductance and mutual inductance.
- CO5:** Review the AC circuits and its power factor.

Syllabus

UNIT- I: ELECTROSTATICS

Gauss law and its applications- Electric field due to uniformly charged sphere-Electric field due to uniform cylindrical charge-Electric field due to infinite plane sheet of charge-Coulomb's theorem-Deduction of Coulomb's law of Gauss law-Principle of a capacitor – Capacity of a spherical and cylindrical capacitors – Energy stored in a capacitor – Loss of energy due to sharing of charge-Types of capacitors.

UNIT- II: CURRENT ELECTRICITY

Kirchoff's law- Wheatstone condition for bridge balance – Carey Foster's Bridge – Potentiometer principle- Calibration of ammeter and voltmeter- Seebeck effect- Law of thermo emf- Measurement of thermo emf using potentiometer – Theory of moving coil ballistic galvanometer- Correction for: damping–Figure of merit.

UNIT- III: MAGNETISM AND MAGNETIC EFFECT

Basic definitions - Susceptibility –Properties of para, dia and ferro magnetic materials– Experiment to draw B-H curve by ballistic method–Energy loss due to hysteresis-Importance of hysteresis – Maxwell's screw rule-Fleming's left hand rule-Biot-Savart law-Magnetic induction at a point due to a straight conductor- Magnetic induction at a point on the axis of circular coil- Force on a current carrying conductor in a magnetic field-Force between two parallel current carrying conductors.

UNIT -IV: ELECTROMAGNETIC INDUCTION

Faraday's Law– Self-inductance – Self-inductance of a long solenoid – Self-inductance of a toroid-Determination of self-inductance by Rayleigh's method- Mutual inductance- Mutual inductance between two co-axial solenoids –Experimental determination of mutual inductance- Coefficient of coupling –Earth inductor-Determination of B_H .

UNIT -V: AC CIRCUITS

EMF induced in a coil-Peak value and r.m.s value of an AC – AC circuit containing L, C and R in series– Q factor – Series and parallel resonance circuits-Comparison – Sharpness of resonance– Power factor – Growth decay of current in circuit containing L and R- Charging and discharging of capacitor through R- High resistance by leakage.

BOOKS FOR STUDY

1. R.Murugesan, Electricity and Magnetism, S. Chand and Co. (2008).

BOOKS FOR REFERENCE

1. Narayanamoorthy and Nagaratnam, Electricity and Magnetism National Publishing Comp. Chennai (2005).
2. Brijlal, N.Subrahmanyam, Electricity and Magnetism, S.Chand and Co.(2004).
3. S.K.Chatterjee, Fundamentals of Electricity and Magnetism, PHI, India(2008).
4. K.K.Tewari, Electricity and Magnetism, S.Chand and Co. (2006).
- 5.

COURSE OUTCOME

| S.No | Outcome | Cognitive level |
|------|--|-----------------|
| 1 | Explains Gauss Law and list of its application | U,Ap |
| 2 | Describes Wheatstone's network, its applications and other current electricity experiments | U,Ap |
| 3 | Discuss the properties of magnetism, its types and experiment | U |
| 4 | Understand the Laws of Electromagnetic Induction and experimental determination | U |
| 5 | Explains AC circuits and its combinations | U |

**ELECTIVE COURSE –I: DIGITAL ELECTRONICS AND MICROPROCESSOR
(U19PH9E)**

Semester- V

Instruction hrs. /week : 4

Elective Course : I

Credit : 4

Course Objectives:

CO1: Study the Concept of number system and basic gates

CO2: Understand De-Morgan's theorem, Boolean expressions and its simplification

CO3: Study the concept of combinational circuits

CO4: Understand the concept of flip flop and counters

CO5: Study the basic ideas about assembly language programming and elementary idea about writing program

Syllabus

UNIT- I: NUMBER SYSTEMS AND LOGIC GATES

decimal, binary, octal, hexadecimal number systems – Inter conversions –BCD code, Excess – 3 code, Gray code – One's and two's complements – Simple binary arithmetic operations – Addition, subtraction, multiplication and division – Binary subtraction using one's and two's complements – Positive and negative logic – Basic and derived logic gates, symbols and their truth tables – AND, OR, NOT, NAND, NOR, XOR, and XNOR – Universality of NAND and NOR gates.

UNIT- II: BOOLEAN ALGEBRA AND SIMPLIFICATION OF LOGIC EXPRESSIONS

Boolean algebra – Basic laws of Boolean algebra – De-Morgan's theorems -Reducing Boolean expressions using Boolean laws – SOP and POS forms of expressions min terms and max terms – Karnaugh map simplification for 2,3,4 variable-Tabulation method.

UNIT- III: COMBINATIONAL DIGITAL SYSTEMS

Half and full adders-Half and full subtractors-Four bit adder-subtraction by 1's and 2's compliment using adder-BCD adder-Multiplexer-Demultiplexer-Decoder-2 to 4 and 3 to 8 decoder-Encoder-Octal to binary encoder.

UNIT IV: SEQUENTIAL DIGITAL SYSTEMS

Flip flop – RS – clocked RS – T and D flip flops – JK and master slave flip flops – Shift registers – SISO and SIPO shift registers - Ring counter –Johnson's counter – Four bit asynchronous counter – Mod-2 and mod-4 counter –Synchronous counter.

UNIT- V: MICROPROCESSOR (8085)

Introduction to microprocessor – Basic components of a microcomputer –Memory – ROM – RAM – Architecture of 8085 – Address bus – Data bus – Control bus– Pin configuration – Registers- Arithmetic and logic unit – Flags – Instruction format –Types of instructions – Addressing modes – Assembly language programming –Programmes for 8-bit addition, 8-bit subtraction.

BOOKS FOR STUDY

1. V. Vijayendran , Digital Fundamentals, S.Viswanathan, Printers and Publishers Private Ltd, Chennai,)(2004) (Unit- I to Unit -IV).
2. B.Ram, Fundamentals of Microprocessor and Microcomputers, Dhanpat Rai Publications, New Delhi, 2008. (For Unit- V only).

BOOKS FOR REFERENCE

1. W.H. Gothmann , Digital Electronics, Prentice Hall of India, Pvt, New Delhi (1996).
2. Anokh Singh, A.K. Chhabra, Fundamentals of Digital Electronics and Microprocessors, S. Chand and Co., New Delhi (2003).
3. A.P. Malvino, D.P. Leach, Digital Principles and Application, IV Edition, Tata McGraw Hill, New Delhi (1968).
4. V. Vijayendran, Fundamentals of Microprocessor – 8085, S. Viswanathan Printers and Publishers Private Ltd., Chennai, (2004).

COURSE OUTCOME

| S.No | Outcome | Cognitive level |
|------|---|-----------------|
| 1 | Understands the Number system, its mutual conversions and basic gates | U,Ap |
| 2 | Explains the Boolean Algebra, its simplification | U,Ap |
| 3 | Describes various combinational circuits | U |
| 4 | Discuss the sequential circuits and other experiments | U |
| 5 | Understands the architecture of 8085 and its instruction set | U,Ap |

**ELECTIVE COURSE –II COMPUTER PROGRAMMING –
C LANGUAGE (U19PH10E)**

| | |
|-----------------------------------|-----------------------------|
| Semester- V | Elective Course : II |
| Instruction hrs. /week : 4 | Credit : 4 |

Course Objectives:

CO1: Study the elementary ideas about C language.

CO2: Understand the input-output statements and various control structures.

CO3: Study the ideas about function and its categories.

CO4: Study about pointers, structures.

CO5: Developing programming for some basic concepts.

Syllabus

UNIT- I: INTRODUCTION

IMPORTANCE OF C – Basic structure of C Programs – Programming Style-Character set, Keywords and identifiers –Constants – Variables – Primary data types – Declarations of variables – Assigning values of variables.

Operators and expressions: Arithmetic, Relational, Logical, Assignment, Increment and Decrement, Conditional, Bitwise, Comma Operators – Arithmetic expressions –Procedure and Associativity.

UNIT- II: INPUT OUTPUT OPERATOR

getchar, putchar, formatted output (printf) and formatted input (scanf).

Control Structure: Decision making with if, - if Else–Nested If...else- else if ladder- switch – go to – Break and Continue statements – while – do, while – for statements.

UNIT -III: ARRAYS

One – dimensional and two dimensional arrays, declaring arrays– Initializing arrays-Multi dimensional arrays.

Functions: Basic functions – Return values and their types – Calling a function – Category of functions –Nesting of functions- Recursion-Function with arrays.

UNIT- IV: STRUCTURES AND UNION

Structure definition and initialization – Arrays of structures – Arrays within structures – Structures and functions – Unions.

Pointers: Declaration and initialization- Accessing a variable through its pointer-Pointer expressions- Pointers and arrays – Pointer and character strings- Pointer and functions.

UNIT- V: Development of algorithm, flowchart and program for the following problems.

1. Average of a set of numbers.
2. Conversion of Fahrenheit to Celsius.
3. Solving quadratic equation.
4. Finding the factorial using recursion.

5. Add and subtract two matrices.
6. Find the largest element in an array.
7. Sorting a set of numbers in ascending order.
8. Arrange the names in alphabetical order.
9. Check for palindrome
10. Find standard deviation for an array of numbers

BOOK FOR STUDY

1. E.Balagurusamy, Programming in ANSI – C, Tata McGraw Hill publications (2004).

BOOKS FOR REFERENCE:

1. Byron S. Gottifried Schaum’s Outline Series Theory and Problems of Programming with C Tata McGraw Hill, Internationals (1998).
2. Venugopal K.R and Sudep R.P, Programming with C, Tata McGraw Hill, (1998).
3. Reema Thareja, Introduction to C, Oxford Press (2010).
4. D. Srivastava, S.K.Srivastava, C in Depth, BPB Publications (2008).

COURSE OUTCOME

| S.No | Outcome | Cognitive level |
|------|--|-----------------|
| 1 | Understands the basic ideas of C language | U |
| 2 | Explains various control statements and looping statements | U |
| 3 | Describes the ideas of function, arrays | U |
| 4 | Discuss about structures and pointers | U |
| 5 | Develops C program for certain concepts | Ap |

CORE COURSE - (CC-IX): Major Practical –III(U19PH11P)

(At the end of the Sixth Semester- Any 15 experiments choosing a minimum of 6 from each section)

Instruction hrs.3 hrs./week

Credit: 6

Course Objectives:

CO1: Study the concept Young's modulus of a given material experimentally.

CO2: Understand various experiments using spectrometer.

CO3: Understanding the concepts of potentiometer, magnetism, Self Inductance.

CO4: Study about the ideas of LCR, Oscillator.

CO5: Understand various experiments using IC's.

General and Electronics Experiments

SECTION – A- Analog Experiments

1. Koenig's method – Uniform bending – Young's Modulus(Y).
2. Spectrometer $i-i'$ curve.
3. Spectrometer – Small angle prism.
4. Spectrometer – Grating – Normal incidence.
5. Spectrometer – Grating minimum deviation and dispersive power.
6. Spectrometer – Cauchy's constants.
7. Spectrometer – Fraunhofer lines.
8. Field along the axis of a coil – Determination of magnetic moment (m).
9. M and H – Absolute determination using deflection and vibration magnetometer.
10. Potentiometer - High range voltmeter calibration
11. Potentiometer-Temperature coefficient of resistance
12. Anderson's bridge-Self inductance of a coil (L).
13. De-Sauty's bridge-Self inductance of a coil (L).
14. B.G. – Determination of mutual Inductance.
15. Solar cell characteristics

SECTION – B Digital Experiments

1. Series and Parallel resonance circuits (CRO to be used).
2. Regulated power supply using Zener, Percentage of regulation.
3. Hartley oscillator using transistor (CRO to be used).
4. Colpitt's oscillator using transistor(CRO to be used).
5. Study of logic gates using suitable IC's.
6. Logic gates – AND, OR and NOT gates using discrete components – Truth table.
7. Universal gates NAND/NOR and basic gates from universal gates.
8. Adder– Half and Full adder.
9. Subtractor- Half and Full subtractor.
10. Demorgan's theorem and Boolean algebra.
11. Op – Amp – Adder and subtractor.
12. Op – Amp – integrator and differentiator.
13. Study of Flip Flops.
14. BCD to 7 segment decoder – 7 segment LED display
15. FET characteristics.
16. Astable multivibrator using transistor.

COURSE OUTCOME

| S.No | Outcome | Cognitive level |
|-------------|---|------------------------|
| 1 | Understands the concept of Spectrometer | U |
| 2 | Explains the concept of Magnetism, | U |
| 3 | Explains the concept of Zener diode, discrete components | U |
| 4 | Understands the concept of oscillator | U |
| 5 | Explains the concept of IC's and various experiments using it | U |

CORE COURSE - X: MAJOR PRACTICAL – IV(U19PH12P)

Semester-VI

Instruction hrs.3 hrs./week

Credit: 6

Course Objectives:

CO1: Developing C program for simple arithmetical concepts.

CO2: Developing C program to explain arrays, functions.

CO3: Developing μ P program for simple 8-bit programmes.

CO4: Developing μ P program to explain complex programmes

CO5: Developing μ P program to display a 6 letter word

Any 12 experiments choosing a minimum of 6 from each section

(At the end of the VI Semester)

C- Programming and Assembly language programming

SECTION – A C -Programme

1. Average of a set of numbers.
2. Conversion of Fahrenheit to Celsius.
3. Solving quadratic equation.
4. Finding the factorial using recursion.
5. Add and subtract two matrices.
6. Find the smallest and largest element in an array.
7. Sorting a set of numbers in ascending/ descending order.
8. Arrange the names in alphabetical order.
9. Multiplication of two 3x3 matrices.
10. Fibonacci Series.
11. Check for palindrome.

SECTION – B – Microprocessor 8085.

1. 8-bit addition and 8-bit subtraction.
2. 8-bit multiplication and division.
3. Conversion from decimal to hexadecimal system.
4. Conversion from hexadecimal to decimal system.
5. 16-bit addition.
6. 1's compliment and 2's compliment subtraction.
7. Find the smallest number in a given array.
8. Find the largest number in a given array.
9. Find the Square of a given number from the look up table.
10. Find the sum of series of 8-bit numbers (sum 16-bit).
11. Display a 6 letter word.
12. Addition of two 8-bit numbers using 8051
13. Subtraction of two 8-bit numbers using 8051

COURSE OUTCOME

| S.No | Outcome | Cognitive level |
|-------------|---|------------------------|
| 1 | Understands the concept of 8085 architecture with simple programmes | U |
| 2 | Explains the concept of 8085 architecture with various instructions | U |
| 3 | Explains the concept of array using 8085 | U |
| 4 | Understands the C program concept with elementary programmes | U |
| 5 | Explains the concept of arrays, functions in C Program | U |

CORE COURSE-XI ATOMIC AND NUCLEAR PHYSICS (U19PH13)

Semester- VI

Core Course : XI

Instruction hrs. /week : 4

Credit : 6

Course Objectives:

CO1: Discuss the properties of cathode rays, positive rays and its experimental arrangement

CO2: Study vector atom model, coupling schemes

CO3: Understand the fine structure of spectral lines by various effects

CO4: Discuss the basic property of nuclei and counters.

CO5: Review about basic ideas of nuclear models and elementary particles

Syllabus

UNIT- I: CATHODE RAYS AND POSITIVE RAYS

Photoelectric effect – Richardson and Compton experiment – Experimental investigation – Laws of photoelectric emission – Einstein’s photoelectric equation - Cathode rays – Properties – e/m of cathode rays – Millikan’s oil drop method – Positive rays – Properties – e/m of positive rays: Thomson’s parabola method – Aston’s-Bain’s bridge - Determination of critical potential – Franck and Hertz’s experiment.

UNIT- II: VECTOR ATOM MODEL

Sommerfeld atom model-Vector atom model-Variation of quantum numbers, L-S and j- j Couplings – Pauli’s exclusion principle - Electronic configuration of elements and periodic classification - Magnetic dipole moment of electron due to orbital and spin motion – Bohr magneton- Stern and Gerlach experiment.

UNIT- III: FINE STRUCTURE OF SPECTRAL LINES

Optical spectra – Spin orbit coupling –Experimental verification of normal Zeeman effect- Fine structure of sodium D lines – Zeeman effect - Larmor’s theorem - Quantum mechanical explanation of the normal Zeeman effect – Anomalous Zeeman –Paschen Back effect-Stark effect.

UNIT-IV: PROPERTIES OF NUCLEI AND INSTRUMENTS

Review of basic properties of nuclei – Mass, radius, binding energy, nuclear moments – Isotopes- Isobars – Radioactivity-Cyclotron – Betatron- Geiger - Muller counter -Wilson cloud chamber- Q value of nuclear reaction – Discovery of neutron, positron.

UNIT- V: NUCLEAR MODELS AND ELEMENTARY PARTICLES

Nuclear fission – Nuclear fusion - Liquid drop model –Neutrons in fission process– Nuclear energy – Thermo nuclear reactions – Atom bomb- Shell model – Magic numbers– Basic ideas of a nuclear reactor - Hydrogen bomb.

Basic classification of subatomic particles – Photons- Leptons – Meson – Baryons.

BOOK FOR STUDY

1. R .Murugheshan, Modern Physics, S.Chand& Co. (2010).

BOOKS FOR REFERENCE

1. Arthur Beiser, Concept of Modern Physics: McGraw Hill, Ed.VI (1999).

2. Brijlal ,N. Subrahmanyam, Nuclear and Particle Physics, S.Chand & Co, New Delhi (2005).
3. Brijlal, N.Subrahmanyam, Nookala Subhadra Devi, S.Chand & Co, New Delhi (2005).
4. V.Devananthan, Nuclear Physics, Narosa Publications (2012).
5. S.N.Goshal,Atomic Physics, S.Chand& Co, New Delhi(2010).

COURSE OUTCOME

| S.No | Outcome | Cognitive level |
|-------------|---|------------------------|
| 1 | Explains about cathode rays, positive rays and its experiment | U |
| 2 | Describes about various Atom models | U |
| 3 | Discuss the fine structure of spectral lines | U |
| 4 | Understands the properties of nucleous and chambers | U,Ap |
| 5 | Discuss about different atom models and elementary particles | U |

CORE COURSE –XII ELEMENTS OF THEORETICAL PHYSICS (U19PH14)

Semester- VI

Instruction hrs. /week : 4

Core Course : XII

Credit : 6

Course Objectives:

CO1: Study about elementary ideas of classical mechanics

CO2: Discuss about wave mechanics

CO3: Review about quantum mechanics, developing Schrodinger's equation

CO4: Understand about statistical mechanics and different statistics

CO5: Discuss about basic ideas of astrophysics

Syllabus

UNIT - I: CLASSICAL MECHANICS

Cartesian co-ordinates – Principle of virtual work – Virtual force – Generalized-co-ordinates - Generalized momentum - Generalized kinetic – energy – D'Alembert's principle (D.A.P) – Lagrangian's equation of motion from D.A.P - Application of Lagrangian formalism to (i) Atwood's machine (ii) Simple pendulum - Hamilton as total energy operator – Hamilton's variational principle.

UNIT-II: WAVE MECHANICS

De Broglie concept of matter waves – De Broglie wavelength – Wave velocity and group velocity for the De Broglie waves –Heisenberg's uncertainty relations – G.P. Thomson's experiment for verifying De Broglie relation – Photo electric effect – Einstein's photo electric equation.

UNIT -III: SCHRODINGER's EQUATION

Operator formalism – Total energy, momentum, kinetic and potential energy operators – Eigen function and its properties - Derivation of Schrodinger's equation – Time Dependant and independent – Particle in a box.

UNIT- IV: STATISTICAL MECHANICS

Introduction-Phase space- Fundamental postulates of statistical mechanics- Thermodynamic probability- Boltzmann's theorem on entropy and probability- Maxwell- Boltzmann distribution law – Bose-Einstein distribution law – B.E condensation-Fermi Dirac distribution Law.

UNIT- V: ASTROPHYSICS

Classification of stars-The Harvard classification system- Hertzsprung – Russel diagram- Luminosity of a star- Stellar evolution- White Dwarfs- Electrons in a white Dwarf star- Chandrasekhar limit – Neutron stars-Black holes-Supernova explosion-Photon diffusion time- Gravitational potential energy of a star.

BOOKS FOR STUDY

1. R. Murugesan , Mechanics and Mathematical Physics, S. Chand publications (2008).

2. R. Murugesan and Kiruthiga Sivaprasath, Modern Physics, S. Chand Publications (2008).

BOOK FOR REFERENCE

1. Arthur Beiser , Modern Physics, Tata McGraw Hill Publications(1998).
2. K.D.Abhyankar ,Astrophysics of the Solar System, University Press (India) Private Limited (2012).
3. Ajit Kumar, Fundamentals of Quantum Mechanics, Cambridge press (2005).
4. Salinas, Introduction to Statistical Physics, Springer (2004).

COURSE OUTCOME

| S.No | Outcome | Cognitive level |
|-------------|--|------------------------|
| 1 | Understands about classical mechanics | U |
| 2 | Describes about wave mechanics | U |
| 3 | Discuss about elementary ideas of quantum mechanics and its applications | U,Ap |
| 4 | Explains statistical mechanics, classical and quantum statistics | U |
| 5 | Understands the basic concept of Astrophysics | U |

**CORE COURSE –XII SOLID STATE PHYSICS AND MATERIALS SCIENCE
(U19PH15)**

Semester- VI

Instruction hrs. /week : 4

Core Course : XII

Credit : 6

Course Objectives:

CO1: Understand about crystal structure, bonding crystal imperfections

CO2: study about conducting, di-electric and insulating materials and its properties

CO3: Discuss about different types of magnetic materials and its theories

CO4: Bringing the ideas of smart, fiber and new materials

CO5: Understand the brief ideas of superconductors and its theories.

Syllabus

UNIT- 1: CRYSTAL STRUCTURE, BONDING INSOLIDS AND CRYSTAL IMPERFECTIONS

Crystal periodicity - Unit cell - Symmetry elements - Point group – Bravais lattices – Miller indices – Inter planar spacing – X-ray diffraction – Bragg’s law – Powder method diffractometer. Atomic bonding: Ionic bond – Bond dissociation energy – Cohesive energy – Madlung constant – Covalent bond – Metallic bond – Hydrogen bond – Van der Waals bond – Crystal imperfections: point, line and surface imperfections – Colour centres.

UNIT- II: CONDUCTING AND DIELECTRIC MATERIALS

Interpretation of Ohm’s law – Relaxation types and electrical conductivity – Wiedmann-Franz law – Dielectrics – Definitions - Types of electric polarization – Frequency and temperature - Effects of polarization – Dielectric losses – Local field - Clausius-Mosotti relation - Determination of dielectric constant - Schering bridge – Properties of insulating materials.

UNIT- III: MAGNETIC MATERIALS

Different types of magnetic materials - Classical theory of dia and para magnetism – Weiss theory of paramagnetism - Molecular field theory of ferro magnetism – Domain theory of ferromagnetism – Hard and soft magnetic materials.

UNIT- IV: NEW MATERIALS

Metallic glasses – Fiber reinforced plastics - Fiber reinforced metals – Surface acoustic wave materials- Bio materials – Ceramics – Cermets – Electrets - Nano phase materials - Intermetallic compounds – Shape memory alloys - SMART materials- Conducting polymers.

UNIT- V: SUPERCONDUCTORS

Meissner effect – Thermal properties- Energy gap-Isotope effect— Type I and Type II super conductors – BCS theory - Josephson tunneling- Theory of D.C. Josephson effect- A.C. Josephson effect- SQUID – Applications.

BOOKS FOR STUDY

1. M. Arumugam - Materials Science – Anuradha Publications – 3rd Edition (2008).
2. S.O. Pillai – Solid State Physics – New Age International (P) Limited, Publishers, 7th Edition (2015).

BOOKS FOR REFERENCE

1. R.K.Puri, V.K.Babbar, Solid State Physics, S.Chand (2005).
2. C.Kittel, Introduction to Solid State Physics – Wiley India, 7th Edition (2010).
3. P.K. Palanisamy, Material Science – Scitech Publication (2005).
4. M.A. Wahab, Solid State Physics- Narosa publications (2006).

COURSE OUTCOME

| S.No | Outcome | Cognitive level |
|------|--|-----------------|
| 1 | Explains about crystal structure and crystal imperfections | U |
| 2 | Understands about conducting and dielectric materials and its properties | U, Ap |
| 3 | Describes the theory of Para, Dia and Ferro magnetic materials | U |
| 4 | Outlines the idea of different new age materials | U |
| 5 | Discuss about superconductors and its theories | U |

**ELECTIVE COURSE -III OPTO ELECTRONICS AND FIBER OPTIC
COMMUNICATION (U19PH16E)**

SEMESTER - VI

Instruction hrs. /week: 5

Elective Course: III

Credit : 4

Course Objectives:

CO1: Understand the idea about interaction of light with matter

CO2: Discuss the working and applications of various opto electronic materials

CO3: Study about the principle of laser and its types

CO4: Discuss the basic principle of optical fiber and its communication system

CO5: Bringing the ideas about optical data storage and hologram

Syllabus

UNIT- I: INTERACTION OF LIGHT WITH MATTER

Optical constants- Basic principle-Extinction coefficient- Absorption coefficient-Reflectivity and transmissivity-Light absorption in metals, semiconductor-Excitons-Franz Keldyesh effect-Salient features of optical absorption in metals, semiconductor and insulator.

UNIT- II: OPTO ELECTRONIC MATERIALS AND DEVICES

Optoelectronic materials- Characteristics-Liquid crystal display-Types of display-Light emitting diode- LED materials-LED displays.

Photo detectors: Photo conductor-Photo diode-Photo transistor-Solar cell and its applications.

UNIT- III: LASERS

Basic principle- Laser characteristics-Spontaneous emission – Stimulated absorption- Stimulated emission- Einstein Coefficients – Population inversion – Pumping action –Laser characteristics-Laser applications (any four)-Nd-YAG laser-Helium – Neon –CO₂ laser – Semiconductor laser.

UNIT- IV: FIBER OPTIC COMMUNICATION

Principle of Optic fibre-Propagation of optical signal through fibre- Acceptance angle-Numerical aperture- Single and multi mode fibres -Light source: Laser diode-Light detectors: Avalanche photo diode-Optic fiber communication link(block diagram)-Advantages of fiber optics communication.

UNIT -V: OPTICAL DATA STORAGE

Surface storage-Phase change recording-Magneto optical data storage-Hi-tech evolved in system development-Automatic focusing-Automatic track following capacity of CD- Advantages of CD –Holographic storage- Construction and reconstruction of a hologram.

BOOKS FOR STUDY

1. S. Jayakumar, Material Science, R.K Publishers, Coimbatore (2002).

2. P. Mani, Text Book of Engineering Physics-I, Dhanam publications (2009), 5th edition.
3. P. K.Palanisamy, Semiconductor Physics and Opto Electronics, Scitech Publications (2004).

BOOKS FOR REFERENCE

1. M.N.Avadhanalu, P.S.Hemne, An Introduction to Lasers, S.Chand,(2005).
2. S.Mohan, V, Arjunan, M.Selvarani, M.Kanchana Mala, Laser Physics, MJP Publishers (2008).
3. Spana Katiyar, Optical Fiber Communication, Katson books (2012).
4. John M.Senior, Optical Fiber Communications, Pearson, India (2010).

COURSE OUTCOME

| S.No | Outcome | Cognitive level |
|-------------|--|------------------------|
| 1 | Explains about interaction of Light with matter | U |
| 2 | Describes about various opto electronic devices | U |
| 3 | Understand about basic principle of Laser and its types | U |
| 4 | Discuss about the principle of Fiber optics and its uses in detail | U |
| 5 | Explains about optical data storage and its various types | U, Ap |

ALLIED PHYSICS – I(U19APH1)

(From June 2019 onwards)

Semester: III
Instruction Hours/Week: 4

Second Allied Course: 1
Credit: 3

COURSE OBJECTIVES

On the successful completion of the course, students will be able to

CO1: Understand the concept of elasticity and the experimental determination of Young's modulus of a material.

CO2: Have knowledge about simple harmonic motions and reverberation time.

CO3: Explain the theory of surface tension, viscosity and their experimental determination.

CO4: Differentiate the concepts of heat, thermal conductivity and their experimental determinations.

CO5: Gain knowledge about electromagnetic radiation, Raman effect and basics of fiber optics.

Syllabus

UNIT-I: PROPERTIES OF MATTER

Stress – Strain, Hooke's law – Elastic behavior of a material – Different moduli of elasticity- Relation between elastic constants – Work done per unit volume in longitudinal strain - Poisson ratio - Expression for bending moment – Experimental determination of Young's modulus by non-uniform bending and uniform bending (pin and microscope method).

UNIT-II: SOUND

Simple Harmonic Motion – Composition of two simple harmonic motion - Along a straight line and at right angles to each other – Lissajou's figures and their applications.

Acoustics of buildings- Reverberation – Reverberation time – Sabine's formula- Conditions for good acoustics – Law of vibration of stretched strings – Sonometer.

UNIT-III: SURFACE TENSION AND VISCOSITY

Definition and dimension of surface tension – Variation of surface tension with temperature – Experiment to determine the surface tension of given liquid by drop weight method-Experiment for interfacial tension between water and liquid.

Co-efficient of viscosity and its dimension –Streamline flow and turbulent flow-Expression for critical velocity- Significance of Reynold's number-Poiseuille's formula – Experiment to determine the co-efficient of viscosity (Poiseuille's method).

UNIT-IV: THERMAL PHYSICS

Newton's law of cooling – Verification – Specific heat capacity of liquid by cooling – Bomb calorimeter-Thermal conductivity of a bad conductor-Lee's disc method-Conduction- Coefficient of thermal conductivity – Good and bad conductor. Stefan's law of radiation – Solar constant – Angstrom's pyroheliometer - Temperature of the sun.

UNIT-V: OPTICS

Electromagnetic Spectrum – Spectral response of human eye – UV and IR spectroscopy – Raman effect – Experimental arrangement – Applications of Raman effect.

Fiber Optic communication: Introduction – Optic fiber – Numerical aperture – Coherent bundle – Fiber optic communication system and its advantages –Single mode and multimode fibers - Optic sensors-Temperature sensor.

BOOKS FOR STUDY

1. BrijLal and N.Subrahmanyam, Text book of Sound, Vikas Publications Pvt. Limited, (2000).

2. R.Murugesan, Properties of Matter, S.Chand and Co. New Delhi (1999).
3. BrijLal and N.Subrahmanyam, Heat and Thermodynamics, S.Chand (1999).
4. BrijLal and N.Subrahmanyam, Text Book of Optics, S.Chand and Co. Delhi (2010).

BOOKS FOR REFERENCE

1. R.Murugesan, Modern Physics, S.Chand and company Ltd., New Delhi (2006).
2. D.S.Mathur, Elements of Properties of matter , ShyamLal Charitable Trust, New Delhi(2005).
3. Ajoy Ghatak, Optics, Tata Mc Graw Hill, Delhi, 2nd Edi. (2004).
4. A. Sundaravelusamy, Allied Physics – I, Priya Publications.

COURSE OUTCOME

| S.No | Outcome | Cognitive level |
|-------------|---|------------------------|
| 1 | Explains about stress, strain, Y-modulus | U,Ap |
| 2 | Describes about sound and acoustics | U |
| 3 | Understand about surface tension, viscosity and its experiments | U,Ap |
| 4 | Discuss about the ideas of heat, specific heat capacity | U |
| 5 | Explains about different spectroscopy and fiber optics | U |

ALLIED PHYSICS PRACTICALS(U19APH2P)

(From June 2019 onwards)

Semester: III & IV

Second Allied Course: II

Instruction Hours/Week: 2+3

Credit: 3

COURSE OBJECTIVES

On the successful completion of the course, students will be able to

CO1: Understand the concept of elasticity of different materials.

CO2: Understand the laws of Transverse vibrations experimentally.

CO3: Explain the concepts of Surface Tension, Viscosity through their experiments.

CO4: Explain the concepts of heat and thermal conductivity through experiments.

CO5: Realize the uses of semiconductor diodes, logic gates, IC's and rectifiers in daily life.

(At the end of the Even Semester-Any Fifteen experiments)

1. Non-uniform bending – Pin and microscope method.
2. Uniform bending – Pin and microscope method.
3. Sonometer – Verification of laws of transverse vibrations.
4. Specific heat capacity of a liquid – Newton's law of cooling method.
5. Thermal conductivity of a bad conductor – Lee's disc method.
6. Meter bridge – Specific resistance of a material of a coil.
7. Carey Foster bridge- Specific resistance of a material of a coil.
8. Newton's rings –Determination of radius of curvature(R).
9. Spectrometer – Refractive index of a (μ) of solid prism.
10. Spectrometer- Determination of wavelength using grating.
11. Air wedge – Thickness of insulation of a wire.
12. Characteristics of a junction diode.
13. Co-efficient of viscosity a liquid-Poiseuille's method.
14. Surface tension and interfacial tension of a liquid-Drop weight method.
15. Construction of full wave rectifier.
16. Study of logic gates-using ICs.
17. Figure of merit-Table galvanometer.
18. EMF of a thermocouple.
19. Study of logic gates (AND, OR, NOT) using discrete components.
20. Meter bridge-Verification of laws of resistance.

COURSE OUTCOME

| S.No | Outcome | Cognitive level |
|------|--|-----------------|
| 1 | Understands the concept of properties of matter, sound, heat | U |
| 2 | Explains the concept of viscosity, surface tension, light | U |
| 3 | Explains the concept of current electricity | U |
| 4 | Understands the concept of IC's | U |
| 5 | Explains the concept of rectifier | U |

ALLIED PHYSICS – II(U19APH3)

(From June 2019 onwards)

Semester : IV
Instruction Hours/Week: 5

Second Allied Course: III
Credit: 3

COURSE OBJECTIVES:

On the successful completion of the course, students will be able to

CO1: Understand the basics of electrostatics.

CO2: Understand the concepts about electricity and electromagnetic induction

CO3: Get idea about the atom models, X - rays and crystal structure determination

CO4: Acquire knowledge about the functioning of nuclear particle detectors.

CO5: Understand the importance of semiconductors and basics of digital electronics.

UNIT –I: ELECTROSTATICS

Coulomb's law- Gauss law and its applications- Intensity at a point due to charged sphere and cylinder-Principle of capacitor- Capacity of the spherical- Cylindrical condenser -Energy of a charged capacitor- Sharing of charges and loss of energy.

UNIT -II: ELECTRICITY

Kirchoff's law- Applications- Wheatstone bridge- Carey Foster's bridge-Laws of electromagnetic induction- Expression for induced E.M.F- Self inductance- Determination of coefficient of self inductance – Rayleigh's method-Mutual inductance of solenoid- Experimental determination of mutual inductance.

UNIT- III: ATOMIC PHYSICS:

Sommerfeld and Vector atom models-Quantum numbers in vector atom model- Pauli's exclusion principle - Continuous and characteristics of X-Rays-Moseley's law and its importance- Bragg's law-Miller indices- Determination of crystal structure-Powder crystal method.

UNIT –IV: NUCLEAR PHYSICS

Nuclear Size-Charge – Mass- Spin- Nuclear models- Liquid drop model- Shell model – Particle detectors- Cloud chamber-Bubble chamber- Photographic emulsion technique-Elementary particles (fundamental ideas only).

UNIT- V: ELECTRONICS AND DIGITAL ELECTRONICS

Semiconductors - Properties- Junction diode- Forward and reverse bias-V-I characteristics.

Number systems –Decimal, binary, octal, hexadecimal and their mutual conversions-Binary arithmetic operations.

Basic logic gates- AND, OR, NOT, NOR, NAND – NOR and NAND gate as universal gates, Laws of Boolean algebra- De- Morgan's theorems.

BOOKS FOR STUDY AND REFERENCE

1. BrijLal and N.Subrahmanyam, Text book of Electricity and Magnetism, Pragati Prakashan Publisher(1997).
2. R. Murugesan, Modern Physics, S.Chand & Co, New Delhi(2010).
3. B.L. Theraja, Basic Electronics, S. Chand &Co, New Delhi(2008).
4. Anokh Singh, A.K.Chhabra, Fundamentals of Digital Electronics and Microprocessors, S.Chand and Co., New Delhi (2003).

COURSE OUTCOME

| S. No | Outcome | Cognitive level |
|--------------|---|------------------------|
| 1 | Explains about electrostatics, types of capacitors | U,Ap |
| 2 | Describes about concept of current electricity, electromagnetic induction | U,Ap |
| 3 | Understand about atom models, X-rays | U |
| 4 | Discuss about the ideas of nucleus, models and elementary particles | U |
| 5 | Explains about diode, number system and IC's | U |

NME – I ENERGY PHYSICS(U19NME1)

(From June 2019 onwards)

Instruction hours/week: 2

**NME Course - I
Credit: 2**

Course Objectives:

On the successful completion of the course, students will be able to

CO1: Know the importance of renewable energy sources.

CO2: Understand the importance of solar energy.

CO3: Understand the fundamentals of bio mass energy.

CO4: Get an idea of different energy sources.

CO5: Think about energy storage and conservation.

Syllabus

UNIT- I: CONVENTIONAL ENERGY SOURCES

World's reserve - Commercial energy sources and their availability - Various forms of energy - Renewable and conventional energy system.

UNIT- II: SOLAR ENERGY

Renewable energy sources – Solar energy – Nature of solar radiation – Components – Solar heaters – Solar cookers.

UNIT- III: BIOMASS ENERGY FUNDAMENTALS

Biomass energy – Classification – Biomass conversion process. - Gobar gas plants – wood gasification – Advantages & disadvantages of biomass as energy source.

UNIT- IV: OTHER FORMS OF ENERGY SOURCES

Geothermal energy – Wind energy – Ocean thermal energy conversion – Energy from waves and tides (basic ideas only.)

UNIT- V: ENERGY STORAGE AND ITS IMPACT

Conservation of energy – Global Warming – Energy conservation principles – Energy storage.

BOOK FOR STUDY

1. K.Karuppannan and N.Suganthi, Energy Physics, Priya Publications, Karur (2006).

BOOKS FOR REFERENCE

1. S.A. Abbasi and Nasema Abbasi, “Renewable Energy sources and their Environmental Impact”, PHI Learning Pvt. Ltd., New Delhi (2008).

2. P. Kothari, K.C. Singal and Rakesh Ranjan, “Renewable energy sources and Emerging Technologies”, Prentice Hall of India Pvt. Ltd., New Delhi (2008).

3. G.D. Rai, Non -Conventional Energy Sources, Khanna Publications (2005).

COURSE OUTCOME

| S.No | Outcome | Cognitive level |
|-------------|---|------------------------|
| 1 | Explains about various conventional energy sources | U |
| 2 | Describes about concept Solar energy and Solar components | U |
| 3 | Understand about Bio mass energy | U |
| 4 | Discuss about the ideas about other energy sources | U |
| 5 | Explains about Energy storages | U |

NME – II LASER PHYSICS(U19NME2)
(From June 2019 onwards)

Instruction hours/week: 2

NME Course - II
Credit: 2

Course Objectives:

On the successful completion of the course, students will be able to

CO1: Understand the fundamentals of Laser.

CO2: Know the production of different types of Laser light.

CO3: Describe the applications of Laser in Industry.

CO4: Explain the use of Laser in medicine.

CO5: Know the use of lasers in Fiber Optics communication system.

Syllabus

UNIT- I: FUNDAMENTALS OF LASER

Spontaneous emission - Stimulated emission – Einstein coefficients - Population inversion - Pumping action – Laser characteristics.

UNIT- II: PRODUCTION OF LASER

Nd-YAG laser - Helium-Neon laser - CO₂ laser - Semiconductor diode laser.

UNIT- III: INDUSTRIAL APPLICATIONS OF LASER

Material processing- Welding - Laser cutting- Hologram -Recording and reconstruction of hologram-Applications of holography.

UNIT -IV: LASERS IN MEDICINE

Applications of laser in medicine - Types of laser medical applications - Photo thermal applications - Laser surgery and its advantages.

UNIT -V: FIBER OPTICS

Principle of light in fibre optics-propagation of light in optical fibres -Numerical aperture and acceptance angle-Light sources and detectors of optic fibres -Optic fibre communication system-Advantages of optic fibre communication.

BOOK FOR STUDY

1. P.Mani , Text Book of Engineering Physics-I, Dhanam publications -5th edition(2009).

BOOKS FOR REFERENCE

1. N. Avadhanulu, An introduction to LASERS, S. Chand & Company (2001).

2. William T Silfvast, Laser fundamentals, Cambridge University Press, Published in South Asia by foundation books, New Delhi (2004).

3.S.Mohan, V,Arjunan, M.Selvarani, M.Kanchana Mala, Laser Physics, MJP Publishers(2008).

4. Sapna Katiyar, Optical Fiber Communication, Katson books (2012).

COURSE OUTCOME

| S.No | Outcome | Cognitive level |
|-------------|---|------------------------|
| 1 | Explains about fundamental principles of Laser | U |
| 2 | Describes about different types of Laser | U |
| 3 | Understand about Industrial applications of Laser | U |
| 4 | Discuss about the applications of Laser in medical field | U |
| 5 | Explains about the principle of fiber optics and its applications | U |



BHARATHIDASAN UNIVERSITY, TIRUCHIRAPPALLI- 620 024

ENVIRONMENTAL STUDIES – U19ES

(Applicable to the candidates admitted from the Academic year 2019-20 onwards)

Unit: 1 The Multidisciplinary nature of environmental studies
Definition, scope and importance. (2 lectures)
Need for public awareness

Unit: 2 Natural Resources:
Renewable and non-renewable resources:
Natural resources and associated problems.

- a) Forest resources: use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
- b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.
- c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
- d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
- e) Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.
- f) Land resources: Land as a resources, land degradation, man induced Landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

(8 lectures)

Unit: 3 Ecosystems

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers and decomposers
- Energy flow in the ecosystem
- Ecological succession.

- Food chains, food webs and ecological pyramids
- Introduction, types, characteristic features, structure and function of the following ecosystem:-

. Forest ecosystem

- b. Grassland ecosystem
- c. Desert ecosystem
- d. Aquatic ecosystems, (ponds, streams, lakes, rivers, oceans, estuaries)

(6 lectures)

Unit: 4 Biodiversity and its conservation

- Introduction – Definition : Genetic, species and ecosystem diversity
- Biogeographical classification of India
- Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values
- Biodiversity at global, National and local levels
- India as a mega-diversity nation
- Hot-spots of biodiversity
- Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts.
- Endangered and endemic species of India
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.
- Biological Diversity Act 2002/ BD Rules, 2004

(8 lectures)

Unit: 5 Environmental Pollution

Definition

Causes, effects and control measures of :

- a. Air Pollution
- b. Water Pollution
- c. Soil Pollution
- d. Marine Pollution
- e. Noise pollution
- f. Thermal Pollution
- g. Nuclear hazards

- Solid waste Management: Causes, effects and control measures of urban and industrial wastes.

- Role of an individual in prevention of pollution
- Pollution case studies
- Disaster management: floods, earthquake, cyclone and landslides.
- Ill-Effects of Fireworks: Firework and Celebrations, Health Hazards, Types of Fire, Firework and Safety

(8 lectures)

Unit: 6 Social Issues and the Environment

- From Unsustainable to Sustainable development.
- Urban problems related to energy.
- Water conservation, rain water harvesting, watershed management.
- Resettlement and rehabilitation of people; its problems and concerns.

Case studies

- Environmental ethics: Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act.
- Air (Prevention and Control of Pollution) Act.
- Water (Prevention and Control of Pollution) Act.
- Wildlife Protection Act.
- Forest Conservation Act.
- Issues involved in enforcement of environmental legislation
- Public awareness.

(7 lectures)

Unit: 7 Human Population and the Environment

- Population growth, variation among nations.
- Population explosion – Family Welfare Programmes
- Environment and human health
- Human Rights - Value Education
- HIV/ AIDS - Women and Child Welfare
- Role of Information Technology in Environment and human health
- Case studies.

Unit: 8 Field Work

- Visit to a local area to document environmental assets-river / forest/ grassland/ hill / mountain

References:

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Public Ltd Bikaner.
 2. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt Ltd, Ahamedabad – 380013, India, E-mail: mapin@icenet.net(R)
 3. Brunner R.C. 1989, Hazardous Waste Incineration, McGraw Hill Inc 480 p
 4. Clark R.S. Marine Pollution, Clarendon Press Oxford (TB)
 5. Cunningham, W.P.Cooper, T.H.Gorhani E & Hepworth, M.T. 2001.
 6. De A.K. Environmental Chemistry, Wiley Eastern Ltd
 7. Down to Earth, Centre for Science and Environment (R)
 8. Gleick, H.P. 1993. Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford University, Press 473p.
 9. Hawkins, R.E. Encyclopedia of India Natural History, Bombay Natural History Society, Bombay (R)
 10. Heywood, V.H & Watson, R.T. 1995. Global Biodiversity Assessment. Cambridge University Press 1140 p.
 11. Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws Himalaya Pub. House, Delhi 284 p.
 12. Mckinney, M.L. & Schoch R.M. 1996. Environmental Science systems & Solutions, Web enhanced edition 639 p.
 13. Mhaskar A.K. Matter Hazardous, Techno-Science Publications (TB)
 14. Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
 15. Odum, E.P. 1971 Fundamentals of Ecology. W.B. Saunders Co. USA. 574 p
 16. Rao MN & Datta, A.K. 1987 Waste Water treatment, Oxford & IBH Publication Co. Pvt Ltd 345 p.
 17. Sharma B.K. 2001 Environmental chemistry Goel Publ House, Meerut.
 18. Survey of the Environment, The Hindu (M).
 19. Townsend C. Harper, J and Michael Begon, Essentials of Ecology, Blackwell science (TB)
 20. Trivedi R.K. Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media (R).
 21. Trivedi R.K. and P.K. Goel, Introduction to air pollution, Techno-Science Publications (TB).
 22. Wagner K.D. 1998 Environmental Management. W.B. Saunders Co. Philadelphia USA 499 p
- (M) Magazine (R) Reference (TB) Textbook
23. <http://nbaindia.org/uploaded/Biodiversityindia/Legal/33%20Biological%20Diversity%20Rules,%202004.pdf>.

SEMESTER – II

COURSE CODE: U19SBE1

HOURS: 2

CREDITS: 2

OFFICE AUTOMATION

UNIT I:

MS- Word- Introduction to Computers - Hardware - Software, Operating System: Windows XP -MS-Paint, Notepad, WordPad, Introduction to MS-Word, Creating, Editing and Formatting Document - Working with Drawing objects - Text Manipulation

UNIT II:

Working with Tables – Columns – Labels - Plotting, editing and Filling drawing objects - Bookmark – Header & Footer - Checking and Correcting a document - Creating Labels – Envelops – Mail Merge – Formatted output and Report generation Printing Documents, Working with Internet.

UNIT III:

Ms – Excel - Ms – Excel: Introduction – Data Entry – Cell Formatting - Plotting Graphs – Workbook Features – Library Functions

UNIT IV:

Conditional Functions and Data Sorting – Limit the data on a worksheet - Data Validation –Data consolidation - Chart creation - Checking and Correcting Data - Tracking and Managing Changes- Advanced Features

UNIT V:

MS – PowerPoint- Introduction - Creating, Editing and Formatting Presentation – Applying Transition and Animation Effects - Applying Design Templates - Viewing and Setting up a Slide Show - Navigating among Different Views - Ms Outlook: Introduction to Folder List – Address Book.

TEXTBOOKS

1. Jill Murphy, Microsoft Office Word- Comprehensive Course, Labyrinth Publications, 2003.
2. McGraw-Hill/Irwin-Deborah Hinkle, Microsoft Office 2003 PowerPoint: A Professional Approach, Comprehensive w/ Student CD, New Delhi, 2003.
3. Nellai Kannan, C., MS-Office, Nels Publications, Tamil Nadu, 2002.

SEMESTER – III
HOURS: 2

COURSE CODE: U19SBE2
CREDITS: 2

DESKTOP PUBLISHING

UNIT I:

Photoshop Tools : Move, Type, Marquee, Lasso, Crop, Shapes, Healing, Brush, Patch, Cloning Stamp, Eraser, Gradient, Blur, Smudge, Dodge, Pen, Eye Dropper, Patch selection and Zoom tool.

Layer: New layer, Layer set, Duplicate layer, Rasterize and Merge down

Layer Styles: Drop shadow, inner shadow, outer glow & inner glow, Bevel and Emboss, Gradient overlay, Stroke.
Text formatting

UNIT II:

File: Save, File formats, Page set up.

Edit: Check spelling, Copy merged, Fill, Transform, Define pattern.

Image: Motion blur, Twirl, lens flare, Glowing edges, lighting effects, solarize, water paper, Stained glass, Mosaic Tiles.

Window: Character and Paragraph settings.

COREL DRAW:

UNIT III:

Drawing Tools: Pick, Shape, Knife, eraser, Smudge, Roughen brush, free transform, Zoom ,hand, Free hand, Bezier, Artistic, Pen, Poly line, Point, Interactive connective, Spiral tool.

Colour Tool: Paint Bucket Tool, Eye Dropper, Fill Tools. Fill Options, Stroke Options.

UNIT IV:

Special Effects: 3D effects, Add perspective, Blend, Contour, Artistic media, lens, and Power clip.

Shaping Options: Weld, trim, Intersect.

Text Effects: Format text, bullet, and fit text to path, align and straighten, spell check.

File Menu: Save, Save as, Import, Page set Up.

PAGE MAKER:

UNIT V:

Page Maker Tools: Pointer, Rotate, Line, Rectangle, Ellipse, Polygon, Hand, Text, Crop, Rectangle frame tools. Text layout, Style and Objects: Alignments, Styles, fill, frame options, Stroke, Group, Lock, unlock, mask, polygon settings character and paragraph settings.

Text Editing: Edit story: Undo, Redo, Cut, Copy, Paste, paste Special, Spelling check and Find.

File: Page set up, save, Save as.

TEXTBOOKS

1. CorelDraw IN Simple Steps – Shalini Gupta Corel DRAW Bible - DEBORAH MILLER
2. Teach Yourself Adobe Photoshop – Rose Carla Adobe Photoshop Cs Classroom in a Book by Adobe Press.
3. Using Microsoft Word - Asmita Bhatt Pagemaker In Easy Steps - Scott Basham Ctoa Material By Genesis.

SEMESTER – III

COURSE CODE: U19SBE3P

HOURS: 2

CREDITS: 2

OFFICE AUTOMATION & DESKTOP PUBLISHING LAB

UNIT I:

Office Automation

1. MS – Word: Text Formatting, Mail Merge
2. Ms – Excel: Implement the Statistical & Mathematical Function
(Using Min ,Max, Median, Average, Standard Deviation, Correlation, Logical ‘if’
Condition) for the given data.

Prepare a Chart for a given Data using Pie diagram / Histogram

UNIT II:

Photoshop

3. Design a College Brochure / Birthday Card.
4. Cropping, rotating and Overlapping the image.
5. Create a single image from Multiple image.
6. Creating an image with multilayer’s.

UNIT III:

Corel Draw

7. Design a Visiting Card \ Greeting Card using Draw & Text tools.
8. Create a logo for a Company \ College.

UNIT IV:

Page Maker

9. Type and format a letter using text tool.
10. Prepare a Invitation for College Day /Sports Day.

PART – IV: VALUE EDUCATION - U19VE

HOURS: 2

CREDITS: 2

Learning Objectives

This subject deals with the

- Philosophy of life
- Individual qualities
- social values
- Mind culture
- Personal health.

UNIT I:

PHILOSOPHY OF LIFE Human Life on Earth (Kural 629), Purpose of Life (Kural 46) Meaning and Philosophy of Life(Kural 131, 226) The Law of Nature (Kural 374) Glorifying All form of Life in this Universe (Kural 322, 327) – Protecting Nature /Universe (Kural 16, 20, 1038)

UNIT II:

INDIVIDUAL QUALITIES Basic Culture (Kural 72, 431) Thought Analysis (Kural 282, 467, 666) Regulating desire (Kural 367), Guarding against anger (Kural 158, 305, 306, 314), To get rid of Anxiety (Kural 629), The Rewards of Blessing (Kural 3), Benevolence of Friendship (Kural 786), Love and Charity (Kural 76), Self – tranquility/Peace (Kural 318)

UNIT III:

SOCIAL VALUES (INDIVIDUAL AND SOCIAL WELFARE) Family (Kural 45), Peace in Family (Kural 1025), Society (Kural 446), The Law of Life (Kural 952), Brotherhood (Kural 807) , The Pride of Womanhood (Kural 56) Five responsibilities/duties of Man : a) to himself, b) to his family, c) to his environment, d) to his society, e) to the Universe in his lives (Kural 43, 981), Thriftness (Thrift)/Economics (Kural 754), Health (Kural 298), Education (Kural 400), Governance (Kural 691), People’s responsibility/ duties of the community (Kural 37), World peace (Kural 572)

UNIT IV:

MIND CULTURE Mind Culture (Kural 457) Life and Mind - Bio - magnetism, Universal Magnetism (God – Realization and Self Realization) - Genetic Centre – Thought Action – Short term Memory – Expansiveness – Thought – Waves, Channelising the Mind, Stages - Meditation (Kural 261, 266, 270), Spiritual Value (Kural 423)

UNIT V:

TENDING PERSONAL HEALTH Structure of the body, the three forces of the body, life body relation, natural causes and unnatural causes for diseases (Kural 941), Methods in Curing diseases (Kural 948, 949) The Five units, simple physical exercises.

LEARNING OUTCOMES:

On successful completion of the course, the students should have acquired knowledge over

- Philosophy of life
- Individual qualities
- social values
- Mind culture
- Personal health

TEXTBOOKS

1. Philosophy of Universal Magnetism (Bio-magnetism, Universal Magnetism) The World Community Service Centre Vethatri Publications (for Unit IV)
2. Pope, G.U., Dr. Rev., Thirukkural with English Translation, Uma Publication, 156, Serfoji Nagar, Medical College Road, Thanjavur 613004 (for All Units)
3. Value Education for Health, Happiness and Harmony, The World Community Service Centre Vethatri Publications (for All Units)

PART – IV: SOFT SKILLS - U19SS

HOURS: 2

CREDITS: 2

Learning Objectives

This subject deals with knowledge of understanding

- Interpersonal skills
- Communicative skills
- Corporate skills
- Resume Writing.

LEARNING OUTCOMES:

On successful completion of the course, the students should have acquired knowledge over

- Interpersonal skills
- Communicative skills
- Corporate skills
- Resume Writing.

UNIT I:

Know Thyself / Understanding Self Introduction to soft skills self discovery – Developing positive attitude – Improving perceptions – Forming values.

UNIT II:

Interpersonal Skills/ Understanding Others Developing interpersonal relationship –Team building – group dynamics –Net working- Improved work relationship

UNIT III:

Communication Skills/ Communication with others Art of Listening –Art of reading –Art of speaking – Art of writing –Art of writing emails-e mail etiquette

UNIT IV:

Corporate Skills/ Working with Others Developing body language –Practising etiquette and mannerism – Time management – Stress management.

UNIT V:

Selling Self/ Job Hunting Writing resume /cv-interview skills – Group discussion –Mock interview Mock GD –Goal setting –Career planning

TEXT BOOKS

1. Meena. K and V.Ayothi (2013) A Book on Development of Soft Skills (Soft Skills: A Road Map to Success) P.R. Publishers & Distributors, No, B-20 &21, V.M.M Complex, Chatiram Bus Stand, Tiruchirapalli -620 002. (Phone No: 0431-2702824; Mobile No: 94433 70597, 98430 7442) Alex K. (2012)
2. Soft Skills – Know Yourself & Know the World, S.Chand & Company LTD, Ram Nagar, New Delhi - 110 055. Mobile No: 94425 14814(Dr.K.Alex)

REFERENCE BOOKS

1. Developing the leader within you John C Maxwell

2. Good to Great by Jim Collins
3. The Seven habits of highly effective people Stephen Covey
4. Emotional Intelligence Daniel Goleman
5. You can Win Shive Khera

Principle centred leadership Stephen Covey

SEMESTER – VI**COURSE CODE: U19GS****PART – V: GENDER STUDIES****HOURS: 1****CREDITS: 1****Learning Objectives**

This subject deals with

- Concept of gender,
- Women's Studies vs Gender Studies,
- Areas of Gender Discrimination,
- Women development and Gender Empowerment

LEARNING OUTCOMES:

On successful completion of the course, the students should have acquired knowledge over

- Concept of gender Women's Studies vs Gender Studies Areas of Gender Discrimination
- Women development and Gender Empowerment

UNIT I:

Concepts of Gender: Sex-Gender-Biological Determinism- Patriarchy- Feminism -Gender Discrimination -Gender Division of Labour -Gender Stereotyping-Gender Sensitivity - Gender Equity —Equality-Gender Mainstreaming Empowerment

UNIT II:

Women's Studies Vs Gender Studies: UGC's Guidelines - VII to XI Plans- Gender Studies: Beijing Conference and CEDAW-Exclusiveness and Inclusiveness.

UNIT III:

Areas of Gender Discrimination: Family Sex Ratio-Literacy -Health -Governance Religion Work Vs Employment- Market - Media - Politics Law Domestic Violence — Sexual Harassment — State Policies and Planning

UNIT IV:

Women Development and Gender Empowerment: Initiatives International Women's Dcca4e - International Women's Year - National Policy for Empowerment of Women - Women Empowerment Year 2001- Mainstreaming Global Policies.

UNIT V:

Women's Movements and Safeguarding Mechanism:— In India National / State Commission for Women (NCW) - All Women Police Station Family Court- Domestic Violence Act - Prevention of Sexual Harassment at Work Place Supreme Court Guidelines - Maternity Benefit Act - PNDT Act - Hindu Succession Act 2003 Eve Teasing Prevention Act - Self Help Groups 73 and 74 Amendment for PRIS.

TEXTBOOKS

1. Bhasin Kamala, Understanding Gender: Gender Basics, New Delhi: Women Unlimited 2004
2. Bhasin Kamala, Exploring Masculinity: Gender Basics, New Delhi: Women Unlimited, 2004

3. Bhasin Kamala, What is Patriarchy? : Gender Basics, New Delhi: Women Unlimited, 1993
4. Pernau Margrit Ahmad Imtiaz, Reifeld Hermut (ed.,) Family and Gender: Changing Values in Germany and India, New Delhi: Sage Publications, 2003
5. Agarwal Bina, Humphries Jane and Robeyns Ingrid (ed.,)
6. Capabilities, Freedom, and Equality: Amartya Sen's Work from a Gender Perspective, New Delhi: Oxford University Press, 2006
7. Rajadurai.S.V, Geetha.V, Themes in Caste Gender and Religion, Tiruchirappalli: Bharathidasan University, 2007 Misra Geetanjali, Chandiramani Radhika (ed.,)
8. Sexuality, Gender and Rights: Exploring Theory and Practice in South and Southeast Asia, New Delhi: Sage Publication, 2005 Rao Anupama (ed.,)
9. Gender &Caste: Issues in Contemporary Indian Feminism, New Delhi: Kali for Women, 2003
10. Saha Chandana, Gender Equity and Gender Equality: Study of Girl Child in Rajasthan, Jaipur: Rawat Publications, 2003
11. Krishna Sumi,(ed.,) Livelihood and Gender Equity in Community Resource Management New Delhi: Sage Publication, 2004
12. Wharton .S Amy, The Sociology of Gender: An Introduction to Theory and Research, USA: Blackwell Publishing, 2005.
13. Mohanty Manoranjan (ed.,) Class, Caste, Gender: Readings in Indian Government and Politics- 5, New Delhi: Sage Publications, 2004.
14. Arya Sadhna, Women, Gender Equality and the State, New Delhi: Deep & Deep Publications, 2000.