Kazi Nazrul University, Asansol

SYLLABUS OF B.SC. (PROGRAM) WITH ELECTRONICS

2019-2020

SEMESTER – I

Course Name: Circuit Theory and Network Analysis

Course Code: BSCPELCC101

<table>
<tr><td colspan="2">Course type: Core
(Theory + Practical)</td><td colspan="2">Course details: CC-1(1)</td><td colspan="2">L-T-P : 4-0-4</td></tr>
<tr><td rowspan="3">Credit: 6</td><td rowspan="3">Full marks: 100</td><td colspan="2">CA Marks</td><td colspan="2">ESE Marks</td></tr>
<tr><td>Practical</td><td>Theoretical</td><td>Practical</td><td>Theoretical</td></tr>
<tr><td>30</td><td>10</td><td>20</td><td>40</td></tr>
</table>

Course Learning Outcomes:

(After the completion of course, the students will have ability to) :

- Understand DC transient analysis.
- Solve Problems of transients.
- Understand AC circuit analysis.
- Study basic circuit concepts in a systematic manner suitable for analysis and design.
- Analyze the electrical circuit using network theorems.
- Understand the two port network parameters.

Content/ Syllabus:

Core Course - I (Theory)

CIRCUIT THEORY AND NETWORK ANALYSIS

Basic Circuit Concepts

Voltage and current sources, Resistors in series and parallel, Inductors, Fixed and variable inductors, Self and mutual inductance, Faraday‘s law and Lenz‘s law of electromagnetic induction, Energy stored in an

inductor, Capacitors, Principles of capacitance, Parallel plate capacitor, Permittivity, Definition of Dielectric Constant,Dielectric strength, Energy stored in a capacitor.

DC Transient Analysis

RC Circuit- charging and discharging, Growth and decay of current in RL Circuit, Time Constant, RL and RC Circuits with DC sources, DC Response of Series RLC Circuits.

AC Circuit Analysis

Sinusoidal Voltage and Current, Definition of Instantaneous, Peak, Peak to Peak, Root Mean Square and Average Values. Voltage-Current relationship in Resistor, Inductor and Capacitor, Phasor diagrams, Complex Impedance, Power in AC Circuits, Instantaneous Power, Average Power, Reactive Power, Power Factor.

Sinusoidal Circuit Analysis for RL, RC and RLC Circuits.Resonance in Series and Parallel RLC Circuits, Frequency Response of Series and Parallel RLC Circuits, Quality (Q) Factor and Bandwidth.

Passive Filters: Low Pass, High Pass, Band Pass and Band Stop.

Circuit Analysis

Kirchhoff‘s Current Law (KCL), Kirchhoff‘s Voltage Law (KVL), Node analysis, Mesh analysis.

Network Theorems

Principal of Duality, Superposition Theorem, Thevenin‘s Theorem, Norton‘s Theorem, T and π types of networks, Image and Characteristic impedances, Maximum Power Transfer Theorem.

Two Port Networks: Impedance (Z) Parameters, Admittance (Y) Parameters.

Text and References:

A Text Book on Electrical Technology Vol-1, B. L.Theraja& R. K. Theraja, S. Chand.
Network Analysis, Van Valkenburg, Pearson.
Electronic Circuits, Schilling and Belove, TMH.
Electric Circuits, S. A. Nasar, Schaum’s outline series, Tata McGraw Hill (2004).
Electrical Circuits, M. Nahvi& J. Edminister, Schaum’s Outline Series, Tata McGraw-Hill (2005).
Electrical Circuits, K.A. Smith and R.E. Alley, 2014, Cambridge University Press.
Network, Lines and Fields, J.D.Ryder, Prentice Hall of India.
Electrical Circuit Analysis, Mahadevan and Chitra, PHI Learning.
Microelectronic circuits, A.S. Sedra, K.C. Smith, A.N. Chandorkar, 2014, 6th Edn., Oxford University Press.

Core Course - I (Practical) LAB – I

Course Learning Outcomes:

(After the completion of course, the students will have ability to) :

- Verify network theorems using resistive networks and D.C. sources.
- Study response curve of LCR series resonance.
- Familiarize with basic electronic components (R, C, L, diodes, transistors),digital Multimeter, Function Generator and Oscilloscope.
- Determine the current through a resistance by potentiometer.
- Study I-V characteristics of a suitable resistor and that of a junction diode within specified limit on a graph, and hence to estimate d.c. and a.c. resistances of both the elements at the point of intersection.

Content/ Syllabus:

List of Experiments:

1. Familiarization with basic electronic components (R, C, L, diodes, transistors),digital Multimeter, Function Generator and Oscilloscope.

2. Determination of the current through a resistance by potentiometer.

3.Verification of (a) Thevenin's theorem and (b) Norton's theorem.

4. Verification of the Maximum Power Transfer Theorem.

5.Study of response curve of LCR series resonance.

6. Study ofI-V characteristics of a suitable resistor and that of a junction diode within specified limit on a graph, and hence to estimate d.c. and a.c. resistances of both the elements at the point of intersection.

Text and References:

Basic Electronics: A Text Lab Manual, Zbar, TMH.
Laboratory Manual for Electronic Devices and Circuits, Bell, PHI.
Laboratory Manual for Electric Circuits , Bell, PHI.
Electric Circuits: Schaum's Outlines, J. Edminister and M. Nahvi, TMH.
Advanced Practical Physics Volume II B. Ghosh, New Central Book Agency.
An Advanced Course in Practical Physics, Chattopadhyay and Rakshit, New Central Book Agency(P) Limited.

SEMESTER – II

Course Name: Solid State Electronics

Course Code: BSCPELCC201

<table>
<tr><td colspan="2">Course type: Core
(Theory + Practical)</td><td colspan="2">Course details: CC-1(2)</td><td colspan="2">L-T-P : 4-0-4</td></tr>
<tr><td rowspan="3">Credit: 6</td><td rowspan="3">Full marks: 100</td><td colspan="2">CA Marks</td><td colspan="2">ESE Marks</td></tr>
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<tr><td>30</td><td>10</td><td>20</td><td>40</td></tr>
</table>

Course Learning Outcomes:

(After the completion of course, the students will have ability to) :

- Learn about semiconductor physics.
- Describe the behavior of semiconductor devices such as diodes, transistor, FET etc.
- Reproduce the I-V characteristics of Diodes/BJT/FET devices.
- Learn about the applications of p-n junction diodes.

Content/ Syllabus:

Core Course - II (Theory)
SOLID STATE ELECTRONICS

Semiconductor Physics

The atomic structure, Energy band diagram and classifications of solids, Metals insulators and semiconductors (Qualitative discussions only),Generation of hole-election pairs at room- temperature and intrinsic semiconductor, Energy band diagram, carrier density; doping and impurity semiconductor, majority and minority carriers, p-type and n-type semiconductors, advantage of silicon over germanium as semiconductor device material, Transport parameters, Current flow in semiconductors, Diffusion and Drift current.

Junction Diode and its applications

p-n junction and its properties (depletion region, barrier voltage, barrier width, junction capacitance and junction resistance), Junction diode, forward and reverse biased characteristics, diode equation (I-V expression only), a.c. and d.c. resistances of a diode, Zener and avalanche breakdown. Qualitative idea of Schottky diode.

Use of diode as rectifier, calculation of ripple factor and efficiency of half and full wave rectifier, Filter-capacitor and inductance filters, their role in power supply, output waveform and working, Regulation-Line and load regulation, Zener diode as voltage regulator.

Bipolar Junction Transistor

Bipolar Junction Transistors (NPN & PNP), Principles of operation, Different modes of operations, Input and output characteristics of transistor in CE and CB configurations, Regions of operation (active, cut off and saturation), Current gains α and β, Relations between α and β, dc load line and Q point, Simple problems.

Biasing of BJT (PNP and NPN), idea of bias stability, Factors affecting Stability, Stability factor, Study of Fixed, Self and Voltage divider biasing.

Unipolar Devices

JFET, Construction, working and I-V characteristics (output andtransfer), Pinch off voltage, MOSFET (Enhancement and Depletion) and its characteristics.

UJT, basic construction, working, equivalent circuit and I-Vcharacteristics.

Reference Books:

Introduction to Solid State Physics, C.Kittel, John Wiley.
Integrated Electronics, Millman and Halkias, TMH.
Foundations of Electronics,Chattopadhyay and Rakshit, New Age.
Basic Electronics -Solid State,B.L.Theraja (Current Edition).
Principles of Electronics,V.K.Mehta (Current Edition).
Electronic Devices and Circuit Theory, R. L. Boylestad and L. Nashelsky, Pearson.
Basic Electronics & Linear Circuits, Bhargava, Kulashretha, Gupta, TMH.
Solid State Electronic Devices, Streetman & Banerjee, PHI.
Electronic Devices and Circuits, Salivahanan, TMH .
Electronic Devices and Circuits, David A. Bell, 5th Edition 2015, Oxford University Press.
Electronic Circuits: Discrete and Integrated, D.L. Schilling and C. Belove, Tata McGraw Hill.

Core Course - II (Practical) LAB – II

Course Learning Outcomes:

(After the completion of course, the students will have ability to) :

- Study P-N Junction diode characteristics, to calculate dc and ac resistances.
- Study Zener diode Characteristics in reverse bias, to determine breakdown voltage and ac resistance at breakdown.
- Study Transistor input & output characteristics (CE & CB Modes). To determine dc & ac resistances and current gain.
- Study mutual and drain characteristics of JFET, to determine JFET parameters and to verify their interrelation.
- Study half & full wave rectifier with junction diode with (capacitor) and without filter.
- Study voltage regulation using Zener diode.

Content/ Syllabus:

Solid State Electronics
List of Experiments:

1. Study of P-N Junction diode characteristics, to calculate dc and ac resistances.
2. Study of Zener diode Characteristics in reverse bias, to determine breakdown voltage and ac resistance at breakdown.
3. Study of Transistor input & output characteristics (CE & CB Modes). To determine dc & ac resistances and current gain.
4. Study of mutual and drain characteristics of JFET, to determine JFET parameters and to verify their interrelation.
5. Study of half & full wave rectifier with junction diode with (capacitor) and without filter.
6. Study of voltage regulation using Zener diode.

Text and References:

Basic Electronics: A Text Lab Manual, Zbar, TMH.
Laboratory Manual for Electronic Devices and Circuits, Bell, PHI.
Laboratory Manual for Electric Circuits , Bell, PHI.
Electric Circuits: Schaum's Outlines, J. Edminister and M. Nahvi, TMH.
Advanced Practical Physics Volume II B. Ghosh, New Central Book Agency.
An Advanced Course in Practical Physics, Chattopadhyay and Rakshit, New Central Book Agency(P) Limited.

SEMESTER – III

Course Name: ELECTRONIC COMMUNICATION

Course Code: BSCPELCC301

<table>
<tr><td colspan="2">Course type: Core(Theoretical)</td><td colspan="2">Course details: CC-1(3)</td><td colspan="2">L-T-P : 5-1-0</td></tr>
<tr><td rowspan="3">Credit: 6</td><td rowspan="3">Full marks: 50</td><td colspan="2">CA Marks</td><td colspan="2">ESE Marks</td></tr>
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</table>

Course Learning Outcomes:

(After the completion of course, the students will have ability to) :

- Understand the basic concepts of a communication system.
- Understand radio wave propagation.
- Understand transmission techniques.
- Understand satellite communication.
- Understand baseband analog modulation.

Content/ Syllabus:

Radio Wave Propagation

Characteristics of electromagnetic wave, propagation of radio waves in different frequencies, structure of the atmosphere, ground wave propagation, sky wave, critical frequency and virtual height, maximum usable frequency and skip distance(qualitative discussions only)

Electronic communication

Introduction to communication – means and modes. Need for modulation. Block diagram of an electronic communication system. Brief idea of frequency allocation for radio communication system in India (TRAI).Electromagnetic communication spectrum, band designations and usage.Channels and base-band signals.Concept of Noise, signal-to-noise (S/N) ratio.

Analog Modulation

Amplitude Modulation, modulation index and frequency spectrum.Generation of AM (Emitter Modulation), Amplitude Demodulation (diode detector), Concept of Single side band generation and detection. Frequency Modulation (FM) and Phase Modulation (PM), modulation index and frequency spectrum, equivalence between FM and PM

Generation of FM using VCO, FM detector (slope detector), Qualitative idea of Super heterodyne receiver.

Satellite Communication

Introduction, need, Geosynchronous satellite orbits, geostationary satellite, advantages of geostationary satellites. Satellite visibility, transponders (C - Band), path loss, ground station, simplified block diagram of earth station. Uplink and downlink.

SKILL ENHANCEMENT COURSE

Course Name: Design and fabrication of electronic circuits

Course Code: BSCPELCSE301

<table>
<tr><td colspan="2">Course type: SE</td><td colspan="2">Course details: SEC-1</td><td colspan="2">L-T-P : 0-0-8</td></tr>
<tr><td rowspan="3">Credit: 4</td><td rowspan="3">Full marks: 50</td><td colspan="2">CA Marks</td><td colspan="2">ESE Marks</td></tr>
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<tr><td>30</td><td>……</td><td>20</td><td>……</td></tr>
</table>

Course Learning Outcomes:

(After the completion of course, the students will have ability to) :

- Learn about electronic/electrical components, resistor, capacitor, inductor, transformer, signal sources (ac and dc), transistor, FETs, op-amps.

- Design CE AF amplifier on broadband, design of Zener Diode regulator, FET audio amplifier, feedback amplifier, design of low frequency oscillator, various Op-Amp circuits, modulator and demodulator.
- Construct radio receiver, square wave generator.

Content/ Syllabus:

SEC - 1

Design and Fabrication of electronic circuits

- Knowledge of electronic/electrical components, resistor, capacitor, inductor, transformer, signal sources (ac and dc), transistor, FETs, op-amps.

- Design of CE AF amplifier on broadband, design of ZenerDiode regulator, FET audio amplifier, feedback amplifier, design of low frequency oscillator, various Op-Amp circuits, modulator and demodulator.

  Construction of radio receiver, square wave generator.

References:

Basic Electronics: A Text Lab Manual, Zbar, TMH

Laboratory Manual for Electronic Devices and Circuits, Bell, PHI Laboratory Manual for Electric Circuits , Bell, PHI

Electric Circuits: Schaum's Outlines, J. Edminister and M. Nahvi, TMH

SEMESTER – IV

Course Name: ANALOG ELECTRONICS CIRCUIT

Course Code: BSCPELCC401

Course type**: Core (Theory + Practical)**	Course details: **CC-1(4)**			L-T-P : **4-0-4**	
Credit: **6**	Full marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	**20**	**40**

Course Learning Outcomes:

(After the completion of course, the students will have ability to) :

- Learn about feedback amplifiers.
- Learn about power amplifiers, tuned amplifiers. .
- Explain concepts of different oscillators.
- Learn about OP Amp and its applications.

Content/ Syllabus

Analog Electronics (Theory, Credit - 4)

Feed back in Amplifier: General theory of feedback, negative and positivefeedback, advantages of negative feedback, types of negative feedback intransistor amplifiers, current series, voltage series, current shunt – voltageamplifier (qualitative discussion only).

Voltage and Power amplifiers: Class A, B, C and AB amplifiers, Class-B Push pullamplifier, RC coupled, Transformer coupled amplifiers (qualitative discussiononly).

Oscillators: Positive feedback and oscillation, BarkhausenPrinciple,CollectorTuned Oscillator, Phase shift oscillator, Crystal Oscillator. (qualitative discussiononly), basic idea of Multivibrators,

Operational Amplifier: Differential Amplifier, CMRR, Characteristics of ideal OPAmp, Inverting &noninverting amplifier, Adder, Integrator and Differentiatorcircuits using Op Amp.

References :

Integrated Electronics, Millman and Halkias, TMH.

Electronic Principles, Malvino, TMH .

OP-Amp and Linear Integrated circuits, Gaykwad, Pearson.

Foundations of Electronics ,Chattopadhyay and Rakshit New Age International.

Analog Electronics : Devices and Circuits , B.C. Sarkar and S. Sarkar, Damodar

Group, Burdwan.

Electronics, V.K.Mehta

Basic Electronics, B.L.Theraja

Electronics, B.Ghosh

Analog Electronics, DSC - ID Lab –III (Credit : 2)

Course Learning Outcomes:

(After the completion of course, the students will have ability to) :

- To draw the static characteristics of P-N-P and N-P-N transistors in CB, CE, modes.
- To study JFET characteristics
- To study transistor CE amplifier.
- To study Op AMP inverting amplifier.
- To study adder using Op AMP.

Content/ Syllabus

Analog Electronics, DSC - ID Lab –III (Credit : 2)

1. To draw the static characteristics of P-N-P and N-P-N transistors in CB, CE, modes.
2. To study JFET characteristics
3. To study transistor CE amplifier.
4. To study Op AMP inverting amplifier.
5. To study adder using Op AMP.

References:

Basic Electronics: A Text Lab Manual, Zbar, TMH

Laboratory Manual for Electronic Devices and Circuits, Bell, PHI Laboratory Manual for Electric Circuits , Bell, PHI

Electric Circuits: Schaum's Outlines, J. Edminister and M. Nahvi, TMH. Practical Physics ,Rakshit and Chattopadhyay

Advanced Practical Physics Volume II B. Ghosh, New Central Book Agency.

SKILL ENHANCEMENT COURSE

Course Code: BSCPELCSE401

<table>
<tr><td colspan="2">Course type: SE</td><td colspan="3">Course details: SEC-2</td><td colspan="2">L-T-P : 0-0-8</td></tr>
<tr><td rowspan="3">Credit: 4</td><td rowspan="3">Full marks: 50</td><td colspan="2">CA Marks</td><td colspan="2">ESE Marks</td></tr>
<tr><td>Practical</td><td>Theoretical</td><td>Practical</td><td>Theoretical</td></tr>
<tr><td>30</td><td>……</td><td>20</td><td>……</td></tr>
</table>

Course Learning Outcomes:

(After the completion of course, the students will have ability to) :

- Understand concept of household wiring.
- Learn about repairing of domestic appliances.

Content/ Syllabus

SEC - 2

Household wiring and repairing of domestic appliances

1. Concept of house wiring, use of fuses, protection devices, etc, choice of wires depending on the current consumption, parallel connections, knowledge of LEDs, CFLs, use of heat-sinks, calculation of loads.

2. Repairing and servicing of refrigerator, μwave oven, induction heater, gas stoves, geyser, battery maintenance and repairing of charging devices, coil winding of fans, grinder-mixer repairing.

SEMESTER – V

SKILL ENHANCEMENT COURSE

Course Name- Electronics: Digital Circuit

Course Code: BSCPELCSE501

Course type**: SE**	Course details: **SEC-3**			L-T-P : **0-0-8**	
Credit: **4**	Full marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	……	**20**	**……**

Course Learning Outcomes:

After the completion of course, the students will have ability to :

- Design clock frequency generator
- Know how to design a decade counter
- Explain the working of R-S flip-flop.
- Understand the design and working of Master-Slave flip-flop.

Content/Syllabus:

1) Design and study of clock frequency generator.
2) Study of R-S flip-flop.
3) Study of decade counter.
4) Study of Master-Slave flip-flop.

DISCIPLINE SPECIFIC ELECTIVES (DSE)

(Any one from A & B)

A.

Course Name: Digital Electronics

Course Code: BSCPELCDSE501

Course type**: DSE** **(Theory + Practical)**	Course details: **DSE-IA**			L-T-P : **4-0-4**	
Credit: **6**	Full marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	**20**	**40**

Course Learning Outcomes:

(After the completion of course, the students will have ability to) :

- Understand and represent numbers in powers of base and converting one from the other.
- Carry out arithmetic operations using number systems.
- Understand basic logic gates.
- Understand concepts of Boolean algebra and techniques to reduce/simplify Boolean expressions.
- Analyze and design combinational as well as sequential circuits.

Content/Syllabus:

Number Systems: Decimal numbers, binary number, octal numbers,hexadecimalnumbers, BCD numbers (weighted and unweighted codes),Excess three code,

Gray code, parity conversions, arithmetic operations,ASCII, Extended ASCII codes,9's and 10's complement code.

Boolean algebra: Boolean relations, commutative, associative anddistributive

laws, OR, AND, and NOT operations, De Morgan theorems.

Logic Gates: Inverters, OR, AND and NOR gates, EX-OR and EX-NORgates,Simplification of Boolean expressions using Boolean algebra andDe-Morgan's theorems, sum of products and product of sums forms,Karnaugh-map, NAND and

NOR gates as universal building blocks.

Combinational Logic: Binary adder, half adder, full adder, Multiplexer

andDemultiplexer

Sequential Circuits: Latches, Flip-flops, R-S flip-flop, J-K flip-flop, Master -slave

flip-flop, D flip-flop, T flip-flop.

References :

Digital Logic and Computer Design, Mano , Pearson.

Digital computer electronics, Malvino and Brown, Tata McGraw Hill.

Digital Principles, Leach and Malvino , TMH.

Modern Digital Electronics, Jain, TMH.

Digital Circuits, Vol-I and II, D.RoyChaudhuri, Platinum publishers .

A text book of digital electronics, Sedha, S. Chand.

DIGITAL ELECTRONICS DSE-IA (Practical), Lab. (Credit : 2)

Course Learning Outcomes:

(After the completion of course, the students will have ability to) :

- Study the Logic Gates.
- Design complex digital logic circuits using universal gates.
- Simplify a given SOP & POS circuits.
- Study Karnaugh map.

Syllabus:

1. Study of basic logic gates.
2. Study of universal logic gates.
3. Simplification of SOP and POS circuits.
4. Study of Karnaugh map.

B.

Course Name: Optical Communication

Course Code: BSCPELCDSE502

<table>
<tr><td colspan="2">Course type: DSE
(Theory + Practical)</td><td colspan="2">Course details: DSE-IA</td><td colspan="2">L-T-P : 4-0-4</td></tr>
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</table>

Course Learning Outcomes:

After the completion of course, the students will have ability to:

- Learn basics of optoelectronic processes
- Identify the types of optoelectronics devices and explain their characteristics and working principle
- Learn basic of optical fiber communication, optical fiber materials, structure, modes in optical fibers etc.
- Familiarized with optical fiber losses, attenuation, dispersion, EM wave propagation

Content/Syllabus:

Optoelectronics : Characteristics of optical emission, electro-luminescence. LED:Power and efficiencycalculation, Structure of LED and its characteristics, Hetero-junctionLED,Photo diode: PIN photodiode, hetero junction diode, Avalanche Photo diode, Phototransistor. LDR, photovoltaic cells, photo emissive cells - types, materials, construction, response, opto-couplers – characteristics, noise figures,

applications in analogue and digital devices. (30)

Fiber optics: Optical fibre–materials, construction, step index and graded indexfibres, ray propagation,attenuation. Modes in optical fibres, intermodal dispersion, singlemodefibre- working principle, attenuation, dispersion and bandwidth. Multimode fibre- attenuation, dispersion.Propagation of EM waves,

Fibre coupling. (20)

References :

Semiconductor Opto Electronics Devices, P. Bhattacharya .

Optoelectronics and Fiber Optic Communication, D C Sarkar and C K Sarkar, New Age.

Photonics : A Yariv and P Yeh. Oxford.

Optical Electronics : By Ghatak and Thyagrajan , Cambridge University Press.

OPTICAL COMMUNICATION DSE-IA (Practical), Lab. (Credit : 2)

Course Learning Outcomes:

(After the completion of course, the students will have ability to) :

- Study the Laser diode and its working
- Study single mode fibre and its workings
- Do measurement of power, frequency & attenuation and numerical aperture

Syllabus:

1) Study of Laser diode and Single mode optical fibre:- Measurement of Power, Frequency & attenuation, and Numerical aperture.

SEMESTER – VI

SKILL ENHANCEMENT COURSE

Course Name- Electronics: Design and Study of DC power supplies using ICs

Course Code: BSCPELCSE601

Course type**: SE**	Course details: **SEC-4**			L-T-P : **0-0-8**	
Credit: **4**	Full marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	……	**20**	**……**

Course Learning Outcomes:

After the completion of course, the students will have ability to :

- Design a DC power supplies using ICs and explain its working

Content/Syllabus:

1) **Design and study of DC positive & negative power supplies using ICs.**

DISCIPLINE SPECIFIC ELECTIVES (DSE)

(Any one from A & B)

A.

Course Name: RADIO AND TELEVISION

Course Code: BSCPELCDSE601

Course type**: DSE** **(Theoretical)**	Course details: **DSE-IB**			L-T-P : **5-1-0**	
Credit: **6**	Full marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
			10	**…..**	**40**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

- Learn basics features of communication system, especially radio communication, types of radio waves, classification of radio receivers
- Understand the electromagnetics of radio wave, modes of propagation, free space propagation, ionospheric wave propagation and their characteristics
- Acquire knowledge about basic Television system, television broadcasting, coverage of television, scanning principles etc.

Content/Syllabus:

Radio Communications: Introduction, basic requirements of radio communications, communication systems, basic features of communication: transmitter, receiver, classification of radio waves, ordinary receiver and super heterodyne receiver.

Radio wave propagation: Introduction, electromagnetic or radio waves, freespace propagation, modes of propagation, ground wave and surface wave, sky wave or ionospheric wave, space wave propagation, tropospheric scatter propagation, sky wave propagation, maximum usable frequency, skip distance duct propagation.

Television: Introduction–Historical development, television broadcasting,coverage of television, Basic television system and scanning principles, Essentials Of colour television.

References:

Antenna and wave propagation, K D Prasad, SatyaPrakashan

Electromagnetic field theory, K AGangadhar, P M Ramanathan, Khanna Publication.

Electromagnetic field theory, S P Ghosh, McGraw Hill.

Principles of electromagnetics, M.N.O. Sadiku, Oxford.

Monochrome and colour television, R.R. Gulati, New Age International.

Television and video engineering, A M Dhake, Tata McGraw Hill.

Colour television, principles and practice, R RGulati, New Age International.

Electronic (classical and modern), R K Kar, Books & Allied (P) Ltd.

B.

Course Name: MEASUREMENTS and INSTRUMENTATION

Course Code: BSCPELCDSE602

<table>
<tr><td colspan="2">Course type: DSE
(Theoretical)</td><td colspan="2">Course details: DSE-IB</td><td colspan="2">L-T-P : 5-1-0</td></tr>
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<tr><td>…..</td><td>10</td><td>….</td><td>40</td></tr>
</table>

Course Learning Outcomes:

After the completion of course, the students will have ability to:

- Explain the basic working principle of various electronic measurement instruments used to measure electrical parameters like current, voltage, power etc.
- Understand and describe the specifications, features, characteristics, error and the performance of an instrument
- Learn about various types AC bridges and their applications in measurements of capacitance, frequency, inductance etc.

- Gain knowledge about the functional blocks of a CRO and do analysis, measurements of waveform display
- Explain working of various types of sensors, transducers and their applications

Content/Syllabus:

Basic Measurement Instruments: PMMC instrument, galvanometer, DCmeasurement - ammeter, voltmeter, **o**hm meter, AC measurement. (10)

Connectors and Probes: Low capacitance probes, high voltage probes, currentprobes, identifying electronic connectors – audio and video, RF/Coaxial, USB etc.

(basic idea only). (5)

AC Bridges: Wheatstone bridge method, A.C. bridges, Measurement of SelfInductance, Maxwell's bridge, Measurement of Capacitance, Schering's bridge, Measurement of frequency, Wien's bridge (qualitative discussion only). (10)

Oscilloscopes: CRT, wave form display and electrostatic focusing, time base andsweep synchronization, measurement of voltage, frequency and phase by CRO.

(10)

Transducers and Sensors: Classification of transducers, Basicrequirement/characteristics of transducers,active& passive transducers, Resistive (Potentiometer, Strain gauge – Theory, types, temperature compensation and applications), Capacitive, Inductive (LVDT) and piezoelectric transducers. Measurement of temperature, Optical transducers (photoresistors, photovoltaic

cells, photodiodes). (15)

References :

Modern Electronic Instrumentation and Measurement Techniques, Helfrick and Cooper,Prentice-Hall of India, Reprint 1988.

Instrumentation Measurement and Feedback, Jones, B.E., Tata McGraw-Hill, 1986.

Electrical Measurement and Measuring Instruments, Golding, E.W., 3rd Edition, Sir Issac Pitman and Sons, 1960.

Measurement Systems: Application and Design, DoebelinE.O. , McGraw Hill Book - Fifth Edition (2003).

Principles of Electrical Measurements, Buckingham, H. and Price, E.N., 1961.Test and measuring instruments

Electronic Instrumentation, Kalsi, Tata McGraw Hill (2006)

A Course on Electrical and Electronic Measurements and Instrumentations, A K Sawhney, DhanpatRai& Sons.

DISCIPLINE SPECIFIC ELECTIVES (DSE) : Lab

DSE- IB: **Credit – 2**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

- Do measurement of signal characteristics using Oscilloscope
- Do measurement of pressure, temperature, strain etc. using various sensors and transducers

Syllabus:

Measurement of signal characteristics by oscilloscope. Use of sensors / transducers for measurement of pressure, temperature, photo-resistors, and strain.