BHAKTA KAVI NARSINH MEHTA UNIVERSITY JUNAGADH

Faculty of Science

Board of Studies - Physics

Draft Syllabus

Bachelor of Science

(Semester-III)

(Effective from June, 2019)

BHAKTA KAVI NARSINH MEHTA UNIVERSITY – JUNAGADH

Faculty: Science   **Subject: Physics**   **Semester- 3 & 4**   **ACADEMIC YEAR-2019-2020**

Sr. No	Level UG or PG	Semester	Course Group Core Elective -1 Elective -2/ Allied/SEC/ DSE	Course (Paper) Title	Paper No.	Credit	Teaching Hours	Internal Marks	External Marks	Practical Internal Marks	Practical External Marks	Total Marks
1	UG	3	Core	Fiber Optics, Laser and Electronics	301	4	60 (Theory)	30	70	-	-	100
1	UG	3	Core	Fiber Optics, Laser and Electronics	301	3	60 (Practical)	-	-	15	35	50
2	UG	4	Core	Magnetostatics, Thermodynamics & Electronics	401	4	60 (Theory)	30	70	-	-	100
2	UG	4	Core	Magnetostatics, Thermodynamics & Electronics	401	3	60 (Practical)	-	-	15	35	50

B.Sc. (Physics)
Semester -4
Paper: Physics-401
(Fiber Optics, Laser and Electronics)

Course duration:Theory: 60 hours, 6 hours a week, Credit: 4
Practical: 60 hours, 6 hours a week, Credit: 3
Theory: External Marks: 70, Internal Marks: 30, Total: 100
Practical: External Marks: 35, Internal Marks: 15, Total: 50

PAPER STYLE FOR SEMESTER -4

1. B. Sc. Physics Syllabus for Semester 4 consists of 5 units:
2. All units carry 14 marks
3. Total 5 questions one question from each unit.
4. Each question of 14 mark
5. Time duration:2.30 Hours

Question:1 from Unit 1 : Mark 14
Question:2 from Unit 2 : Mark 14
Question:3 from Unit 3 : Mark 14
Question:4 from Unit 4 : Mark 14
Question:5 from Unit 5: Mark 14

Each question should be divided in a and b sub questions as shown below.
(a) Answer the following questions (any two out of three) [10 Marks]

(b) Answer the following questions (any one out of two) [04 Marks]
(Application / Example / Problem / Theory)

B.Sc. (Physics)
Semester -3
Paper: Physics-301
(Fiber Optics, Laser and Electronics)

UNIT -1: (12 hour: 14 Mark)

Fiber Optics : Optical Fibers, Critical angle of Propagation, Modes of propagation, Acceptance angle, Fractional refractive index change, Numerical Aperture, Types of Optical Fibers, Applications, Illumination & Image transmission, OpticalCommunications, Military Applications, Optical fiber Sensors, Medical Applications, Fiber opticcommunication, Advantage.

Basic Reference book for 1 : A Text Book of Optics

N.Subrahmanyan,BrijLal&M.N.Avadhanulu (S.Chand& Co.)

UNIT -2: (12 hour: 14 Mark)

Lasers : Interaction of Radiation with matter(Spontaneous and stimulatedemission), Light amplification & conditions, Population Inversion, Pumping,Metastablestates, The principle pumping schemes, Optical Resonance, Types of Lasers, Ruby Laser, Nd:YAG Laser, He-Ne Laser, Semiconductor Laser, PN junction Laser,Applications.

Basic Reference book for 2: A Text Book of Optics N.Subrahmanyan,

BrijLal&M.N.Avadhanulu (S.Chand& Co.)

UNIT-3: (12 hour : 14 Mark)

Transistor Biasing & Stabilization of operating point:

Transistor Biasing, Inherent variation of the transistor parameters, stabilization,Stability factors, Methods of transistor biasing- base resistor method, EmitterBias Method, feedback resistor method, voltage divider biasing, Low powertransistor biasing circuit designing, Numerical Examples.

Single Stage Transistor amplifier circuit:

Introduction to the single stage transistor amplifier, How Transistor amplifies?,Graphical Explanation, Practical circuit of transistor amplifier, Phase reversal,voltage gain, Load line analysis, Classification of Amplifiers, Frequencyresponse andbandwidth of CE amplifier, Numerical Examples.

Basic Reference books for unit-3:

1) Principles of electronics By V.K.Mehta&Rohit Mehta, Publisher: S.Chand

2) Basic Electronics By B.L.Thereja, Publisher :S.Chand.

UNIT -4: (12 hour: 14 Mark)

A.C. Circuit: L-R circuit, R-C Circuit, L-C Circuit, L-C-R series andparallel Circuit with resonance, Numerical Examples.

A.C Bridge & their applications : A.C. Bridge –Condition for BridgeBalance (Impedence Bridge), Maxwell's Impedence& L/C Bridge, Owen'sBridge, De Sauty's Bridge, Wien's Bridge, Schering Bridge, Kohlraush'sBridge, Numerical Examples.

Oscillators : Sinusoidal oscillators, Positive feedback, Barkhausen Criterion,Different types of transistor oscillators, Colpitt's Oscillator, HartleyOscillator, Phase Shift Oscillator, Wein Bridge Oscillator, NumericalExamples.

UNIT -5: (12 hour: 14 Mark)

Modulation and Demodulation

Radio broadcasting, transmission & reception, Modulation, Types of Modulation, Amplitude Modulation, Transistor AM Modulator, Limitations of Amplitude Modulation, Frequency Modulation, Demodulation, Essentials in demodulation, AM diode detector, Types of AM radio receivers.

Basic Reference books :

1) Electricity and Magnetisam By D.C. TayalPublisher :Himaliya publishingHouse.

2) Moderan Electronics instrumentation and Mesurement techniques By AlbertD Helfrick& William D Cooper Publisher : PHI

3) Principles of electronics By V.K.Mehta&Rohit Mehta Publisher: S.Chand

Other Reference books for semester -3 :

1) Electromagnetics by B. B. Laud, Publisher: Willey Eastern Limited.

2) Electricity and Magnetism By Edward M. Purcell, Publisher: McGraw-Hill

3) Electricity and Magnetism By J.H. Fewkes&J.Yarwood, Publisher: Oxford University Press

4) University Physics By Ronald Lane Reese, Publisher: Thomson Brooks

 5) Concept of physics By H C Verma part 1, Publisher: BharatiBhawan

 6) University Physics with modern physics By Sears ,Zemansky& H D Young, Publisher: PEARSON

7) Basic electronics and linear circuits By N NBhargavA, D C Kushreshtha, S C Gupta, Publisher: Technical Teachers Training Institute Chandigarh.

8) Elements of Electronics ByBagde& Singh, Publisher: S.chand

9) Electronic Device And Circuits By Allen Mottershead, Publisher: PHI

10) Engineering Physics by DrAvadhanulu ,DrKulshreshtha, S. Chand Publication

Useful Web site for e-leaning:

1. www.physic.about.com
2. www.physic.org
3. www.Physicsclassroom.com
4. www.howstuffworks.com
5. www.colorado.edu/physics/2000
6. www.ndrs.org. physic.com
7. www.physlinc.com
8. www.fearofphysics.com
9. www.hyper physics.com

LIST OF EXPERIMENTS for B.Sc. (Physics)

semester -3

1. To determine the Young's modulus (Y) of material by Cantilever method

2. To determine the Young's modulus (Y) of material by bending of beam.

3. To determine the viscosity of liquid by Searl's co-axial cylinder.

4. To determine the Moment of Inertia of a Fly wheel.

5. To determine resolving power of prism.

6. To determine resolving power of telescope.

7. To determine refractive index of liquid by using liquid lens method.

8. To determine radius of curvature of a given lens and refractive index of glass using optical lever method.

9. Study of Zener Diode as voltage regulating characteristics.

10. To study the Characteristics of Photo Transistor and verify inverse square law.

11. To determine Q point and Load line for BJT.

12. To determine the figure of merit & volt sensitivity of ballistic galvanometer.

13. To study the Frequency response & Bandwidth of R.C.Coupled Amplifier.

14. To study the variation of magnetic field of Solenoid.

15. Experimental measurements by Multimeter, (Power Supply, Resistor, Transistor, Diode, Capacitor).

16. To study L-R and R-C circuit

17. To study a series resonant L-C-R circuit & Determine resonate frequency and quality factor.

18. To study a parallel resonant L-C-R circuit & Determine resonate frequency and quality factor.

19. To determine the capacity 'C' of Capacitor. (verification of Series & Parallel connection of capacitor).

20. To determine the self inductance 'L' of inductor (verification of series & Parallel connection of inductor).

Reference Books for practicals: semester 3

1) B.Sc. Practical physics By C.L.Arora, Publisher: S.chand.

2) A text book of Practical Physics ByInduPrakash&Ramkrishna Publisher: KitabMahal, New Delhi.

 3) Practical Physics ByS.L.Gupta and V. Kumar Publisher: PragatiPrakashan, Meerut.

4) B.SarafetaI-Physics through experiments Vol. I & II.

5) B.Sc. Practical physics By Harnam Singh, Dr P.S. Hemne Publisher: S.chand

BHAKTA KAVI NARSINH MEHTA UNIVERSITY JUNAGADH

Faculty of Science

Board of Studies - Physics

Draft Syllabus

Bachelor of Science

(Semester-IV)

(Effective from June, 2019)

B.Sc. (Physics)
Semester -4
Paper: Physics-401
(Magnetostatics, Thermodynamics & Electronics)

Course duration:Theory: 60 hours, 6 hours a week, Credit: 4
Practical: 60 hours, 6 hours a week, Credit: 3
Theory: External Marks: 70, Internal Marks: 30, Total: 100
Practical: External Marks: 35, Internal Marks: 15, Total: 50

PAPER STYLE FOR SEMESTER -4

1. B. Sc. Physics Syllabus for Semester 4 consists of 5 units:
2. All units carry 14 marks
3. Total 5 questions one question from each unit.
4. Each question of 14 mark
5. Time duration:2.30 Hours

Question:1 from Unit 1 : Mark 14
Question:2 from Unit 2 : Mark 14
Question:3 from Unit 3 : Mark 14
Question:4 from Unit 4 : Mark 14
Question:5 from Unit 5: Mark 14

Each question should be divided in a and b sub questions as shown below.
(a) Answer the following questions (any two out of three) [10 Marks]

(b) Answer the following questions (any one out of two) [04 Marks]
(Application / Example / Problem / Theory)

B.Sc. (Physics)
Semester -4
Paper: Physics-401
(Magnetostatics,Thermodynamics & Electronics)

UNIT 1: (12 hour: 14 Mark)

Magnetostatics: Magnetic fields, Magnetic forces: Cyclotron and Cycloidmotion, Current, Biot-Savart's law: Steady currents and the magnetic field ofsteady current, Straight line current, The divergence of B, The Curl of B,Ampere's law with examples, Comparison of Electrostatics and Magnetostatics,The Vector Potential , Summary: Magnetostatic Boundary Conditions,Numerical Examples.

Basic Reference books for unit 1

1) Introduction to electrodynamics By David J Griffiths, Publisher: PHI.

2) Electricity and MagnetisamBy D.C. Tayal, Publisher: Himaliya publishingHouse.

UNIT -2: (12 hour: 14 Mark)

Laws of thermodynamics: Thermodynamic System, Thermal equilibrium and Zeroth law of thermodynamics, Internal energy, Concept of Heat, First law, Specific heat of the gas – Mayer's formula, Various thermodynamics processes [only Definition], work done during expansion of a gas at constant pressure, Joule Thomson expansion – the porus plug experiment, Heat engine and efficiency, Reversible and Irreversible processes, Carnot's ideal Engineand Carnot's cycle,Reversible and Irreversible engine, second law of thermodynamics, Carnot theorem, Numerical Examples.

UNIT -3: (12 hour: 14 Mark)

Entropy: Concept of Entropy, Entropy change in - Adiabatic ,Reversible and Irreversible processes, Principle of increase of Entropy, The T- S Diagram, The calculation of Entropy, Third law of Thermodynamics, Unattainability of absolute Zero, Application of the Entropy principle, Entropy and Disorder, Numerical Examples.

Theory of Radiation: Thermal Radiation, Black Body and Black Body Radiation , Kirchhoff's Law, Stefan Boltzmann Law, Distribution of Energy in Black Body Spectrum, Wien's Displacement Law & Wien's law of energy distribution, Rayleigh- Jeans Law, Plank's Law, Wien's law and Rayleigh – Jeans law in relation to Planck's law, Numerical Examples.

Basic reference book for unit 2 & 3:

1) Heat thermodynamics and statistical Physics BySinghal, Agrawal&Prakash, Publisher: PragatiPrakashan.

2) Heat thermodynamics and Statistical Physics ByBrijlal, N. Subrahmanyam& P.S. Hemne, Publisher: S.Chand

UNIT -4: (12 hour: 14 Mark)

Semiconductor device: Principle, Working and Construction of - LED, Advantages of LED, Multicolor LED, Application of LED, Principle, Construction, Working and Applications of - Photo Diode, Varactor diode, Solar Cell, Thermistor. FET-Types of FET, Construction and Working JFET, Advantage of JFET and difference between JFET and BJT, Output Characteristics of JFET, Parameters of JFET, J-FET Biasing, Construction & Working of UJT, Equivalent circuit of UJT, Characteristics of UJT, Advantages & Applications of UJT, Numerical Examples .

UNIT -5: (12 hour: 14 Mark)

Digital Circuit: Analog and Digital Signal, Introduction to Number Systems, Decimal to Binary and Binary to Decimal Conversion, Binary Coded Decimal Code, Logic Gates- AND, OR and NOT Gates using Diode, NAND & Nor Gate , NAND and NOR Gate as a universal gate , X-OR Gates, Encoders and decoders,Bollean Algebra and Theorems, De Morgan's Theorems, Simplification of Logic Circuit using Boolean Algebra, Advantages and disadvantages of digital electronic. Numerical Examples.

Basic reference book for unit 4&5:

1) Principles of electronics By V.K.Mehta&Rohit Mehta Publisher: S.Chand

2) Basic Electronics By B.L.TherejaPublisher :S.Chand

Other Reference books for semester 4 :

 1) University Physics By Ronald Lane Reese Publisher: Thomson Brooks

2) Concept of physics By H C Verma part 1 Publisher: BharatiBhawan

3) University Physics with modern physics By Sears ,Zemansky& H D Young Publisher: PEARSON

 4) Basic electronics and linear circuits By N NBhargavA, D C Kushreshtha, S C Gupta Publisher: Technical Teachers Training Institute Chandigarh.

5) Elements of Electronics ByBagde& Singh, Publisher: S.chand

6) Electronic Device And Circuits By Allen Mottershead, Publisher: PHI

7) Thermodynamics, kinetic theory & Statistical thermodynamics By F.W.Sears&G.L.Salinger, Publisher: Narosa

8) Thermal Physics ByS.garg, R.Bansal& C. Ghosh, Publisher: TMG

9) Heat & Thermodynamics by Mark W. Zemansky and R.H. Dittman, Publisher:McGraw Hill, Int. 7th edition.

10) Digital principles and applications by Malvino A.P. & Leach .D.P., publisher: Tata McGraw Hill, 7th edition

11) Electromagnetics by B. B. Laud, Publisher: Willey Eastern Limited.

12) Electricity and Magnetism By Edward M. Purcell, Publisher: McGraw-Hill

13) Electricity and Magnetism By J.H. Fewkes&J.Yarwood, Publisher: Oxford University Press

*Useful Web site for e-leaning***:**
1. www.physic.about.com
2. www.physic.org
3. www.Physicsclassroom.com
4. www.howstuffworks.com
5. www.colorado.edu/physics/2000
6. www.ndrs.org. physic.com
7. www.physlinc.com
8. www.fearofphysics.com
9. www.hyper physics.com

LIST OF EXPERIMENTS for B.Sc. (Physics)

semester -4

1. To Verify Stefan's Law.

2. To determine the thermal conductivity of cardboard by Lee's Method.

3. To determine the wavelength of using Diffraction grating.

 4. To determine high resistances by method of leakage.

 5. To compare the capacities of two capacitors by De Sauty's bridge.

 6. To determine specific resistance of electrolyte by Kohlrauch's bridge.

7. To determine the self induction by Maxwell Bridge.

8. To determine the modulus of rigidity by Maxwell's needle.

 9. To determine the modulus of rigidity by Statistical method (Barton's apparatus).

10. To study the resistance temperature characteristics of Thermistor & Determine energy band gap of semiconductor material by Thermistor.

11. To study of characteristics of Solar Cell.

12. To study the characteristics of FET & Determination of parameters of FET.

13. To study Characteristics of Uni Junction Transistor.

14. Verification of truth table of AND, OR, NOT, NAND & NOR gate.

15. To study NAND gate & NOR gate as Universal gate.

16. To determine e/m by Thomson's method.

17. To verify the Thevnin's theorem.
18. To verify the Maximum Power transfer theorem

19. Construction of FET as Voltmeter.

20 Obtain IV characteristics of given LDR and calculate its resistance (for at least three different light levels).

Reference Books for Practicals:

1) B.Sc. Practical physics By C.L.Arora, Publisher: S.chand.

2) A text book of Practical Physics ByInduPrakash&Ramkrishna Publisher: KitabMahal, New Delhi.

3) Practical Physics ByS.L.Gupta and V. Kumar Publisher: PragatiPrakashan, Meerut.

4) B.SarafetaI-Physics through experiments Vol. I & II.

5) B.Sc. Practical physics By Harnam Singh, Dr P.S. Hemne Publisher: S.chand