

**Part B:** Test based on Theoretical knowledge of the candidate (Total weightage : 10 marks)

### **Scheme for Major Test (70 Marks; Internal Evaluation)**

#### **Setting of Question Paper by the concerned Subject Head of the College**

**The External examination in theory shall consist of the following:**

1. Six (6) short answers to the questions representing all units/syllabi i.e. at least one from each unit (without detail explanation having 70 to 80 words in approximately 7 minutes and having 3 marks for each answer to the question (All Compulsory).
2. Four (4) medium answers to the questions representing all units/ syllabi i.e. at least one from each unit (with explanation having 200-250 words in approximately 12 minutes and having 7 marks for each answer to the question (All Compulsory).
3. Four (4) long answers to the questions (two to be attempted) representing whole of the syllabi with detailed analysis/explanation/critical evaluation/solution to the stated problems within 400 - 500 words in approximately 30 minutes and having 12 marks each answer to the question.

#### **Reference Books:**

1. A text book in Electrical Technology - B L Theraja – S. Chand and Company.
2. Performance and design of AC machines – M.G. Say, ELBS Edn. 37
3. Mechanical workshop practice, K.C. John, 2010, PHI Learning Pvt. Ltd.
4. Workshop Processes, Practices and Materials, Bruce J Black 2005, 3rd Edn., Editor Newnes [ISBN: 0750660732]
5. New Engineering Technology, Lawrence Smyth/Liam Hennessy, The Educational Company of Ireland [ISBN: 0861674480]

### **B.Sc. Semester-IV**

**Syllabus for Examinations to be held in May 2018, 2019, 2020**

**Subject : Physics (Theory)**  
**Code/No.:UPHTC401**

**Course**

**Title of the Course: Waves and Optics**

**Duration: 2 ½ Hours**

**Total**

**Marks: 100**

**No. of Credits: 4**  
**Marks**

**End Semester Examination: 80**

**Internal Assessment Test: 20**

**Marks**

### **Unit-I : FOURIER SERIES**

Periodic functions, even and odd functions, continuous and discontinuous functions, Dirichlet conditions, sine and cosine series, properties of Fourier series, complex form of Fourier series, extension of interval, Fourier solution of simple functions, Applications of Fourier theorem to square wave, rectangular wave, triangular wave, half wave rectifier and full wave rectifier.

### **Unit-II: WAVES**

Wave equation in simple and differential form, general solution of wave equation, velocity of transverse waves in a string, velocity of longitudinal waves in a fluid, energy density and intensity of a progressive wave, phase and group velocity, characteristic impedance of a string, reflection and transmission coefficients, impedance matching, Superposition principle and linearity, stationary/standing waves on a string of fixed length, eigen functions, energy of a vibrating string, eigen frequencies.

### **Unit-III: INTERFERENCE**

Conditions for interference, Young's double slit experiment, theory of interference fringes, Fresnel's biprism and its application to the determination of wavelength of sodium light, Phase change on reflection, thin films (reflected and transmitted cases), Newton's Rings: determination of refractive index of liquid and wavelength of monochromatic light, Michelson's interferometer and its applications to determine (i) Wave length of monochromatic light (ii) thickness of thin transparent plate (iii)

resolution of spectral lines (iv) Determination of refractive index of glass.

#### **Unit-IV: DIFFRACTION**

Fresnel's diffraction, Fresnel's half-period zones, rectilinear propagation of light, Zone plate action of Zone plate, Diffraction at a straight edge, rectangular slit and thin wire, Fraunhofer diffraction, single slit diffraction, two slit diffraction, plane transmission grating, determination of wavelength of monochromatic light using grating, width of principal maximum, absent spectra, dispersive power of grating, limit of resolution, Rayleigh's criterion, resolving power of grating.

#### **Unit-V: POLARIZATION**

Polarization by reflection, Brewster's law, Malus Law, phenomenon of double refraction, Huygen theory of double refraction, Nicol prism, quarter wave plate and half wave plate; theory, production and detection of plane, circularly and elliptical polarized light, optical activity, specific rotation, Laurent's half shade polarimeter.

#### **Scheme for Internal Assessment Test**

The internal assessment shall comprise of two parts :

**Part A:** Total weightage to this part shall be 50% of internal assessment marks i.e. 50 % of the total marks or 10 marks out of 20 marks reserved for internal assessment. It will have eight short questions selecting at least three from each of the two/three units (50% of syllabus) covered. A candidate has to attempt any five questions and each question carries 2 marks.

**Part B:** Total weightage to this part shall be 50% of the internal assessment marks i.e. 50 % of the total marks or 10 marks out of 20 marks reserved for internal assessment. It will have 2 Long questions, selecting one each from first two units/ 50% of the syllabus: A Candidate has to attempt any one question and the question shall carry 10 marks

**Time duration :** One hour

### **Note for examiners/paper setters**

**The External examination in theory shall consist of the following:**

1. Five (5) short answers to the questions representing all units/syllabi i.e. at least one from each unit (without detail explanation having 70 to 80 words in approximately 6 minutes and having 3 marks for each answer to the question (All Compulsory).
2. Five (5) medium answers to the questions representing all units/ syllabi i.e. at least one from each unit (with explanation having 250-300 words in approximately 12 minutes and having 7 marks for each answer to the question (All Compulsory).
3. Five (5) long answers to the questions (two to be attempted) representing whole of the syllabi with detailed analysis/explanation/critical evaluation/solution to the stated problems within 500 - 600 words in approximately 30 minutes and having 15 marks each answer to the question.

### **Text and Reference Books**

1. Fourier Analysis, M.R.Spiegel (TataMcGraw Hill)
2. Mathematical Physics, Satya Prakash
3. Text Book of Vibrations and Waves, S.P.Puri (MacMillan India)
4. Physics of Vibrations and Waves, H.J.Pain (John Wiley, London)
5. Waves and Oscillations, N.Subrahmanyam & B.Lal (Vikas Publishers)

6. Fundamental of Optics, F.A.Jenkins and H,E.White (McGraw Hill)
7. Optics, Ajoy Ghatak (McMillan India)
8. Optics, Brijlal, Subrahmanyam and Avadhanulu (S.Chand & Co.)

### **B.Sc. Semester-IV**

#### **Syllabus for Examinations to be held in May 2018,2019,2020**

**Subject : Physics (Practical)**  
**Code/No.:UPHPC402**

**Course**

**No. of Credits: 2**  
**Marks: 50**

**Total**

**Internal Assessment: 25**

**Marks**

**External Practical Examination: 25**

**Marks**

#### **List of Practicals**

1. To study input and output characteristics of common base PNP/NPN transistor
2. To study input and output characteristics of common emitter PNP/NPN transistor.
3. To study V-I characteristics of FET.
4. To find wavelength of sodium light by using Newton's rings.
5. To find specific rotation of sugar by using polarimeter.
6. To find values of Cauchy constants of material of a prism.
7. To find resolving power of a prism.

8. Characteristics of UJT.
9. Characteristics of SCR.
10. Use of OP-AMP as inverting and non-inverting amplifiers
11. Applications of OP-AMP as (a) Summer (b) Subtractor (c) Integrator and Differentiator

**Note: The students are required to complete at least 5 experiments.**

### **Reference Books**

1. B.Sc. Practical Physics by C.L.Arora
2. Practical Physics by G.L.Squires, Cambridge University Press
3. Advanced Practical Physics for Students by Worsnop and Flint
4. Practical Physics by R.K.Shukla
5. B.Sc. Practical Physics by Harnam Singh
6. A Text Book of Practical Physics by Indu Prakash and Ramakrishna

### **Instructions for Internal Assessment / External Examination**

#### **Practical Examination**

50% Internal

50% External

#### **Internal**

- (a) 20 percent attendance
- (b) 20 percent Viva Voce
- (c) 40 percent practical Work/Book based on the practical done as per time table (Day to day performance)
- (d) 20 percent internal test ( to be conducted by the class teacher or a committee of

subject

teachers constituted by principal of the College)

**External**

(a) 80 percent for practical paper and

(b) 20 percent for Viva Voce

**Note :** Total marks in practical shall be 50 only

**B.Sc. Semester-IV**

**Syllabus for Examinations to be held in May 2018, 2019, 2020**

**Subject : Physics (Skill Enhancement Course)**  
**UPHSE403**

**Course Code/No.:**

**Title of the Course: RENEWABLE ENERGY AND ENERGY HARVESTING**

**Duration: 2 ½ Hours**

**Total Marks: 100 (Minor Paper : 30 marks and Major Paper : 70 Marks)**

**No. of Credits: 04**

### **Unit-I: Fossil fuels and Alternate Sources of energy**

Fossil fuels and Nuclear Energy, their limitation, need of renewable energy, non-conventional energy sources. An overview of developments in Offshore Wind Energy, Tidal Energy, Wave energy systems, Ocean Thermal Energy Conversion, solar energy, biomass, biochemical conversion, biogas generation, geothermal energy tidal energy, Hydroelectricity.

### **Unit-II: Solar Energy and Wind Energy harvesting**

Solar energy : its importance, storage of solar energy, solar pond, non convective solar pond, applications of solar pond and solar energy, solar water heater, flat plate collector, solar distillation, solar cooker, solar green houses, solar cell, absorption air conditioning. Need and characteristics of photovoltaic (PV) systems, PV models and equivalent circuits, and sun tracking systems.

Wind Energy harvesting: Fundamentals of Wind energy, Wind Turbines and different electrical machines in wind turbines, Power electronic interfaces, and grid interconnection topologies.

### **Unit-III: Ocean Energy, Geothermal Energy and Hydro Energy**

Ocean Energy: Ocean Energy Potential against Wind and Solar, Wave Characteristics and Statistics, Wave Energy Devices.

Tide characteristics and Statistics, Tide Energy Technologies, Ocean Thermal Energy, Osmotic Power, Ocean Bio-mass.



Geothermal Energy: Geothermal Resources, Geothermal Technologies.

Hydro Energy: Hydropower resources, hydropower technologies, environmental impact of hydro power sources.

#### **Unit IV : Piezoelectric Energy and Electromagnetic Energy harvesting**

Piezoelectric Energy Harvesting: Introduction, Physics and characteristics of piezoelectric effect, materials and mathematical description of piezoelectricity, Piezoelectric parameters and modeling piezoelectric generators, Piezoelectric energy harvesting applications, Human power

Electromagnetic Energy Harvesting: Linear generators, physics mathematical models, recent applications.

Carbon captured technologies, cell, batteries, power consumption

Environmental issues and Renewable sources of energy, sustainability.

#### **Demonstrations and Experiments**

1. Demonstration of Training modules on Solar energy, wind energy, etc.
2. Conversion of vibration to voltage using piezoelectric materials
3. Conversion of thermal energy into voltage using thermoelectric modules.

#### **Scheme for Minor Test (30 Marks; Internal Evaluation)**

##### **Setting of Question Paper and evaluation of answer scripts by the teacher concerned**

The internal assessment shall comprise of two parts :

**Part A**: Test based on Practical knowledge of the candidate (Total weightage : 20 marks)

**Part B**: Test based on Theoretical knowledge of the candidate (Total weightage : 10 marks)

#### **Scheme for Major Test (70 Marks; Internal Evaluation)**

##### **Setting of Question Paper by the concerned Subject Head of the College**

**The External examination in theory shall consist of the following:**

1. Six (6) short answers to the questions representing all units/syllabi i.e. at least one from each unit (without detail explanation having 70 to 80 words in approximately 7 minutes and having 3 marks for each answer to the question (All Compulsory).
2. Four (4) medium answers to the questions representing all units/ syllabi i.e. at least one from each unit (with explanation having 200-250 words in approximately 12 minutes and having 7 marks for each answer to the question (All Compulsory).
3. Four (4) long answers to the questions (two to be attempted) representing whole of the syllabi with detailed analysis/explanation/critical evaluation/solution to the stated problems within 400 - 500 words in approximately 30 minutes and having 12 marks each answer to the question.

**Reference Books:**

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