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SUBJECT CODE NO: -B-2168

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. Pattern - 2013 (T.Y SEM VI)

Examination November / December 2025

Physics Paper-XX (Non -Conventional Energy Sources and Optical Fibre)

[Time: 1:30 Hours]

[Max. Marks:50]

Please check whether you have got the right question paper.

N. B

- 1) Solve all questions.
- 2) Draw diagrams wherever necessary.

- Q1**
- a) Explain Geothermal Energy. Give its advantages and disadvantages. **10**
 - b) Explain in detail how electron-holes are generated by photon absorption. **10**

OR

- a) Explain the latest developed types of optical fibre. **10**
- b) Explain in detail the process of internal chemical vapour deposition method for the fabrication of optical fibre cables. **10**

- Q2**
- a) Write a short note on Vertical Axis Wind Turbine (VAWT). **05**
 - b) What is meant by Fill Factor? Explain it. **05**
 - c) An optical fibre with core diameter large enough had a core refractive index of 1.50 and cladding refractive index of 1.47. Determine numerical aperture for the fibre. **05**
 - d) A fibre with a cladding radius of 200 μm is bent along the curve with a radius of 4 cm. determine the strain on the fibre. **05**

OR

- a) If the wind speed is 20 m/s and the blade length is 50 m, calculate the power in the wind. (Air density, $\rho = 1.23 \text{ kg/m}^3$) **05**
- b) Calculate the maximum power and cell efficiency of cell at an intensity of W/m^2 **05**
Given: ($V_{oc} = 0.24\text{V}$, $I_{sc} = -9\text{mA}$, $V_m = 0.1\text{V}$, $I_m = -6\text{mA}$)
- c) What are the reasons that mono-mode step index fibre is most widely used in India? **05**
- d) What is the function of the strength member in an fibre cable? **05**

Q3. Choose the correct answer.**10**

1. Which turbine is used in a closed-cycle ocean thermal energy?
 - a) Horizontal
 - b) High pressure
 - c) Low pressure
 - d) Vertical
2. Which type of solar cell gives the highest efficiency?
 - a) Monocrystalline
 - b) Polycrystalline
 - c) Thin film
 - d) Polycrystalline silicon

3. The amount of energy available in the wind at any given instant is proportional to the _____ of wind speed.
- a) Square root power of two
 - b) Square root power of three
 - c) Square power
 - d) Cube power
4. Graded index fibre is used to _____.
- a) Reduce absorption and power loss
 - b) Reduce dispersion
 - c) Secure communication
 - d) Increase Numerical Aperture
5. The refractive index of the core is uniform throughout and undergoes an abrupt change at the cladding boundary which is known as _____.
- a) Uniform index fibre
 - b) Step index fibre
 - c) Scale index fibre
 - d) Graded index fibre
6. Multimode graded index fibre with a wavelength of $0.85\ \mu\text{m}$ has a numerical aperture of 0.29 and core/cladding diameter of _____.
- a) $62.5\ \mu\text{m} / 125\ \mu\text{m}$
 - b) $100\ \mu\text{m} / 140\ \mu\text{m}$
 - c) $85\ \mu\text{m} / 125\ \mu\text{m}$
 - d) $50\ \mu\text{m} / 125\ \mu\text{m}$
7. The output of a solar cell of order of _____.
- a) 1 W
 - b) 5 W
 - c) 10 W
 - d) 20 W
8. Losses incurred during the installation of optical fibre cables due to _____.
- a) Dents
 - b) Bumps
 - c) Axial and geometric variations
 - d) All of the above
9. Which technique is the method of preparing extremely pure optical fibre glass?
- a) Liquid phase
 - b) Radio Frequency Induction
 - c) Optical Attenuation
 - d) Vapour phase deposition
10. Spent slurry biogas plant is used as _____.
- a) Fuel
 - b) Manure
 - c) Food for livestock
 - d) Used again for Generating biogas