Indian Association for the Cultivation of Science

(Deemed to be University under *de novo* Category)

Integrated Bachelor's-Master's Program

Mid-Semester Examination-Autumn 2024

Subject: Elements of Photobiology ***Subject Code(s): BIS 2101***

Full Marks: 25 ***Time Allotted: 2 h***

Group-A

1. What was the motivation for the Miller-Urey experiment? State the key findings of the experiment and a vital issue that was overlooked in the interpretation of the observation. **1+1+1=3**

2. What are the chemical names of vitamin D_3 and its precursor? Draw their chemical structures and mention the wavelength of the light required for the conversion of the precursor to vitamin D_3. **1+2+1=4**

3. What are the deleterious effects of the UV light on human skin? From the viewpoint of molecular photophysical processes, state the origin for the natural selection of purine and pyrimidine bases as the building blocks for our genetic materials. **1+2=3**

4. Explain briefly the molecular mechanism for the light production at ambient temperatures in fireflies. **3**

Group-B

5. **Define the following (any two):** **1×2=2**
   a) Phase of a cycle
   b) Photoperiodism
   c) Sleep-waking flip-flop

9. **Explain (any two):** **2×2=4**
   a) Newborns are hardly affected by jetlag.
   b) Phytoplankton shows negative phototaxis in the morning.
   d) Melanopsin-expressing Ganglion cells are intrinsically photosensitive.

10. **Answer the following (any two):** **2×2=4**
    a) Why is jetlag referred to as "desynchronosis"? Mention two methods to fight the phase shift during jetlag. 1+1=2
    b) Design an experiment to show that circadian rhythm is internally driven. 2
    c) What are zeitgebers? Does genetic variation of the organism contribute to the effect of zeitgebers on it? Explain with an example. 1+1=2

11. **Describe the following (anyone):** 2
    a) Phase response curve of light
    b) Flower clock