

3 Yr. Degree/4 Yr. Honours 3rd Semester Examination, 2024 (CCFUP)

Subject : Physics

Course : PHYS3051 (SEC)

(Basic Instruments and their usage)

Time: 2 Hours

Full Marks: 40

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

1. Answer any five questions:

2×5=10

- (a) What do you mean by resistance and resistivity?
- (b) Give two differences between AC and DC current.
- (c) Two bulbs of 60W and 120W are connected in series with a 120V source. Which bulb will have a greater voltage drop?
- (d) What are the basic differences between a telescope and a microscope?
- (e) What is an optical absorption spectrometer?
- (f) What is the function of a digital meter? What are the common digital meters used in electricity?
- (g) What is the working principle of an oscilloscope?
- (h) In a spectrometer, the angle of the prism is 60° . If the refractive index of the prism material is 1.5, calculate the minimum deviation angle of the light passing through the prism.

2. Answer any two questions:

5×2=10

- (a) Describe the digital and analog electronic voltmeter. What are the main differences between the electrical and electronic devices? 3+2
- (b) Write the working principle of a Raman Spectrometer. What are the uses of Raman Spectrometer for drugs? 3+2
- (c) In a compound microscope, the objective is placed 1.5 cm away from the objective lens. The focal length of the objective lens is 3 cm. The eyepiece has a focal length of 5 cm and the least distance of distinct vision is 25 cm. Calculate the image distance for objective lens and the total magnification. 2.5+2.5
- (d) What are the components of a CRO? Calculate the amplitude and frequency of a voltage signal. 3+2

3. Answer any two questions:

- (a) What are the differences between DC motor and DC generator? Explain shunt, series and compound winding of an armature with diagram. Describe the basic parts of an AC motor.
2+6+2
 - (b) Describe the general parts of a telescope. Write the functions of Astronomical Telescope, Reflecting Telescope and Space Telescope. Estimate the angular magnification of a telescope.
2+6+2
 - (c) Describe the construction and working principle of Huygens eyepiece and objective lens. What is the phase modulation (PM) in signal generator and how does it differ from the frequency modulation (FM)?
6+4
 - (d) What are the differences between an analog and digital signal generator? How does a signal generator produce different frequencies? A signal generator is producing 1 kHz carrier wave and the signal is frequency modulated (FM) with frequency deviation of 500 Hz. What is the frequency of the modulated signal?
3+3+4
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