

Roll No. : .....

Total No. of Questions : 11 ]

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# BPG-1111

M.Sc. (Previous) Examination, 2021

PHYSICS

Paper - IV

(Electronic Devices, Computational Methods and  
Programming)

Time : 1½ Hours ]

[ Maximum Marks : 75

## Section-A

(Marks : 2 × 10 = 20)

*Note* :- Answer all *ten* questions (Answer limit 50 words). Each question carries 2 marks.

(खण्ड-अ)

(अंक : 2 × 10 = 20)

*नोट* :- सभी दस प्रश्नों के उत्तर दीजिए (उत्तर-सीमा 50 शब्द)। प्रत्येक प्रश्न 2 अंक का है।

## Section-B

(Marks : 5 × 5 = 25)

*Note* :- Answer all *five* questions. Each question has internal choice (Answer limit 200 words). Each question carries 5 marks.

(खण्ड-ब)

(अंक : 5 × 5 = 25)

*नोट* :- सभी पाँच प्रश्नों के उत्तर दीजिए। प्रत्येक प्रश्न में विकल्प का चयन कीजिए (उत्तर-सीमा 200 शब्द)। प्रत्येक प्रश्न 5 अंक का है।

## Section-C

(Marks : 10 × 3 = 30)

*Note* :- Answer any *three* questions out of five (Answer limit 500 words). Each question carries 10 marks.

(खण्ड-स)

(अंक : 10 × 3 = 30)

*नोट* :- पाँच में से किन्हीं तीन प्रश्नों के उत्तर दीजिए (उत्तर-सीमा 500 शब्द)। प्रत्येक प्रश्न 10 अंक का है।

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BPG-1111 P.T.O.

**Section–A**

2 each

1. Attempt all questions :
  - (i) Compare the BJT, JFET and MOSFET.
  - (ii) Define the quantum efficiency of a photodetector.
  - (iii) How does CCD Act practically in single phase and two phase arrangements ?
  - (iv) Give the classification of polymer materials.
  - (v) What do you mean by Electrostrictivity effect ?
  - (vi) What are systematic and random errors ?
  - (vii) Write Gauss's central formula for interpolation.
  - (viii) Write Gaussian quadrature formula.
  - (ix) What do you mean by Numerical differentiation ?
  - (x) How, protection is provided for the hardware resources by the Operating System ?

**Section–B**

5 each

2. Give the V-I characteristics for common Emitter configuration of BJT transistor. Also derive the current equation for it.

*Or*

Explain the working principle of a solar cell. Define conversion efficiency and fill factor for a solar cell.

3. What are dynamic effects in MOS capacitors ? What are the applications of CCD ?

*Or*

What is Acousto-Optic Effect ? Mention and explain the categories of Acousto-Optic devices.

4. When is ultrasonic waves produced using piezo electric oscillator ? Explain.

*Or*

Derive formula of Bisection method.

5. Derive the Lagrange's interpolation formula.

*Or*

Derive the Newton-Cotes formula for integration.

6. Explain the Taylor's series method and derive expression.

*Or*

What do you mean by flowchart ? Draw a flowchart to find the roots of a quadratic equation.

### **Section–C**

7. Explain the construction, working and characteristics of LED. Give their applications. 8+2=10
8. Name the various Electro-optic Effects. Explain with a neat diagram, the construction of electro-optic effect based modulator. 2+8=10
9. Explain the Surface Acoustic Wave. Give the advantages of SAW technology. Also, describes the use of SAW material as transducers. 6+4=10
10. Explain the Simpson 1/3 rule. Derive the expression and using it evaluate the following integration taking step size  $h = 0.1$  :

$$\int_0^1 \frac{1}{1+x} dx \quad 10$$

11. Derive Runge-Kutta II order formula and give its graphical representation. 10