

Ph.D Entrance Examination, 2016
(Model Question)
FACULTY OF APPLIED SCIENCES
Optoelectronics
Part A & B

Time:

Max.Marks : 100

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Instructions

Answer any ten questions from Part A and Part B. Each question carries 5 marks.

Part A : Research Methodology (Maximum Marks: 50)

1. What are the personality traits required for a researcher?
2. Write a short note on the 'Mangalyaan' mission of Indian Space Research Organization?
3. Point out the ethics to be adopted into the research?
4. Define a phenomenon? Give examples
5. Distinguish between hypothesis, a theory and a law?
6. List out the parameters for assessing the quality of a research study?
7. Explain the need for quantification of a qualitative concept?
8. Explain the term "plagiarism" as applied to research study?
9. It is said that "knowledge generated by research is cumulative". Discuss?
10. Indicate the need for getting patents for research, principle and products?
11. What is research and indicate purpose of doing research?
12. Distinguish between fundamental research and applied research?
13. Prepare a synopsis of the content of a research proposal?
14. Point out experimental group and control group?
15. As an inspiring researcher how can you avoid choosing subjects/topics that has been already studied by others?

Part B: Optoelectronics (Maximum. Marks: 50)

16. State and explain Poynting's theorem? Write down the Maxwell's equation in free space?
17. Give the electromagnetic spectrum in ascending order of frequency? Write down the frequency/wavelength range of each components?
18. Write down the important interferometric techniques?
19. Distinguish between direct band gap and indirect band gap materials?
20. What you mean by population inversion? how it can be achieved in lasers?
21. Write down the principle of second harmonic generation? Mention some of its applications?
22. Write down the principle of holography? How it is superior to photography?
23. Write down the principle of Raman spectroscopy?
24. What you mean by photonics crystal fiber?
25. How do light propagate through an optical fiber? Discuss briefly about the different types of optical fiber?

26. What are the important components of optical communication? Discuss briefly about optical amplifiers ?
 27. List out some of application of high power lasers?
 28. What information one can get from XRD analysis?
 29. What is the role of Helium in working of He-Ne laser?
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