

**ASSIGNMENT BOOKLET**  
**Bachelor's Degree Programme (B.Sc.)**

**COMMUNICATION PHYSICS**

**Valid from January 1, 2022 to December 31, 2022**

**It is compulsory to submit the Assignment before filling up the  
Term-End Examination Form.**

**Please Note**

- You can take electives (56 or 64 credits) from a minimum of TWO and a maximum of FOUR science disciplines, viz. Physics, Chemistry, Life Sciences and Mathematics.
- You can opt for elective courses worth a MINIMUM OF 8 CREDITS and a MAXIMUM OF 48 CREDITS from any of these four disciplines.
- At least 25% of the total credits that you register for in the elective courses from Life Sciences, Chemistry and Physics disciplines must be from the laboratory courses. For example, if you opt for a total of 64 credits of electives in these 3 disciplines, at least 16 credits out of those 64 credits should be from lab courses.
- You cannot appear in the Term-End Examination of any course without registering for the course. Otherwise, your result will not be declared and the responsibility will be yours.



**School of Sciences**  
**Indira Gandhi National Open University**  
**Maidan Garhi, New Delhi-110068**

**2022**

Dear Student,

We hope you are familiar with the system of evaluation to be followed for the Bachelor's Degree Programme. At this stage you may probably like to re-read the section on assignments for Elective Courses in the Programme Guide that we sent you after your enrolment. A weightage of 30 per cent, as you are aware, has been earmarked for continuous evaluation, which would consist of **one tutor-marked assignment (TMA)** for this course. **Submit your assignment response at your Study Centre.**

### Instructions for Formatting Your Assignments

Before attempting the assignment please read the following instructions carefully:

- 1) On top of the first page of your TMA answer sheet, please write the details exactly in the following format:

---

ENROLMENT NO. : .....

NAME : .....

ADDRESS : .....

.....

.....

COURSE CODE : .....

COURSE TITLE : .....

ASSIGNMENT CODE : .....

STUDY CENTRE : ..... DATE : .....

---

**PLEASE FOLLOW THE ABOVE FORMAT STRICTLY TO FACILITATE EVALUATION AND TO AVOID DELAY.**

- 2) Use only foolscap size writing paper (but not of very thin variety) for writing your answers.
- 3) Leave 4 cm margin on the left, top and bottom of your answer sheet.
- 4) Your answers should be precise and in your own words. Do not copy answers from study material.
- 5) While solving problems, clearly indicate the question number along with the part being solved. Write units at each step of your calculations as done in the text because marks will be deducted for such mistakes. Take care of significant digits in your work. Recheck your work before submitting it.
- 6) **This assignment will remain valid from January 1, 2022 to December 31, 2022.** However, you are advised to submit it within **12 weeks** of receiving this booklet to accomplish its purpose as a teaching-tool.

We strongly recommend that you should retain a copy of your assignment response to avoid any unforeseen situation. If possible, please attach a photocopy of this assignment along with your response.

You could obtain response to the difficulties you may face in PHE-16 course via e-mail by writing to **sgokhale@ignou.ac.in**. Please note that, we do not provide answers to Assignment questions.

We wish you good luck.

# Tutor Marked Assignment

## COMMUNICATION PHYSICS

Course Code : PHE-16  
Assignment Code: PHE-16/TMA/2022  
Max. Marks: 100

**Note: Attempt all questions. Symbols have their usual meanings. The marks for each question are indicated against it.**

---

1. State **with reasons** whether the following statements are True or False. (2×10)
  - i) Wireless communication need not be serial.
  - ii) Modulator is an inherent part of any communication system.
  - iii) It is advantageous to have a transmission line with reflection coefficient = 1.
  - iv) Modulation can be used to reduce noise present in the input signal.
  - v) Numbering plan is unique world-wide.
  - vi) Mixer can be designed using passive components, viz.  $L$ ,  $C$  and  $R$ .
  - vii) Bayer Mask has larger blue component.
  - viii) Splicing involves soldering.
  - ix) Star topology is most rugged.
  - x) Blue tooth works only for mobile devices.
  
2.
  - a) Explain the physical significance of all four parameters/characteristics of any receiver. (4)
  - b) Explain the role of temperature in the noise observed in communication systems. (4)
  - c) Why are hollow waveguides preferred over metallic conductors at microwave frequencies? (2)
  
3. a) A plane wave is described by an electric field
$$E = 180\pi \cos 10^8 (\pi t - 50x).$$
What is its (i) frequency in Hz, (ii) wave number, (iii) phase velocity, and (iv) wavelength? (4)
  - b) What is the physical significance of standing wave ratio? (3)
  - c) What is the characteristic impedance of a transmission line with distributed inductance of  $400 \text{ mH m}^{-1}$  and distributed capacitance of  $10 \text{ } \mu\text{F m}^{-1}$ ? (3)
  
4.
  - a) Why is frequency stabilization required in FM generator? (3)
  - b) What is the advantage of dual slope detector over single slope detector? (2)
  - c) Draw the bipolar RZ and Manchester code waveforms of 1011001101. Show appropriate clock waveform also. (5)

5. a) Trace the journey of the signal from the moment you dial a number till the called party picks up the call in a mobile telephone system. (5)
- b) Design and draw the circuit diagram of a TDM system to handle 3 PAM channels of video signals. Specify the sampling frequency per channel and idle time between samples. (5)
6. a) What are the advantages of superheterodyne receiver over TRF receiver? (3)
- b) Explain the working of CCD camera. (5)
- c) What are the advantages of LCD/Plasma TV over vacuum tube TV? (2)
7. a) Two microwave receivers are situated at 2 km and 20 km distance from a transmitter. If the total attenuation of the signal is 40 dB, what is the power attenuation of the absorbing medium? (5)
- b) In an optical fibre, the refractive index of core is 1.5 and that of cladding is 1.48. Calculate its critical angle. What is its numerical aperture and acceptance angle if immersed in water? (Assume the refractive index of water to be 1.33) (5)
8. a) Why is network security necessary? Explain, how it can be implemented. (5)
- b) Explain the techniques generally used to provide firewall protection. (5)
9. a) Explain the configuration in place for accessing global Internet from a PC. (5)
- b) Compare the OSI and TCP/IP reference models. (5)

\*\*\*\*\*