

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

COMMUNICATION PHYSICS

Valid from January 1, 2021 to December 31, 2021

**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

2021

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, 2021 to December 31, 2021.** 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/2021
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) Rise time of a pulse is the time required for the amplitude to reach from 0% to 100% of the peak amplitude value.
 - ii) All types of device noise are white noise.
 - iii) Standing wave ratio of a matched transmission line is infinite.
 - iv) Frequency modulation index m_f is independent of carrier frequency.
 - v) Frequency shift keying is modulation of digital carrier signal with an analog intelligent signal.
 - vi) In superheterodyne receiver the local oscillator always operates at a fixed frequency.
 - vii) The depth of LCD TV depends on the size of its screen.
 - viii) Waveguide attenuator causes rotation of plane of polarization of the wave.
 - ix) Token ring protocol suffers with the data collision problem.
 - x) WAP helps in connecting devices without cables.
2. a) What approach is followed in practice for the choice of a propagation medium for any communication system? Why is a linear medium of propagation preferred? (4+1)
- b) A plane wave is described by an electric field
- $$E = 180\pi \cos 10^8 (2\pi t - 100y).$$
- What is its (i) frequency in Hz, (ii) wave number, (iii) phase velocity, (iv) wavelength, and (v) direction of propagation? (5)
3. a) Three messages A, B, C have probabilities 0.4, 0.3 and 0.3 respectively, of their occurrences. If total 100 messages are sent out, calculate the total information (I_{total}) carried by them. Also calculate the entropy of the signal. (3+2)
- b) Calculate the noise power and noise voltage generated by a $1\text{M}\Omega$ resistor at 37°C over a 1 MHz bandwidth. (3+2)
4. Explain the working of Armstrong system of frequency modulation using a block diagram. Which discrete component circuit could be used to attain the required phase shift? (8+2)

5. a) Explain, how digital coding can help in overcoming the burst error noise in signal transmission. (5)
- b) In mobile telephony explain in detail the functions of base station and mobile switching centre. (5)
6. a) Explain the use of synchronising pulses in a TV signal. (5)
- b) Explain the image frequency and double spotting phenomena in case of AM receivers. How can they be overcome? (3+2)
7. a) Explain the construction of a Schottky diode and state its advantages over normal $p-n$ junction diode. (5)
- b) In an optical fibre the refractive index of core is 1.52 and that of cladding is 1.48. Calculate the critical angle and acceptance angle when the fibre is immersed in glycerin. Refractive index of glycerin is 1.47. (5)
8. a) What is network security? Explain its types. (5)
- b) Write down the instructions involved in adding three numbers X, Y, Z and storing the result in memory location D . (5)
9. a) Explain the functions available on the tool bar of a typical web-browser. (5)
- b) Compare the WAP architecture with OSI model. (5)
