

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

COMMUNICATION PHYSICS

Valid from January 1, 2023 to December 31, 2023

**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
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2023

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, 2023 to December 31, 2023.** 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/2023
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) Standing wave ratio of a matched transmission line is zero.
 - iii) Amplitude modulation index for dc modulating signal is 100%.
 - iv) Skin depth increases with frequency.
 - v) Though audio frequency range is 20 Hz to 20 kHz, the telephone uses only 4 kHz bandwidth per channel, still the communication is audible.
 - vi) In superheterodyne receiver the local oscillator always operates at a fixed frequency.
 - vii) CCD camera requires electron gun for scanning.
 - viii) In satellite communication, the higher frequency range is chosen for up-linking.
 - ix) Token ring protocol suffers with the data collision problem.
 - x) Blue tooth works only for mobile devices.
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) Explain the procedure of stub matching in transmission lines. (5)
3. a) 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)
b) A dipole antenna of $dl = 2\text{m}$ carries 20 A peak current at 200 MHz frequency. Calculate the radiation intensity in the side-on direction at a distance of 10 km. (5)
4. a) Explain the working of balance modulator for AM generation. State its advantages over a transformer coupled class-C amplifier based AM generator. (3+2)
b) Explain, how digital coding can help in overcoming the burst error noise in signal transmission. (5)
5. a) State the various techniques used for analog modulation of a digital signal carrier. How are they used for continuous wave transmission and two tone modulation systems? State the advantages of two tone modulation system. (2+2+1)
b) In mobile telephony explain in detail the functions of base station and mobile switching centre. (5)

6. a) Explain the image frequency and double spotting phenomena in case of AM receivers. How can they be overcome? (3+2)
- b) What is the role of blanking and sync pulses in a TV signal? How are these pulses incorporated with the video signal? (5)
7. a) Explain the construction of a Schottky diode and state its advantages over normal $p-n$ junction diode. (3+2)
- b) With an appropriate diagram, explain the construction of graded index multimode fibre. How does it reduce the modal dispersion? (2+3)
8. a) Write down the instructions involved in adding three numbers X, Y, Z and storing the result in memory location D . (5)
- b) Differentiate between a Router and a Gateway. (5)
9. a) Justify the need of standard network protocols and describe the various layers of OSI model. (5)
- b) Explain the WAE layer of WAP architecture. Write any four uses of WAP. (5)
