

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

COMMUNICATION PHYSICS

Valid from January 1, 2025 to December 31, 2025

**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.



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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, 2025 to December 31, 2025.** 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/2025
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) Sound wave (longitudinal wave) propagation is the most preferred mode in modern communication systems.
 - ii) Scanning format at TV transmitter and receiver end need not be the same.
 - iii) Skin depth increases with frequency.
 - iv) Modulation can be used to reduce noise present in the input signal.
 - v) Interleaving of messages helps in reducing hum noise in a signal.
 - vi) Splicing involves soldering.
 - vii) CCD camera requires electron gun for scanning.
 - viii) Image frequency can be rejected by tuned IF amplifier.
 - ix) Centronic port of a computer is a serial port.
 - x) Blue tooth works only for mobile devices.

2. a) Explain with a suitable diagram, why the sample frequency should be at least double than the signal frequency. (5)
b) Describe the noises originating in various circuit components of a communication system. (5)

3. a) 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)
b) Explain, how the gain is increased by an antenna array. (5)

4. a) An amplitude modulated carrier wave is viewed on an oscilloscope screen. The maximum amplitude is 50V and minimum amplitude is 8V. Calculate the percentage modulation index. What is the amplitude of unmodulated carrier wave? (5)
b) Design and draw a circuit, with discrete electronic devices used as keys, to implement an FSK generator which gives out frequency f_0 for binary value 0 and f_1 for binary value 1. (5)

5. a) Describe the process of call handling in mobile telephony. (5)
b) If five video signals are to be transmitted on a TDM system using PAM, what is the minimum sampling frequency required? What will be the quiet time between the samples from two consecutive channels? (5)

6. a) In a transmitter the final stage class *C* amplifier is supplied with 18 V dc supply. Calculate what equivalent R_{load} the transistor must see, in order to produce an RF output of 15 W. If the transmitter is to be connected to an antenna with 50Ω load impedance, design and draw an L network to provide required match. (5)
- 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 with the help of a neat diagram the setup to measure VSWR. (5)
- b) In an optical fibre the refractive index of core is 1.53 and that of cladding is 1.49. Calculate the critical angle and acceptance angle when the fibre is immersed in glycerine. Refractive index of glycerine is 1.47. (5)
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)
