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

COMMUNICATION PHYSICS

Valid from January 1, 2024 to December 31, 2024

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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THE PEOPLE'S
UNIVERSITY

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

2024

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 : …………………………………………

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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, 2024 to December 31, 2024**. 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

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) The best mode for transmitting optical signal is Line-of-Sight communication.

    ii) A simple sine wave signal does not carry any information.

    iii) Input impedance for an open ended transmission line of λ/2 length is zero.

    iv) Amplitude distortion in AM gives rise to unwanted frequency components.

    v) Amplitude shift keying is modulation of digital carrier by analog signal.

    vi) Mobile telephony uses time division multiplexing.

    vii) Gunn devices can be built using indirect band gap semiconductors.

    viii) In television, vertical scanning frequency is higher than horizontal scanning frequency.

    ix) Machine language programmes are portable, while assembly language programmes are not.

    x) Router can provide inter-conversion of protocols among connections.

2. a) What are the characteristics of the first stage amplifier of an audio receiver circuit? (5)

    b) Explain the use of step input signal in characterizing a communication system. Why square wave signal is preferred over step input signal? (4+1)

3. a) For a conductor, number of collisions per second is 10^{12}, and plasma frequency is $\omega_p = 2\pi \times 10^{15}$. Calculate the skin depth for the signal frequency of (i) 50 Hz, and (ii) 50 MHz. (3+2)

    b) You have an open ended line of 3λ/4 length. Draw the incident, reflected and resultant voltage and current waves for the current maximum at generator end. (5)

4. a) 10 kHz audio signal is amplitude modulated over a 100 kHz carrier frequency. The peak amplitude of carrier wave is 10 V. If the modulation index is 0.8, find out the frequencies present in the modulated output. Also calculate the maximum and the minimum amplitude of the envelope of modulated signal. (5)

    b) Depict digital signal 101101001 in (i) unipolar RZ, (ii) bipolar NRZ, (iii) bipolar RZ, and (iv) Manchester code. (1+1+1+2)

5. a) Explain the time division switching used in telephony. (5)

    b) Design a TDM system to handle 3 PAM channels if the maximum input frequency of each channel is 50 kHz. (5)

6. a) What are the functions of synchronizing circuits in a television receiver? How are these functions accomplished by using a sync separator circuit? (2+3)

   b) Discuss the advantages of FM over AM in radio transmission. What are the essential differences between AM and FM receiver circuits? (3+2)

7. a) With the help of appropriate diagram, explain the difference between *E*-plane and *H*-plane T-structures of the waveguide. (5)

   b) Compare LED and laser diode used as sources in optical fibre communication. (5)

8. a) Explain the process of instruction execution in a van Neumann machine. (5)

   b) Explain the different types of client-server network architecture. (5)

9. a) What is the difference between Internet and intranet? What are the advantages of intranet? (2+3)

   b) What is blue tooth technology? What are the concerns regarding the interference among blue tooth connections? How are they resolved? (1+1+3)

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