**POORNIMA UNIVERSITY, JAIPUR**

**END SEMESTER EXAMINATION, November 2022**

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|  | **4BT7187** | Roll No. | Total Printed Pages: 2 |
| **4BT7187** |  |
| B. Tech. IV Year VII- Semester (Main/Back) End Semester Examination, November 2022  **(EC)** | |
| **BEC07101: Antenna & Wave Propagation** | | | |

# Time: **3** Hours. Total Marks: **60**

Min. Passing Marks: **21**

Attempt **five** questions selecting one question from each Unit. There is internal choice from Unit I to Unit V. Marks of each question or its parts are indicated against each question / parts. Draw neat sketches wherever necessary to illustrate the answer. Assume missing data suitably (if any) and clearly indicate the same in the answer.

Use of following supporting material is permitted during examination for this subject.

# **1.--------------------------Nil--------------------** **2.------------------Nil-----------------------**

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|  |  | **UNIT-I (CO1)** | **Marks** | **Bloom Level** |
| **Q.1** | **(a)** | Explain these terms related to Antenna.  i) Gain ii) Beamwidth iii) Effective Area iv) Radiation Resistance. | **(6)** | **Analyze** |
|  |  |  |  |  |
|  | **(b)** | If 6 ft (1.83 m) paraboloid reflector is to be used at 6 GHz. Calculate the bandwidth between the first nulls. Also calculate the gain of the antenna and express it in decibels. | **(6)** | **Evaluate** |
|  |  |  |  |  |
|  |  | **OR** |  |  |
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| **Q.2** | **(a)** | An antenna has a radiation resistance of 72 ohm, a loss resistance of 8 ohms and a power gain of 12 db, Determine the antenna efficiency and its directivity. | **(6)** | **Evaluate** |
|  |  |  |  |  |
|  | **(b)** | Draw the radiation pattern for five different antennas with characteristics. | **(6)** | **Apply** |
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|  |  | **UNIT-II (CO2)** |  |  |
|  |  |  |  |  |
| **Q.3** | **(a)** | Explain the array of point sources with its radiation pattern and physical arrangement. | **(6)** | **Analyze** |
|  |  |  |  |  |
|  | **(b)** | An end-fire array composed of λ/2 radiators with axes at right angles to the line of the array required to have a power gain of 20. Determine the array length and the width of a major lobe between the nulls. | **(6)** | **Evaluate** |
|  |  |  |  |  |
|  |  | **OR** |  |  |
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| **Q.4** | **(a)** | Explain n-Element Linear array with its directivity. | **(6)** | **Analyze** |
|  |  |  |  |  |
|  | **(b)** | Describe stacked or rectangular array antennas. | **(6)** | **Understand** |
|  |  |  |  |  |
|  |  | **UNIT-III (CO3)** |  |  |
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| **Q.5** | **(a)** | A circular loop antenna with uniform in phase current has a diameter D. What is (i) Far Field Pattern, (ii) Radiation Resistance, (iii) Directivity when D=2λ | **(6)** | **Evaluate** |
|  |  |  |  |  |
|  | **(b)** | Calculate the Physical area of the loop and compare it with its maximum effective aperture, if the radius of a small loop of constant current is λ/25. | **(6)** | **Evaluate** |
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|  |  | **OR** |  |  |
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| **Q.6** | **(a)** | What are the different components of Yagi Uda antenna? Also define its working principle with diagram. | **(6)** | **Understand** |
|  |  |  |  |  |
|  | **(b)** | Explain different types of Horn Antennas with beam width. | **(6)** | **Analyze** |
|  |  |  |  |  |
|  |  | **UNIT-IV (CO4)** |  |  |
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| **Q.7** | **(a)** | Explain Duct propagation. | **(6)** | **Analyze** |
|  |  |  |  |  |
|  | **(b)** | Describe the fundamental concept of Tropospheric Propagation. | **(6)** | **Analyze** |
|  |  |  |  |  |
|  |  | **OR** |  |  |
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| **Q.8** | **(a)** | A certain broadcast transmitter transmits at 1.2 MHz and uses antenna of 150 m height. If antenna current measured is 9 A, calculate the strength of the electric field in a receiving antenna of height equal to 2 m, placed 40 km away from the transmitter. | **(6)** | **Evaluate** |
|  |  |  |  |  |
|  | **(b)** | How to calculate Reflection Factor for Horizontal Polarization and Vertical Polarization. | **(6)** | **Understand** |
|  |  |  |  |  |
|  |  | **UNIT V (CO5)** |  |  |
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| **Q.9** | **(a)** | How to propagate in Ionosphere? Also discuss various characteristics. | **(6)** | **Analyze** |
|  |  |  |  |  |
|  | **(b)** | Explain virtual height, & skip distance. | **(6)** | **Analyze** |
|  |  |  |  |  |
|  |  | **OR** |  |  |
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| **Q.10** | **(a)** | Discuss the effects of ionosphere on rays of varying incidence. | **(6)** | **Analyze** |
|  |  |  |  |  |
|  | **(b)** | Explain maximum usable frequency, & effective earth radius. | **(6)** | **Analyze** |