**POORNIMA UNIVERSITY, JAIPUR**

**END SEMESTER EXAMINATION, November 2022**

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|  | **3BT5105** | Roll No. | Total Printed Pages: 2 |
| **3BT5105** |  |
| B. Tech. III Year- V Semester (Main/Back) End Semester Examination, November 2022  **(EC)** | |
| **BEC05105 : Microwave Engineering** | | | |

# 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)** | An air field rectangular waveguide has dimension of a = 6 cm and b = 4 cm. The signal frequency is 3GHz. Compute the following for TE10 mode.  (i) Cut off frequency (ii) Phase constant | **(6)** | **L3, L4** |
|  |  |  |  |  |
|  | **(b)** | Describe a technique of measuring the Voltage Standing Wave Ratio. | **(6)** | **L3** |
|  |  |  |  |  |
|  |  | **OR** |  |  |
|  |  |  |  |  |
| **Q.2** | **(a)** | What is parallel strip line? Explain all the parameters of parallel strip line. | **(6)** | **L3** |
|  |  |  |  |  |
|  | **(b)** | Define the dominant and degenerate mode for waveguide. | **(6)** | **L4** |
|  |  |  |  |  |
|  |  | **UNIT-II (CO2)** |  |  |
|  |  |  |  |  |
| **Q.3** | **(a)** | Find out the S matrix of a H plane tee. | **(6)** | **L2** |
|  |  |  |  |  |
|  | **(b)** | Calculate the resonant frequency of a rectangular cavity resonator having dimensions a = 5cm, b = 2cm, d = 15cm; in dominant mode  a) If the cavity is air filled  b) If the cavity is filled with a dielectric having є r = 2.56 | **(6)** | **L2** |
|  |  |  |  |  |
|  |  | **OR** |  |  |
|  |  |  |  |  |
| **Q.4** | **(a)** | Calculate the resonant frequency of a rectangular cavity of dimension a = 3 cm; b = 2 cm; d = 4 cm, and operating in TE101 mode. | **(6)** | **L2** |
|  |  |  |  |  |
|  | **(b)** | What is rat–race hybrid ring? Also explain its applications. | **(6)** | **L3** |
|  |  |  |  |  |
|  |  | **UNIT-III (CO3)** |  |  |
|  |  |  |  |  |
| **Q.5** | **(a)** | Describe the limitation of conventional vacuum tube. | **(6)** | **L3** |
|  |  |  |  |  |
|  | **(b)** | Explain the Bunching process for two cavity klystron. | **(6)** | **L3** |
|  |  |  |  |  |
|  |  | **OR** |  |  |
| **Q.6** | **(a)** | A reflex klystron operates under the following conditions:  Vo = 500V, L = 1.2mm, Rsh = 18kw, e/m = 1.759 x 1011 (mks system), fr = 8GHz. The tube is oscillating at frequency at the peak of the n = 2 mode or 1¾ mode. Assume that the transit time through the gap and beam loading can be neglected   1. Find the value of the repeller voltage Vr.   (ii) Find the direct current necessary to give a microwave gap voltage of 200V. | **(6)** | **L3** |
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|  |  |  |  |  |
|  | **(b)** | Write the short notes on Power output and beam loading for two cavity klystron. | **(6)** | **L3** |
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|  |  | **UNIT-IV (CO4)** |  |  |
|  |  |  |  |  |
| **Q.7** | **(a)** | Draw the schematic diagram of helix travelling tube; also describe the amplification process of Helix travelling wave tube. | **(6)** | **L4** |
|  |  |  |  |  |
|  | **(b)** | Describe the coupling relationship between the electron beam and slow wave helix. | **(6)** | **L3** |
|  |  |  |  |  |
|  |  | **OR** |  |  |
|  |  |  |  |  |
| **Q.8** | **(a)** | Prove the following relation for TWTs Ap = -9.54+47.3NC where Ap is output power gain NC is numerical number. | **(6)** | **L4** |
|  |  |  |  |  |
|  | **(b)** | Write down applications of TWT. | **(6)** | **L3** |
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|  |  | **UNIT V (CO5)** |  |  |
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| **Q.9** | **(a)** | Explain different type of Magnetron. | **(6)** | **L3** |
|  |  |  |  |  |
|  | **(b)** | Describe the coaxial, frequency angle and voltage tunable magnetrons. | **(6)** | **L3** |
|  |  |  |  |  |
|  |  | **OR** |  |  |
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| **Q.10** | **(a)** | Explain Forward wave cross field amplifier. | **(6)** | **L3** |
|  |  |  |  |  |
|  | **(b)** | Explain Backward wave cross field amplifier. | **(6)** | **L3** |