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M.Sc. (Third Semester)

EXAMINATION, Dec. - Jan., 2021-22

PHYSICS

PAPER FOURTH (B)

[Electronics - I Communication]

Time : Three Hours] ***[Maximum Marks:80***

Note: Attempt all sections as directed.

Section - A

(Objective/Multiple Choice Questions)

(1 mark each)

Note: Attempt all questions.

Choose the correct answer.

1. Both axial magnetic field and radial electric field are used in the following vaccum tube
   (A) Magnetron
   (B) A reflex Klyptron
   (C) Klystron
   (D) Travelling wave tube
2. The modes in a reflex klystron
   (A) give the same frequency but different transit time
   (B) result from excessive transit time across the resonator gap
   (C) are caused by spurious frequency modulation
   (D) are just for theoretical consideration.

P.T.O.

3. For use as a local oscillator for frequency measurement the most suitable microwave source would be
   (A) TWT
   (B) Double - cavity klystron
   (C) Reflex klystron
   (D) Magnetron
4. In a travelling - wave table, the purpose of helix structure is
   (A) To make - sure broadband operation
   (B) To minimize the noise figure
   (C) To minimize the RF field axia velocity
   (D) None
5. The modes of propagation supported by a rectangular wave guide is
   (A) TM, TEM, TE modes
   (B) TM, TE
   (C) TM, TEM
   (D) TE, TEM
6. For any mode of propagation in a rectangular waveguide, propagation occurs.
   (A) Above the cut off frequency
   (B) Below the cut off frequency
   (C) Only at the cut - off frequency
   (D) Depends on the dimension of the waveguide
7. Dominant mode is defined as
   (A) Mode with the lowest cut-off frequency
   (B) Mode with the highest cut-off frequency
   (C) Any TEM mode is called a dominant mode
   (D) None of the mentioned

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8. The lowest mode of TM wave propagation is
   (A) TM 10 mode
   (B) TM 01 mode
   (C) TM 11 mode
   (D) TM 12 mode
9. A cylindrical cavity resonator can be constructed using a circular waveguide.
   (A) Shorted at both the ends
   (B) Open at both the ends
   (C) Matched at both the ends
   (D) None of the mentioned
10. A rectangular cavity supports
   (A) TEM mode of resonance
   (B) TM mode of resonance
   (C) TE mode of resonance
   (D) TE, TM mode of resonance
11. The number of semiconductor layers in IMPATT diode is
   (A) Two
   (B) Three
   (C) Four
   (D) None of these
12. Main advantage of a microwave
   (A) Highly directive
   (B) High penetration power
   (C) Moves at the speed of light
   (D) None of these

13. The resolution of pulsed radar can be improved by
   (A) Increasing the pulse width
   (B) Decreasing pulse width
   (C) Increasing the pulse amplitude
   (D) Decreasing the pulse repetition frequency
14. The radar in which both transmission and reception is done using the same antena are called
   (A) Monostatic radar
   (B) Bistatic radar
   (C) Monopole radar
   (D) Dipole radar
15. The selectivity of most recievers is determined largely by
   (A) Sensitivity
   (B) Characteristics of IF section
   (C) Antenna direction
   (D) All of the above
16. The term radar cross section defines the
   (A) Scattering ability of the target
   (B) Power radiating ability of the radar
   (C) Amount of energy scattering by unwanted objects
   (D) Cross section of radar area through which energy is emitted.
17. Why does the orbit take the shape of an ellipse or circle?
   (A) Position can be easily determined
   (B) Consume less fuel
   (C) Most efficient geometry
   (D) Better coverage on earth

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18. The time period taken by the satellite to complete one orbit is called
    (A) Lapsed time
    (B) Time period
    (C) Sidereal period
    (D) Unit frequency
19. What is the angle of inclination for a satellite following an equational orbit
    (A) 0^0
    (B) 180^0
    (C) 45^0
    (D) 90^0
20. Most waves used for communication purpose rely on geostationary satellites because
    (A) They cannot transmit data at long distance due to curvature of the earth
    (B) They are reflected by the atmosphere
    (C) They are very cheap
    (D) It does not occupy space on the earth's surface

Section - B

(Very Short Answer Type Question)

(2 marks each)

Note: Attempt all questions.

1. What is Magnetron?
2. What you know about helix travelling wave tube?
3. What is TE mode?
4. What is rectangular wave?
5. What is resonator?

6. Write Gun effect.
7. What is radar cross section?
8. Explain lock angle.

Section - C

(Short Answer Type Questions)

(3 marks each)

Note: Attempt all question:

1. Define TM modes in circular wave guide
2. Explain role of escape velocity in satellite launching system
3. Explain basis principle of two cavity klystron.
4. Explain excitations of modes in rectangular wave guide.
5. Explain delay in TMPATT process.
6. Explain role of microwave in signal propagation.
7. Explain role of radar frequency in Radar System.
8. Explain orbital spacing.

Section - D

(Long Answer Type Questions)

(4 marks each)

Note: Attempt all question.

1. Explain principle of operation of magnetrons.
2. Explain in detail TM modes in circular wave guide.
3. Explain working and characteristic curve of READ diode.
4. What is radar range equation. Derive this equation.
5 What is satellite communication? Explain lock angles and orbital spacing in satellite system.

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