Roll No.												

PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING

TEST - 1

Even Semester: 2018-19 | **Date**: 01 March 2019

Course Code: ECE-214 | **Time**: 1 Hour

Course Name: Antenna and Microwave Engineering | **Max Marks**: 40

Programme & Sem: B.Tech (ECE) & VI Sem | **Weightage**: 20%

Instructions:

(i) Read the question properly and answer accordingly.

(ii) Question paper consists of 3 parts.

(iii) Scientific and Non-programmable calculators are permitted.

Part A

Answer **all** Questions. **Each** question carries **five** marks. (4Qx5M=20M)

1. Define directivity in terms of radiation intensity, radiated power.
2. What is antenna effective aperture, Prove directivity $D=(4\pi/\lambda^2)A_e$ where A_e is antenna effective aperture.
3. Prove that $P_G=P_R+P_L$ where P_G=Source power, P_R=Radiated power, P_L= Load power.
4. Explain the following

   a) Field regions b) Beam efficiency

Part B

Answer **all** Questions. **Each** question carries **six** marks. (2Qx6M=12M)

5. An antenna has a field pattern is given by $E(\theta)=\cos\theta\cos2\theta$ where $0^\circ\leq\theta\leq90^\circ$ find HPBW and FNBW
6. With suitable diagrams analyze the construction and radiation pattern of resonant and non-resonant 'V' antenna.

Part C

Answer the Question. Question carries **eight** marks. (1Qx8M=8M)

7. Prove that radiated power from small loop antenna of radius 'a' and current 'I_m' is $10\pi^2 (I_m)^2a^4\beta^4$ where 'β' is phase constant.

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GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING

TEST - 2

Even Semester: 2018-19 | **Date**: 13 April 2019

Course Code: ECE 214 | **Time**: 1 Hour

Course Name: Antenna and Microwave Engineering | **Max Marks**: 40

Program & Sem: B.Tech & VI Sem | **Weightage**: 20%

Instructions:

(i) Read the question properly and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and Non-programmable calculators are permitted.

Part A

Answer **all** the Questions. **Each** question carries **five** marks. (4Qx5M=20M)

1. Explain the Features, Advantages and Limitations of Micro Strip Patch Antennas
2. How different regions are formed with flat sheet reflector antennas, Explain with diagram.
3. Explain the construction of Cassegrain Antenna using main and Sub reflectors.
4. What is complex permittivity of earth? Derive the complex permittivity ϵ^{l}

Part B

Answer **both** the Questions. **Each** question carries **six** marks. (2Qx6M=12M)

5. What is Line of Sight Distance? Prove that Line of sight distance is $3.57(\sqrt{h_t}+\sqrt{h_r})$ Km where

   h_t= Transmitting Antenna Height and h_r= Receiving antenna Height.

6. Find the field strength of Space Wave as $E_R=\frac{2E_s}{d}\sin(\frac{2\pi h_t h_r}{\lambda d})$

Part C

Answer **the** Question. The Question carries **eight** marks. (1Qx8M=8M)

7. a) With neat diagrams and circumference-Spacing chart explain the geometry of helical antenna.

   b) Explain transmission and Radiation Modes of Helical Antenna.

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PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING

END TERM FINAL EXAMINATION

Even Semester: 2018-19 | **Date**: 22 May 2019

Course Code: ECE-214 | **Time**: 3 Hours

Course Name: Antenna and Microwave Engineering | **Max Marks**: 80

Program & Sem: B.Tech & VI Sem | **Weightage**: 40%

Instructions:

(i) Read the question properly and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and Non-programmable calculators are permitted.

Part A

Answer **all** the Questions. **Each** question carries **one** mark. (20Qx1M=20M)

1.

i. Effective length of receiving antenna is…….
(a)-Voc/E (b) $VocE^2$ (c)VocE (d) Voc/E

ii. Power radiated per unit area in any direction is given by the pointing vector……..
(a) $P=\frac{E^2}{2H}$ (b)$P=\frac{E}{H}$ (c)$P=\frac{E^2}{H}$ (d) P=E*H

iii. Relation between maximum aperture and directive is, where A_{em} = maximum aperture …..
(a)$D=\frac{4\pi}{\lambda}A_{em}$ (b)$D=\frac{4\pi}{\lambda^2}A_{em}$ (c)$A_{em}=4\pi$ (d) $A_{em}=4\pi^2$

iv. The resolution of an antenna=_____
(a)HPBW/2 (b)FNBW/2 (c) FNBW/4 (d) HPBW/4

v. The bandwidth of the antenna is inversely proportional to _____ of antenna
(a) P-factor (b) S-factor (c) F-factor (d) Q-factor

vi. The measure of solid angle is a _____
(a)Steradian(Sr) (b)Radian (c)Degrees (d)none

vii. Loops are extensively used in_____
(a)Radio receivers (b)Aircraft receivers (c)UHF Transmitters (d)all

viii. The far field components of loop antennas is E_φ=_____
(a) $\frac{120\pi^2\,[I]\sin\theta A}{r\lambda^2}$ (b) $\frac{120\pi^2\,[I]\sin\theta A}{r}$ (c) $\frac{120\pi^2[I]\sin\theta A}{r\lambda}$ (d) $\frac{120\pi^2\,[I]\sin\theta A}{r\lambda^4}$

ix. Radiation resistance of small loop R_r is_____
(a)$197(\frac{C}{\lambda})^4$ (b) $200(\frac{C}{\lambda})^2$ (c) $400(\frac{C}{\lambda})^4$ (d) $497(\frac{C}{\lambda})^2$

x. Directivity of large loop is_____
(a)$D=0.682(\frac{C}{\lambda})$ (b) $26(\frac{C}{\lambda})$ (c)$0.054(\frac{C}{\lambda})$ (d) $2.46(\frac{C}{\lambda})$

xi. Which antenna has high input impedance & greater bandwidth_____
(a)Horn (b)Helical (c) folded dipole (d) Yagi-Uda

xii. The parasitic element whose length is greater than the driven element then it is called_

(a) Dipole (b)Director (c) Reflector (d)Focal

xiii. Microstrip antenna is also known as

(a) Reflector (b)Slot (c) Patch (d) Logarithmic

xiv. VSWR is given by

(a) $\frac{v_{min}}{v_{max}}$ (b)) $\frac{v_i}{v_r}$ (c) $\frac{v_i}{v_r}$ (d) $\frac{v_{max}}{v_{min}}$

xv. The formula for refractive index for ionized layers is

(a) $\sqrt{1+\frac{81N}{f^2}}$ (b) $\sqrt{1-\frac{81N}{f^2}}$ (c) $\sqrt{1+\frac{81N}{f}}$ (d) $\sqrt{1+\frac{81}{f^2}}$

xvi. Distance between Transmitter and Receiver By considering the effect of Curvature of Earth, R=Radius of Earth, h= Virtual Height, β=Tangent Angle with respect to curvature of earth

(a) $2R\left[(90-\beta)-\sin^{-1}\left(\frac{R\cos\beta}{R+h}\right)\right]$ (b) $2R\left[(\beta)-\sin^{-1}\left(\frac{R\cos\beta}{R+h}\right)\right]$

(c) $2R\left[(90-\beta)-\sin^{-1}\left(\frac{R}{R+h}\right)\right]$ (d) $2R\left[(90-\beta)-\sin^{-1}\left(\frac{R\cos\beta}{2}\right)\right]$

xvii. MUF is given by

(a) MUF = $f_c\cos\theta$ (b) MUF = $f_c\sec\theta$ (c) MUF = $\frac{fc}{sec\theta}$ (d) MUF = $f_c\sec^2\theta$

xviii. In order to receive vertically polarized wave, the conductor of the dipole should be mounted

(a) Horizontal (b) at an angle of 45° (c) Vertical (d) at an angle of 60°

xix. Relation Between Maximum Usable Frequency and Skip Distance By considering the effect of Curvature of Earth, Where h= Virtual Height, R=Radius of Earth, D= Distance between Transmitter and Receiver

(a) $D_{Skip}=2\left[\frac{D^2}{8R}\right]\sqrt{\left(\frac{f_{MUF}^2}{f_C^2}\right)-1}$ (b) $D_{Skip}=2\left[h+\frac{D^2}{8R}\right]\sqrt{\left(\frac{f_{MUF}^2}{f_C^2}\right)-1}$

(c) $D_{Skip}=2\left[h+\frac{D^3}{8R}\right]\sqrt{\left(\frac{f_{MUF}^2}{f_C^2}\right)-1}$ (d) $D_{Skip}=2\left[h+\frac{D^2}{8R}\right]\sqrt{\left(\frac{f_{MUF}^2}{f_C^2}\right)}$

xx. Critical frequency of a layer is given by

(a) $f_c=81N_m$ (b) $f_c=81N_m^2$ (c) $f_c=9\sqrt{Nm}$ (d) $f_c=81\sqrt{Nm}$

Part B

Answer **all** the Questions. **Each** question carries **ten** marks. (2Qx10M=20M)

2. a) With suitable diagrams explain the construction and radiation pattern of Rhombic antenna.

   b) The normalized field pattern of an antenna is given by $E(\theta)=\sin\theta\sin\Phi$ where $0\le\Phi\le\pi$, $0\le\theta\le\pi$ find exact directivity and approximate directivity.

3. a) Explain the Design and operation of Yagi-Uda antenna.

   b) How resonant and non-resonant V- antennas are formed with a conducting element of length 'L'

Part C

Answer **all** the Questions. **Each** question carries **ten** marks. (4Qx10M=40M)

4. Derive the Expression for cutoff frequency of wave-guide, with help of fundamental wave equations.

5. (a) What is Skip Distance? With suitable diagrams explain how skip distance changes with respect to incident angle and time (day and night)

   (b) Explain the mechanism of wave bending in ionosphere.

6. Explain in detail about

   (a) Maximum usable frequency (MUF) (b) Critical Frequency

7. (a) what is virtual height? How you measure virtual height with respect to flat earth consideration.

   (b) Derive the relation between Maximum usable frequency, skip distance, and critical frequency by considering flat earth.