ROYAL CIVIL SERVICE COMMISSION

CIVIL SERVICE COMMON EXAMINATION (CSCE) 2009

EXAMINATIOAN CATEGORY: TECHNICAL

PAPER III: SUBJECT SPECILIZATION PAPER FOR ELECTRONIC AND COMMUNICATIONS ENGINEERING

Date	**: 08/ 11 / 09**
Total Marks	**: 100**
Examination Time	**: 150 minutes**
Reading Time	**: 15 minutes**

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. **This paper contains two sections SECTION A and SECTION B.**
2. **Part I of SECTION A consist 30 multiple choice questions. Each question carries one (1) point. All questions in Part I of SECTION A are compulsory.**
3. **Part II of the SECTION A consist 5 short answer questions. Each short question carries five (5) points. Any four (4) questions are to be answered**
4. **SECTION B consists of two (2) case studies. Each case study carries 50 points. Attempt one (1) case study only.**
5. **Programmable calculators are not allowed to be used.**
6. **Answer the questions neatly and legibly**
7. **Please answer the questions on the answer paper.**
8. **Please write your name and number clearly on the answer sheet.**
9. **Just write the number of the answer for the Multiple choice questions**
10. **This question paper has 7 pages excluding this page**
11. **check to make sure that the required number of questions has been answered**

All the best

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SECTION A

Part I (30 points)

Multiple Choice Questions (all questions to be answered)

1. Consider a lossless antenna with a directive gain of +6dB. If 1 mW of power is fed to it the total power radiated by the antenna will be
A) 4 mW
B) 1 mW
C) 7 mW
D) 1/4 mW
Answer:

2. When an electron jumps from higher orbit to lower orbi t, it
A) looses energy
B) gains energy
C) emits energy
D) no energy change
Answer:

3. A semiconductor has almost empty
A) valence band
B) conduction band
C) electron band
D) proton band
Answer:

4. A p-type as well as n-type semiconductor is electrically
A) neutral
B) positive
C) negative
D) both Positive and Negative
Answer:

5. The Knee voltage for silicon pn junction is
A) 0.7V
B) 0.65V
C) 0.75V
D) 0.8V
Answer:

6. When the outermost orbit of an atom has less than 4 electrons, the material is generally a
A) wood
B) paper
C) metal
D) semi-solid
Answer:

7. When load is connected across a voltage source, power is transferred from the source to the load. Now the efficiency at maximum power transfer (maximum power transfer theorem) is
A) 100%
B) 50%
C) 40%
D) 80%
Answer:

8. High Voltage DC (HVDC) transmission is mainly used for
A) bulk power transmission over very long distances
B) inter-connecting two systems with the same nominal frequency
C) eliminating reactive power requirement in the operation
D) minimizing harmonics at the converter stations
Answer:

9. At extremely low frequencies, the electrical sizes of coupling devices become
A) extremely small
B) small
C) no change
D) very large
Answer:

10. With negative feedback, output impedance of amplifier is
A) decreased
B) increased
C) no change
D) doubled
Answer:

11. Tuned amplifiers are generally operated as class
A) A amplifiers
B) B amplifiers
C) C amplifiers
D) D amplifiers
Answer:

12. If the coupling is loose, then resonance curve will be
A) sharp
B) blunt
C) flat
D) straight line
Answer:

13. In amplitude modulation, the audio signal is transmitted at
A) double audio signal frequency
B) same frequency
C) lower frequency
D) carrier frequency
Answer:

14. In amplitude modulation, bandwidth is ……..the audio signal frequency.
A) same as
B) twice
C) half of
D) quarter of
Answer:

15. In a Zener voltage regulator, the zener operates in the
A) forward characteristics region
B) backward characteristics region
C) zero regions
D) breakdown region
Answer:

16. Radar antennas are usually:
A) dipoles
B) parabolic dishes
C) helical antennas
D) loops
Answer:

17. Induction and radiation fields are equal at a distance equal to
A) $6/\lambda$
B) $\lambda \cdot 6$
C) $\lambda/6$
D) $\lambda/2\pi$
Answer:

18. Which of the following antennas is best excited by a waveguide
A) biconical
B) helical
C) discone
D) horn
Answer:

19. Which of the following antenna gives circular polarization
A) yagi-Uda
B) parabolic
C) helical
D) dipole
Answer:

20. Which antenna is frequency dependent antenna
A) yagi-Uda
B) log periodic antenna
C) helical
D) dipole
Answer:

21. Which of the following antenna is λ/4 in length
A) marconi
B) hetz
C) dipole
D) none
Answer:

22. Scatter transmission is used at frequencies
A) UHF and VHF
B) UHF only
C) VHF only
D) VLF only
Answer:

23. Microwave signals follow the curvature of the earth and the phenomenon is known as
A) tropospheric scatter
B) duct Propogation
C) faraday effect
D) none
Answer:

24. In order to receive a vertically polarized wave, the conductor of the dipole should be mounted
A) horizontally
B) vertically
C) at an angle of 45°
D) none
Answer:

25. VLF waves are used for some type of services because
A) they penetrate the ionosphere easily
B) the transmitting antennas are of convenient size
C) low Power is required
D) they are reliable
Answer:

26. The polarization of Electromagnetic wave is
A) the direction of electric and magnetic field
B) the direction of electric field
C) the direction of magnetic field
D) none of the above
Answer:

27. Polarization in Electromagnetic wave is caused by
A) reflection
B) refraction
C) transverse nature of EM waves
D) none of the above
Answer:

28. The attenuation in wave guides near the cut off frequency is
A) very low
B) very high
C) zero
D) none of the above
Answer:

29. Poynting vector has the dimensions
A) watts/metre
B) watts/metre^2
C) watts^2/metre
D) none of the above
Answer:

30. The ground wave eventually disappears, as one moves away from the transmitter because of

A) interference from the sky-wave
B) loss of line of sight condition
C) maximum single hop limitation
D) tilting

Answer:

SECTION A

Part II (4 x5 = 20 points) Answer any four

1. Light Emitting Diode (LED) is used extensively in the display devices because of its numerous advantages. List all the advantages and disadvantages of LED?

2. Two d.c. power supplies A and B are available for electronic equipment. Power supply A has no-load and full-load voltages of 30V and 25V respectively whereas these values are 30V and 29V for power supply B. Now compare the two power supplies and determine which is a better power supply and why?

3. Discuss the characteristics of Zener Diode and explain with a diagram, how it could be used as a voltage regulator? Further list the limitation associated with zener diode.

4. A SCR (Silicon Controlled Rectifier) full wave rectifier supplies to a load of 100Ω. If the peak a.c. voltage between centre tap and one end of secondary is 200V, find (i) d.c. output voltage and (ii) load current for a firing angle of 60°.

5. What is Triac? How it solves the major drawback of SCR? Discuss its operation with a neat diagram

SECTION B (50 Points)

Answer one (1) question only

1. Bhutan has now 4 FM radio broadcasting stations. Prepare a detail description of the how FM station operates, mentioning the details of the FM operating frequencies and the technicalities involved in modulation technique. Your report should include its advantage over other broadcasting techniques and also the disadvantages associated with it.

2. Satellite technologies have proven to be very useful for communication services in the mountainous country like Bhutan, where the developments of infrastructures like laying cable, erecting towers etc are time consuming and expensive. Develop a report to the Royal Government on the Satellite communication technologies, containing the in depth study on the orbits, frequency bands etc. Further explore the possibility of Bhutan having its own satellite for communications and research purpose.