Seat Number

King Mongkut's University of Technology Thonburi
Final Examination
Semester 1 -- Academic Year 2012

Subject: EIE 326 Electronics Communication Engineering
For: Electrical Communication and Electronic Engineering, 3rd. Yr. English program
Exam Date: December 6th , 2012 **Time:** 13.00-16.00

Instructions:-

1. This exam consists of 5 problems with a total of 11 pages, including the cover.
2. Only One A4 sheet is allowed and must submit with the papers
3. Answer each problem on the exam. papers itself.
4. KMUTT 'rule compiled calculator is allowed.
5. Do not bring any exam papers and answer sheets outside the exam room.

Remarks:-

- **Raise your hand when you finish the exam to ask for a permission to leave the exam room.**
- **Students who fail to follow the exam instruction might eventually result in a failure of the class or may receive the highest punishment with university rules.**

Exam No.	1	2	3	4	5	6	7	8	TOTAL
Full Score									
Graded Score									

Name _____ **Student ID** _____

Assistant Prof. Chanin Wongngamkam Tel: 9073

This examination has been approved by the committees of the ENE department.

(Assoc. Prof. Wudhichai Assawinchaichote, Ph.D.)
Head of Electronic and Telecommunication Engineering Department

Name.....ID. no.....Department.....

Choose only one answer and Mark X over the selected choice on page 11 (1 point each)

1. Which one is the most suitable for space communication ?

a .MF b. HF

c. VHF d. UHF

2. Refraction from the ionosphere does not occurs because the operating frequency is ?

a .Higher than the critical frequency b.Equal to the critical frequency

c. Lower than the critical frequency d. Equal to the resonance frequency

3. What will be the result of the 250 microsec. de emphasis network in the standard FM receiver?

a . High tone volume will decrease b. Low tone will be louder

c. noise will decrease d .all is correct

4.Which FM detector convert the frequency deviation to amplitude variation ?

a . Foster – Seeley discriminator b. Slope detector

c .Phase Locked Loop d. Quadrature detector

5. Reciprocal mixing results from ?

a .IF amplifier b. mixer

c. Local oscillator d. no correct answer

6. Which one is not employed in an AM receiver ?

a .diode detector b. PLL

c. limiter d .no correct answer

7. These may result from the RF amplifier ?

a .Harmonics b. Spurious frequencies

c. Noises sidebands d . all is correct

8. These may be found with the carrier frequency.

a .harmonics content b. Spurious frequencies

c. noises sidebands d . Waveform distortion

9. Apply 75 KHz and 79 KHz into the same amplifier, 3rd order can be observed at ?

a 150 KHz b. 71 KHz

c. 154 KHz d. no correct answer

10. What is the main purpose of the second IF in the double conversion receiver ?

a .To reject the image frequency b .To eliminate noises.

c. To controlled the bandwidth d .To increase gain

Name.....ID. no.....Department.....

11. Dolby pre emphasis is differ from normal dolby in this way ?

a. constant boost level

b. Time constant is shorter

c. dynamics boost level

d . Time constant is longer

12. Output of the PLL FM detector can be found at

a .VCO output

b. Phase detector output

c. Low pass filter output

d .no correct answer

13. A super heterodyne receiver with high Intermediate frequency will.. ?

a .Move the image frequency away

b . Bring the image frequency closer

c . lower the bandwidth

d . no correct answer

14. What is the purpose of the LC network in the quadrature detector?

a . IF filtering

b .IF blocking

c .convert FM to PM

d .90 phase shifter

15. Which one can solve the problem of Blocking?

a. Band pass filter

b .Low pass filter

c .High pass filter

d .Limiter

16. Capture effect can be minimized by utilizing ?

a .Double conversion method

b. Addition of a low pass filter

c .Additional bandpass filter

d .Addition of a Limiter

17. Which one is the best description for "square law" ?

a . Output is square wave

b. Output is square (2 times multiplying by itself)

c. Output is square root of input .

d. no correct answer

18. In the FM stereo MPX. System,Compare the level of baseband (L- R) dsb sc and(L+R)

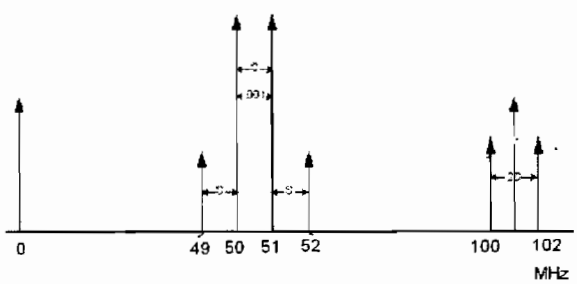
a .They are equal

b. (L-R) dsbsc > (L+R))

c. (L-R) dsbsc < (L+R))

d. (L-R) dsbsc depends on 38 KHz,while (L+R) is constant

Use the following diagram for question 19 – 23



Name.....ID. no.....Department.....

19. Which one is the second order product?

a. 25MHz
b. 101 MHz
c. 52 MHz
d 100 MHz

20. Which one is the harmonics ?

a. 25MHz
b. 101 MHz
c. 52 MHz
d 100 MHz

21. Which one is the third order product?

a. 25MHz
b. 101 MHz
c. 52 MHz
d 100 MHz

22. Which one is the spurious ?

a. 25MHz
b. 101 MHz
c. 52 MHz
d 100 MHz

23. Which one is close to the fifth order product ?

a. 25MHz
b. 101 MHz
c. 52 MHz
d 100 MHz

24. Which one is the main purpose of the 1^{st} IF ?

a .image frequency rejection
b . noise control
c. selectivity
d .Bandwidth control

25. Which one is the main purpose of the de emphasis network?

a .increase the high tone level
b. Decrease the high tone level
c. control the deviation
d .Decrease the low tone level

26. High IP3 means ?

a .more linearity
b. More gain
c. less linearity
d all is correct

27. IP3 of the amplifier can be minimized by ?

a .decrease the level of input signal
b. Always use only one input
c. Gain setting is always maximum
d Gain setting is always minimum

28 . The maximum value of return loss ?

a.1
b. ∞
c. 100
d no correct answer

29. Which one is at the middle point of a smith chart ?

a .$\Gamma = -1+j0$
b. $\Gamma = 1-j0$
c. $\Gamma = 1+j0$
d. $\Gamma = -1+j1$

Name.....ID. no.....Department.....

30. Calculate Z_0 of a coaxial cable with foam dielectric ($\varepsilon = 1.2$), OD. and ID. can be measured as 5 mm and 0.25 mm. respectively ?

a. 120.5 Ω
b. 123.2 Ω
c. 124.6 Ω
d. 130.8 Ω

31. Some type of radio receiver utilizes an up converter at the front end in order to ?

a . Better image rejection
b. block IMD3
c. block harmonics
d. block IMD2

32. What is the purpose of a lowpass filter after a rf amplifier ?

a . Better image rejection
b. block IMD3
c. block harmonics
d. block IMD2

33. What is the purpose of a lowpass filter prior to a rf amplifier?

a . Better image rejection
b. block IMD3
c. block harmonics
d. block IMD2

34. Which one require narrowest bandwidth ?

a . Satellite Tv receiver
b. SSB receiver
c. VHF TV receiver
d. FM narrow band receiver

35. Which one require largest bandwidth ?

a . Satellite Tv receiver
b. SSB receiver
c. VHF TV receiver
d. FM narrow band receiver

36. What kind of terrain reflects more signal than others ?

a .Flat terrain
b. Hilly terrain
c. rough terrain
d. desert terrain

37. Skip Zone can be decreased by?

a . increase the antenna's elevation angle
b. decrease the antenna's elevation angle
c. increase the transmit power
d. decrease the transmit power

38. F1 and F2 layer is separated because of

a. solar flare
b. sun spot
c. sun light
d. no correct answer

39. What is the result of total reflection at D layer

a . Hop distance is lower
b. Hop distance is increased
c. no effect to hop distance
d. Radio wave will reflected back to transmitter

40. This repeater has drop/insert capability

a. Passive repeater
b. RF repeater
c. Heterodyne repeater
d. Regenerative repeater

41. This radio repeater consume less energy than others.

a. Passive repeater
b. RF repeater
c. Heterodyne repeater
d. Regenerative repeater

42. This repeater can only change beam direction

a. Passive repeater
b. RF repeater
c. Heterodyne repeater
d. Regenerative repeater

43. Current and voltage at ¼ wavelength from the shorted end of the TX. line ?

a. current max,voltage min
b. current max,voltage max
c. current min,voltage min
d. current min,voltage max

44. Current and voltage at ¼ wavelength from the opened circuit end of the TX. line ?

a. current max,voltage min
b. current max,voltage max
c. current min,voltage min
d. current min,voltage max

45. Which one is the best low loss insulator for a coaxial cable ?

a. oxygen
b. air
c. ceramic
d. no correct answer

46. A RF repeater convert the incoming polarized and outgoing polarized for what purpose ?

a. To follow the recommendation of the Authority
b. To avoid the feedback issue
c. To follow the need of the receiver
d. no correct answer

47. Which one is best describe for atmospheric ducting ?

a. Radio wave is trapped between the different temperature layer
b. Radio wave is trapped in the ionosphere layer
c. Radio wave is trapped between F1 and F2
d. no correct answer

48. A Tropo scatter Radio always employ two dish antennas because ?

a. One dish for Tx another for Rx.
b. To increase gain of the system
c. It utilized the diversity system
d. no correct answer

49. What kind of communication is incapable of multihop ?

a. MF Broadcasting
b. HF communication
c. VHF communication
d. no correct answer

Name.....ID. no.....Department.....

50. At higher frequency,what is needed for a low loss coaxial cable ?

a. insulator with low ε_r is needed
b. insulator with high ε_r is needed
c. Solid outer conductor is needed
d. no correct answer

51. Front to back of a dipole antenna is equal to ?

a. 10
b. 5
c. 2
d. 1

52. compare -100 dBm and 1 x10^{-6} V_{rms} for 50 Ohms ?

a. can not compare different unit
b. -100 dBm is more than 1 x10^{-6} V_{rms}
c. -100 dBm is less
d. They are equal

53. Selective fading can be resolved by using ?

a. polarized diversity
b. space diversity
c. frequency diversity
d. all is correct

54. Multipath fading effects can be minimized by using ?

a. polarized diversity
b. space diversity
c. frequency diversity
d. all is correct

55. This can minimized the effects of Indoor wave propagation ?

a. polarized diversity
b. space diversity
c. frequency diversity
d. all is correct

56. Compare the radio line of sight distance and optical line of sight distance on many part of the world ?

a. Radio horizon is beyond the optical horizon
b. Radio horizon is equal to the optical horizon
c. Radio horizon is shorter than the optical horizon
d. no correct answer

57. Convert Return loss of 20 dB to VSWR ?

a. 1.202
b. 1.212 dB
c. 1.222
d. no correct answer

58. What is not true for the QPSK ?

a. bandwidth is half of BPSK
b. adopted IQ modulator
c. class C amplifier can be used
d. no correct answer

59. Waves travel from the back of a building may pass the corner and reach the front of the building because of this characteristic of the wave ?

a. Refraction
b. Diffraction
c. Reflection
d. all is correct

Name.....ID. no.....Department.....

60. What kind of antenna is popular among AM transmitter station ?

a. Monopole antenna
b. Dipole antenna
c. Loop antenna
d. no correct answer

2. Write down the solution and answer in the space below (24 points)

2.1. Convert return loss of 20 dB to VSWR ? (3 points)

2.2 Calculate the velocity factor of a transmission line with PVC insulation ($\varepsilon_r = 3$) (3 points)

2.3 Calculate Z_o of a parallel transmission line which have Ø 4mm connectors space 300 mm apart by PVC (3 points)

2.4 Calculate the diameter (Ø) of outer conductor of a 50 Ohms coaxial cable .Given inner Ø = 1.5 mm(3 points)

2.5 Calculate the Gain (dBi) of an antenna which has $A_e = 1m^2$ operate at 10GHz (3 points)

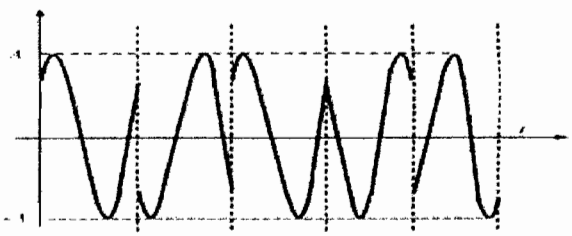
Name.....ID. no.....Department.....

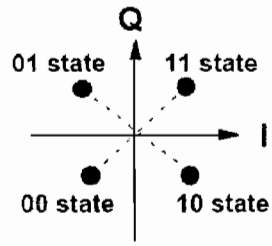
2.6 Calculate reflection coefficient (Γ) when the measured VSWR is 1.75 (3 points)

2.7. A microwave communication system working at 2GHz . The transmitting and receiving antennas are installed on the roof of two buildings located 16 km. apart. Calculate the maximum radius of the 1st Fresnel zone? (3 points)

2.8. The satellite in the GEO orbiting above the Earth at 36500 Km. Downlink transmitting frequency is 12 GHz. Calculate the free space path loss in dB? (3 points)

3. From the following waveform, write down the incoming symbols from left to right .For example the most left symbols is 11 (I&Q) (4 points)





Answer.....

4. Explain the basic and advantages of OFDM (6 points)

Name.....ID. no.....Department.....

5. Briefly explained the following terms (6 points)

1 **Cross-Polarization Ratio ,CPR**

2 **Polarized fading caused**

3 **Absorption fading**

4 **Skip fading**

5 **Multipath fading**

6 **Selective Fading**