

**M. Sc. PHYSICS
FIRST SEMESTER
ELECTRONICS
MPH - 104**

Duration: 3 Hrs.

Marks: 70

Part : A (Objective) = 20

Part : B (Descriptive) = 50

[PART-B : Descriptive]

Duration: 2 Hrs. 40 Mins.

Marks: 50

[Answer question no. One (1) & any four (4) from the rest]

1. i. What is the difference between BJT and FET? 2+3+5 =10
ii. Discuss about the working of a transistor as common-emitter amplifier.
iii. How does FET works as a common- source amplifier? 5+5=10

2. i. Discuss the principle and working of a Impatt diode. Discuss about the characteristics curve of the diode.

or

ii. Discuss the principle and working of a Tunnel diode and also the V-I characteristics curve.
iii. What is an operational amplifier? Discuss about inverting and non-inverting OPAMP.

3. Explain complete analysis process for Amplitude modulation. 8+2=10

A 400W carrier is modulated to a depth of 75%. Calculate total power in the modulated wave.

4. Define frequency modulation. Derive the expression for frequency modulation index m_f . 5+5=10

Derive the following for AM wave

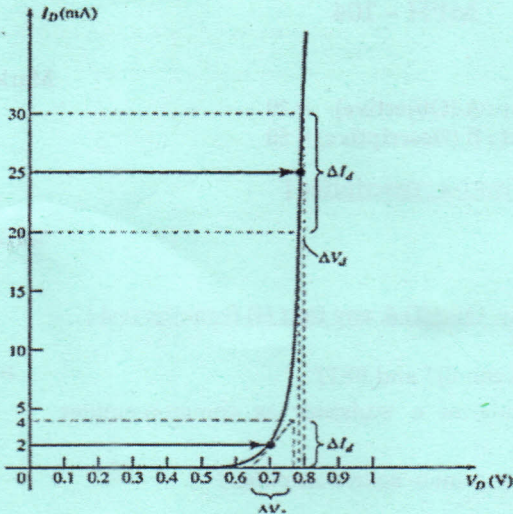
$$P_{total} = P_{carrier} \left(1 + \frac{m^2}{2}\right)$$

5. Define antenna. Classify different types antennas. Discuss various parameters involved in measurement of antenna performances. Explain with circuit diagram diode detection process of AM signals.

6+4=10

6. I_D (mA)

4+6=10



- a. From the characteristics shown in Fig. 1,
- Determine the ac resistance at $I_D = 2 \text{ mA}$.
 - Determine the ac resistance at $I_D = 25 \text{ mA}$.
 - Compare the results of part (i) and (ii) to the d.c. resistances at each current level.
- b. What is a diode equivalent circuit? How can diode be replaced with equivalent model. Discuss the models with suitable figures.

7. Design a MOD-13 counter using J-K flip flop with truth table. Draw the block diagram of SISO and SIPO register.

6+4=10

8. Draw the block diagram of a 8085 microprocessor. Write a programme to add few numbers kept in a memory location 2000H to 2009H. store the result in 3000H.

4+6=10

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[PART-A : Objective]

Choose the correct answer from the following:

1×20=20

1. Which of the following gate is known as universal gate:
 - a. AND
 - b. OR
 - c. NOT
 - d. NAND
2. Which of the following Flip Flop used to construct register:
 - a. S-R
 - b. J-K
 - c. T
 - d. D
3. How many Flip Flop is required to design a MOD - 6 counter ?
 - a. 2
 - b. 3
 - c. 4
 - d. 6
4. Which of the following is the fastest register :
 - a. SISO
 - b. SIPO
 - c. PISO
 - d. PIPO
5. Which of the following is a wrong statement w.r.t. a digital system:
 - a. easy to interface
 - b. Noise free
 - c. Low cost
 - d. Large size
6. Which of the following is special purpose register of 8085 microprocessor?
 - a. B
 - b. C
 - c. AC
 - d. E
7. Example of 1 Byte instruction is
 - a. HLT
 - b. MVIA, 30H
 - c. LDA, 3000H
 - d. JMP 4000H
8. In AM, the modulation index lies between
 - a. -1 and 1
 - b. 0 and 1
 - c. 1 and ∞
 - d. $-\infty$ and ∞
9. The bandwidth requirement of AM wave is
 - a. $2f_m$ where f_m is the highest modulating frequency
 - b. $2f_m$ where f_m is the highest modulating frequency
 - c. $2nf_m$ where n is the number of significant sidebands
 - d. $f_c + f_m$ where f_c is the carrier frequency
10. In AM wave, $P_{USB} = P_{LSB}$ is
 - a. $\frac{1}{2} \left(\frac{m^2}{2+m^2} \right) P_T$
 - b. $\frac{1}{2} \left(\frac{m^2}{2-m^2} \right) P_T$
 - c. $\frac{1}{2} \left(\frac{2m^2}{1+m^2} \right) P_T$
 - d. $\frac{1}{2} \left(\frac{2m^2}{1-m^2} \right) P_T$
11. In frequency modulation
 - a. the frequency of carrier remains constant
 - b. the amplitude of carrier remains constant
 - c. the amplitude of carrier is varied
 - d. the frequency of the signal is made equal to the carrier frequency
12. In an AM wave with 100 percent modulation, each sidebands carries _____ of the total transmitted power
 - a. one-half
 - b. one-sixth
 - c. one-third
 - d. two-third

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[PART (A) : OBJECTIVE]

Duration : 20 Minutes

Serial no. of the main Answer sheet

- 13. Demodulation
 - a. is performed at the transmitting station
 - b. removes sidebands
 - c. rectifies modulation signal
 - d. is opposite of modulation
- 14. The main purpose modulation is to
 - a. combine two waves of different frequencies
 - b. achieve wave shaping of carrier wave
 - c. transmit low frequency information over long distances efficiently
 - d. produce sidebands
- 15. The intersection of load-line on the characteristic curve can easily be determined if one simply employs the fact that anywhere on the horizontal axis.
 - a. $I_D = 0$
 - b. $V_D > 0$
 - c. $I_D > 0$
 - d. $V_D = 0$
- 16. Band gap energy of solar cell is
 - a. 1.0 to 1.5 eV
 - b. less than 1.0 eV
 - c. 1.0 to 1.8 eV
 - d. more than 1.8 eV
- 17. The type of total current produced during the reverse-biasing condition is
 - a. conventional current
 - b. drift current
 - c. diffusion current
 - d. all of the above
- 18. In Impatt diode, the process of impact ionization continues until
 - a. Saturation takes place
 - b. Avalanche takes place
 - c. Diffusion takes place
 - d. None of the above
- 19. Which among the following is not true for a LED
 - a. Less power consumption
 - b. Long life
 - c. High Operating Voltage
 - d. Emitted light is nearly monochromatic
- 20. In a p-type semiconductor, the Fermi energy level lies
 - a. close to Conduction band
 - b. inside the Conduction band
 - c. inside the Valence band
 - d. close to Valence band

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Course :

Semester : Roll No :

Enrollment No : Course code :

Course Title :

Session : 2017-18 Date :

Instructions / Guidelines

- The paper contains twenty (20) / ten (10) questions.
- Students shall tick (✓) the correct answer.
- No marks shall be given for overwrite / erasing.
- Students have to submit the Objective Part (Part-A) to the invigilator just after completion of the allotted time from the starting of examination.

Full Marks	Marks Obtained
20	

Scrutinizer's Signature

Examiner's Signature

Invigilator's Signature