FAKIR CHAND COLLEGE
ELECTRONIC SCIENCE – GENERAL - 2020
Part-II

Full Marks-50 **Time- 2 hours**

Group-A

Answer question no.1 and any other two questions.

1. Answer any 5 questions: **1x5**
   (a) What is the decimal equivalent of $(1010.011)_2$?
   (b) What are the basic differences between a decoder and a demultiplexer?
   (c) Verify the Boolean identity: A(A+B)=A.
   (d) What is Parity bit and in what purpose it is used?
   (e) Convert $(BC56)_{16}$ to octal number system?
   (f) What are the basic components of unregulated power supply?
   (g) What is meant deflection sensitivity?
   (h) What is a multimeter?

2. (a) Design a full adder circuit using 4:1 MUX**.** **6**
   (b) Subtract (1000100)2 from (1010100)2 using 2's compliment method**.** **4**
3. (a) Simplify the Boolean expression $F(A,B,C,D)=\sum m(3,4,5,7,9,13,14,15)$ USING Karnaugh map**.** **4**
   (b) Draw a circuit diagram of 4-bit ripple counter and give its timing diagram**.** **6**
4. (a) Draw a circuit of D flip-flop with NAND gates. Write its truth table**.** **2+1**
   (b) Draw and explain the circuit of a 4 bit shift register with serial loading, parallel loading, serial reading and parallel reading**.** **7**
5. (a) Sketch the circuit diagram of L type, LC type and pi type filter. **2**
   (b) What is meant by Load and Line regulation? **2**
   (c) Draw the circuit diagram of regulated power supply using zener diode and explain its operation? **6**
6. Draw the block diagram of CRO. Explain with block diagram the principle of operation of sweep frequency generator. **5+5**
7. Draw the circuit diagram of triangular wave generator. Give the block diagram of a function generator. **5+5**

Group-B

Answer question no.8 and any two other questions.

8. Answer any 5 questions: **1x5**
(a) What is dielectric polarization?
(b) Define SNR.
(c) What is meant by lossless transmission line?
(d) What is demodulation?
(e) What is PWM?
(f) Write Poisson's equation.
(g) State Coulomb's law.
(h) What is self-inductance?

9. State Biot-Savart's law. Give integral and differential forms of Gauss's law in electrostatics. Find an expression for the energy stored in a charged capacitor. **2+4+4**
10. (a) What are meant by electric displacement and electric polarization? Write the relation between them**. 5**
(b) What is an electric dipole? Find the electric field of an electric dipole at a distance r from origin**. 5**
11. What is transmission line? Derive transmission line equations in terms of voltage and current and its solutions. What is meant by characteristic impedance of a transmission line? **2+6+2**
12. (a) Define reflection co-efficient of a transmission line. What would its value be for a open circuited, short circuited and perfectly matched line**? 2+3**
(b) What is a standing wave? Define VSWR for a lossless transmission line. How is it related to reflection co-efficient? **2+2+1**
13. What are the different ways in which a radio wave can travel from a transmitting antenna to receiving antenna? Why is sky wave reception better at night? What are cut-off wavelength and guide wavelength? **4+3+3**
14. Obtain the expression for AM wave. Sketch the waveform of message signal, carrier signal and AM wave. What are modulation envelope and over modulation? **5+1+4**
15. (a) the peak to peak value of an AM voltage has a maximum value of 8V and a minimum voltage of 2V. What are the percentage of modulation and the amplitude of the modulated carrier? **5**
(b) Describe the side bands present in an FM wave. Compare these side bands with those of AM wave. **2+3**