UG/5th Sem/ELEC(H)/Pr/19

2019

B.Sc. (Honours)

5th Semester Examination

# ELECTRONICS

Paper - DSE2-P

(Practical)

Full Marks : 20 Time : 3 Hours

*The figures in the margin indicate full marks.*
*Candidates are required to give their answers in their own words as far as practicable.*

## Nano Electronics Lab

Answer any *one* question selecting by lucky draw.

1. Synthesize at least two different sizes of Nickel oxide / Copper oxide / Zinc oxide nano particles using Sol. Gel method.

2. Use suspension method to synthesize a polymer by using the supplied materials.

3. Use emulsion method to synthesize a polymer by using the supplied materials.

*[ Turn Over ]*

4. Draw I-V characteristic of given nano material. Determine the magneto resistance of given thin film.

5. Determine the particle size of the nano materials from the X-ray diffraction peak.

6. Determine the particle size of the given materials using He-Ne LASER.

7. Take two selective area electron diffraction (SEAD) images of the two different samples. Evaluate <hkl> planes of the three different spots of each images.

8. How do you find band gap from UV-VIS spectra? Mention the steps to measure UV-VIS spectra of the nanoparticles.

9. Measure the temperature dependent behaviour of the nano materials. Plot the data and find out the activation energy of the samples.

**Distribution of Marks**

| | | |
|---|---|---|
| Experiment | : | 15 marks |
| Laboratory Note Book | : | 02 marks |
| Viva-voce | : | 03 makrs |
| Total | : | 20 marks |

## Transmission Lines, Antenna and Wave Propagation

Answer any *one* question selecting by lucky draw.

1. Write a programe to find the skin depth of non-magnetic medium for given - values of conductivity $(\sigma)$, Dielectric constant $(\in)$. Plot the curve of skin depth vs frequency.

2. Write a programe to plot the curve phase velocity vs frequency for good dielectric (non-magnetic).

   Given : (Conductivity of the medium $(\sigma)$, Dielectric constant $(\in)$.

3. Write a program to find the phase velocity ($v_p$) of a wave propagating in good conductor. The medium is non magnetic. Plot the curve $v_p$ vs frequency ($\omega$).

4. Write a program to plot the standing wave pattern in a short circuited transmission line.

5. Write a program to plot the standing wave pattern of a open circuited transmission line (Cossline)

6. Write a program to plot the impedance profile on a short circuited transmission line.

*[ Turn Over ]*

7. Write a program to plot the impedance profile on a open circuited transmission line.

8. Write a program to plot directivity vs angle for a $\lambda/4$ dipole antenna.

9. A loss less transmission line of characteristic impedance $Z_0 = 100\,\Omega$ is terminated by an load impedance $Z_2 = 40 + j70\,\Omega$. The line is $0.3\lambda$ long. Use the Smith chart to find

   (a) Input impedance

   (b) Return loss

   (c) VSWR

   (d) The distance of maximum voltage from load.

10. Write a program to find the depth of penetration at time $t$ = 1, 2, 5, 10, 15, 20 unit time (use proper unit of time to show the curve) and plot it with respect to time.

11. Write a simple program to find the dissipated power in a loss-less transmission lines. Show graphical display also.

12. Write a program to find the input impedance of a transmission line terminated by pure capacitive load impedance and plot it with respect to frequency.

13. Write a simple program to find the frequency range of operation of a metallic waveguide for pure $TE_{10}$ mode of operation. Show your result(s) in form of graphical display.

14. Write a program to find the instantaneous field of a plane wave and find its phase velocity.

15. Write a program to find the directivity and bandwidth of an antenna.

**Distribution of Marks**

| Experiment | | |
|---|---|---|
| Program | : | 5 marks |
| Execution | : | 7 marks |
| Result | : | 3 marks |
| Laboratory Note Book | : | 02 marks |
| Viva-voce | : | 03 makrs |
| Total | : | 20 marks |

*[ Turn Over ]*

## Control Systems

Answer any *one* question selecting by lucky draw.

1. Study the performance characteristics of a dc servo motor angular position control using continuous signal.

2. Study the performance characteristics of a dc servo motor angular position control using step signal.

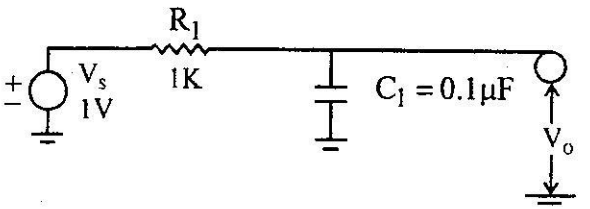
3. Study the characteristics of a synchro as an error detector.

4. Study the speed control of a dc motor.

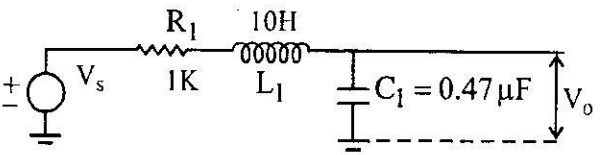
5. Determine the step and impulse response of a type-o unity feedback closed loop system using PSPICE. Determine the variation of control system parameters due to the increase of system Type (uto to type-2).

6. With a first order simulated process, datermine closed loop response using PI and PID controller using PSPICE.

7. Write the PSPICE program to obtain the transient response of the circuit shown in the figure below for the following input (a) unit step (b) unit impulse (c) unit ramp




8. Write the PSPICE program to obtain the transient response curve for the following circuit.




9. The open loop transfer function of a unity feedback control system is given by

$$G(S) = \frac{8}{S(1+0.05S)(1+0.2S)}$$

If a series lag compensator of transfer function

$$G(S) = \frac{1+2.22S}{1+20.2S}$$

*[ Turn Over ]*

is connected with the system, determine steady state error, settling time, percentage peak overshoot, gain margin and phase margin of the system using MATLAB.

10. The open loop transfer function of a unity feedback control system is given by

$$G(S)=\frac{10}{S(1+0.2S)}$$

Now connect a series lead compensator of transfer function $G(S)=\frac{1+0.1S}{1+0.2S}$

Determine steady state error, settling time, percentage overshoot and phase margin of the system using MATLAB.

11. Consider the single loop unity feedback system where negative feedback is provided. The open loop transfer function is

$G(S)=\frac{\omega_n{}^2}{S^2+2\xi\omega_n S}$; where $\xi$ is the dumping ratio.

(a) Determine step response for

$\xi = 0.1, 0.3, 0.8, 1.0$, when $\omega_n = 1$

(b) From the plot, comment on the shape of it for increasing damping ratio. Use MATLAB.

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