B.Tech 1st Year (EC,EE& ME)
Minor Test- Session 2018-2019
(ODD SEMESTER)
Subject: Fundamentals of Electronics Engineering

TIME:-2 Hours **M.M. 20**

NOTE:- Attempt All questions.

1. Attempt any three parts of the following. Q. 1(a) is compulsory.

(a) Explain voltage regulation in rectifiers. Prove that voltage regulation in HWR and FWR is same and given by the expression (4)

$$\% \text{ Regulation} = \frac{r_f}{R_L} x100$$

Where r_f = diode forward resistance
RL = Load resistance

(b) Find the DC and ac resistance of a Ge Junction diode at 25^0C with $I_o = 25\mu A$ at an applied voltage of 0.2V across diode. (2)

(c) Explain the current flow mechanism in NPN transistor with leveled structural diagram why collector region area is larger than emitter region area? (2)

(d) Why operating point is not selected near saturation region in BJT. (2)
A transistor has $\beta = 150$. Find the collector and base current if $I_E = 10mA$.

2. Attempt any two parts of the following. Q. 2(a) is compulsory.

(a) Draw the circuit diagram of Potential Divider Biasing arrangement in BJT with V_{CC} = 22.5V, R_C = 5.6K, R_2=10K and R_1 = 90K, β = 55 and V_{BE} = 0.6V. The transistor operates in active region. Determine operating point and stability factor. (4)

(b) Draw the complete experimental setup diagram to obtain the characteristics of PNP transistor in CB configuration. Draw input and output characteristic curves with leveled parameters and indicate different regions of operation. (2)

(c) Compare the performance measures of different rectifier configurations in tabulated form. Which rectifier configuration is suitable for low voltage rectification? (2)

3. Attempt any two parts of the following. Q. 3(a) is compulsory.

(a) Draw the circuit diagram of Half wave rectifier with following data. (4)
Secondary winding resistance =120 Ohms, Diode forward resistance =20 Ohms, Load resistance = 5K Ohm. The voltage appearing at the secondary winding is 200 Sin 314t Calculate
(i) I_{dc}
(ii) E_{dc}
(iii) PIV
(iv) efficiency

(b) Discuss the capacitive effect of step graded p-n Junction in. (2)
(i) Forward bias
(ii) Reverse bias

(c) What is the significance of operating point in BJT? Why it shifts? Write the Criteria for the selection of operating point. (2)

BAS - 01

Roll No. 2 0 1 8 0 2 1 0 8 4

Name of the Course: B. Tech-I year
Odd Semester
Minor Examination: 2018-19
Subject Name: Engineering Mathematics – I

Time: 2 hrs. **Max. Marks: 30**

Note: Answer all questions.

Q. 1 Attempt any three parts of the following. Q. 1(a) is compulsory.

(a) Evaluate $D^n[\log(x^2 - 2x\cos\alpha + 1)]$ 4

(b) If $y = A\left(x + \sqrt{x^2-1}\right)^n + B\left(x - \sqrt{x^2-1}\right)^n$, prove that 3

(i) $(x^2-1)y_2 + x\,y_1 - n^2 y = 0$

(ii) $(x^2-1)y_{n+2} + (2n+1)x\,y_{n+1} = 0.$

(c) Find the characteristic equation of the matrix 3

$$A = \begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}$$

And also find the value of $A^8 - 5A^7 + 7A^6 - 3A^5 + A^4 - 5A^3 + 8A^2 - 2A + I$

(d) If z be a function of u and v, and u and v be the functions of two other variables x and y such that $u = l\,x + m\,y \quad v = l\,y - m\,x$ show that 3

$$\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial y^2} = (l^2 + m^2)\left(\frac{\partial^2 z}{\partial u^2} + \frac{\partial^2 z}{\partial v^2}\right)$$

Q.2 Attempt any three parts of the following. Q. 2 (a) is compulsory.

(a) If u, v, w are the roots of the equation in μ and $\frac{x}{a+\mu} + \frac{y}{b+\mu} + \frac{z}{c+\mu} = 1$, then find the Jacobian $\frac{\partial(x,y,z)}{\partial(u,v,w)}$. 4

(b) Expand $Sin^{-1}\left(\frac{2x}{1+x^2}\right)$ in ascending powers of x, upto x^9. 3

(c) Expand x^y in powers of $(x - 1)$ and $(y + 1)$ upto the third degree terms. 3

(d) State and prove Euler's theorem and verify for 3

$$u(x,y,z)=\frac{x}{y}+\frac{y}{z}+\frac{z}{x}$$

Q.3 Attempt any three parts of the following. Q. 3(a) is compulsory.

(a) Find the inverse of the matrix by row elementary operations 4

$$\begin{bmatrix} 2 & 1 & -1 & 2 \\ 1 & 3 & 2 & -3 \\ -1 & 2 & 1 & -1 \\ 2 & -3 & -1 & 4 \end{bmatrix}$$

(b) Find the rank of the following matrix by reducing it to echlon form 3

$$\begin{bmatrix} 1 & 2 & -1 & 4 \\ 2 & 4 & 3 & 4 \\ 1 & 2 & 3 & 4 \\ -1 & -2 & 6 & -7 \end{bmatrix}$$

(c) Find the Eigen values and corresponding Eigen vectors of A^2-2A+I, where 3

$$A=\begin{bmatrix} 2 & 3 & 4 \\ 0 & 4 & 2 \\ 0 & 0 & 3 \end{bmatrix}$$

(d) Show that if $\beta \neq -5$, system of equations 3

$$\begin{aligned} 3x-y+4z &= 3 \\ x+2y-3z &= -2 \\ 6x+5y+\beta z &= -3 \end{aligned}$$

has a unique solution. If $\beta=-5$, show that the equations are consistent. Determine the solutions in each case.

BAS - 02

Roll No. 2 0 1 8 0 2 1 0 8 4

Name of the Course: B. Tech-I year
Semester-I
Minor Test (Examination): 2018-19
Subject Name: Engineering Physics -I

Time: 2 hrs. **Max. Marks: 20**

Note: Answer all questions.

Q.1 Attempt any three parts of the following. Q. 1(a) is compulsory.

(a) Write short note with some examples on (i) Inertial frame of reference (ii) Non-inertial frame of reference (iii) Absolute frame of reference. 4

(b) Explain the physical significance & negative results of the Michelson Morey Experiment? 2

(c) Differentiate between ψ and $I\psi I^2$. What is the physical significance of wave function? 2

(d) Derive the time independent Schrodinger wave equation. Give significance of the equation. 2

Q.2 Attempt any two parts of the following. Q. 2(a) is compulsory.

(a) State the postulates of special theory of relativity? Derive the mass-energy relation? 4

(b) What do you understand by time dilation? What is the proper interval of time? Establish the relation between the two? 2

(c) A beam of μ meson travels with a speed of 0.6 C. Their mean life time as observed in laboratory is $2.9*10^{-6}$ s. what is their mean life at rest? 2

Q.3 Attempt any two parts of the following. Q. 3(a) is compulsory.

(a) Write down the Schrodinger equation for a particle in one dimensional potential well. Find the wave functions and energy spectrum for the first three bound state. 4
An electron is bound in one dimensional box of size $4*10^{-10}$ m. what will be the minimum energy.

(b) Show that the de Broglie wavelength for a material particle of rest mass m_0 and charge q accelerated from rest through a potential difference of V volts realistically is given by 2

$$\lambda = \frac{h}{\sqrt{2m_0qV(1+\frac{qV}{2m_0c^2})}}$$

(c) Describe the Davisson-Germer experiment to demonstrate the wave nature of particle? 2