

Total No. of Questions :5]

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Roll No

CS/IT - 304

B.E. III Semester

Examination, June 2014

Electronics Devices and Circuit

Time : Three Hours

Maximum Marks : 70

Note: i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.

ii) All parts of each question are to be attempted at one place.

iii) All questions carry equal marks, out of which part A and B (Max. 50 words) carry 2 marks, part C (Max. 100 words) carry 3 marks, part D (Max. 400 words) carry 7 marks.

iv) Except numericals, Derivation, Design and Drawing etc.

1. a) Why does the conductivity of a semiconductor change with the rise in temperature? 2
- b) For faster action which transistor is used and why. 2
- c) What is a varactor diode? 3
- d) Explain the principle of operation of any one type of MOSFET. 7

OR

Explain the four modes of operation of BJT. 7

2. a) What do you mean by feedback? 2
- b) An amplifier has a gain of 2×10^5 without feedback determine the gain if negative feedback is applied given $\beta = 0.02$ 2
- c) Explain the effect of negative feedback on bandwidth. 3
- d) Explain the wein bridge oscillator in detail. 7

OR

[2]

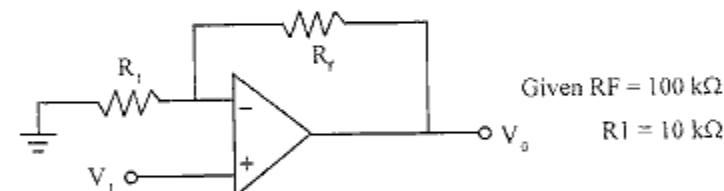
With the neat diagram explain the class B push pull amplifier. 7

3. a) Write the applications of clamping circuits. 2
- b) Why differential amplifier is necessary? 2
- c) Define differential gain and common mode gain. 3
- d) Draw and explain Darlington amplifier. 7

OR

Draw the circuit diagram of a stable multivibrator. 7

4. a) Define slew rate. 2
- b) List down characteristics of OPAMP. 2
- c) Determine the voltage gain for the circuit shown. 3



- d) Draw and explain OPAMP as an integrator. 7

OR

Give the pin connections of IC 555 explain the use of each pin. 7

5. a) What is line regulation and load regulation? 2
- b) Define voltage regulation. 2
- c) Briefly explain the working of zener regulator. 3
- d) Draw the block diagram and explain switched mode power supply. 7

OR

- e) Explain a current limiting circuit. 7

OR

Evaluate the integral $\int_0^{\infty} \frac{\cos ax}{x^2+1} dx$. 7

2. a) Determine the Newton - Raphson iterative formula to find the k^{th} root of N. 2
- b) Find a real root of the equation $x \log_{10} x = 1.2$ by regula - falsi method correct to one decimal place. 2
- c) Find a real root of the equation $3x = \cos x + 1$ by iterative method correct to two decimal places. 3
- d) Apply Crout's factorization method to solve the system of equations: 7

$$\begin{aligned} x - y &= 0 \\ -2x + 4y - 2z &= -1 \\ -y + 2z &= 1.5 \end{aligned}$$

OR

Apply Gauss-Seidel iteration method to solve the system of equations: 7

$$\begin{aligned} 20x + y - 2z &= 17 \\ 3x + 20y - z &= -18 \\ 2x - 3y + 20z &= 1.5 \end{aligned}$$

3. a) Prove that: $e^x = \left(\frac{\Delta^2}{E} \right) e^x \cdot \frac{Ee^x}{\Delta^2 e^x}$ 2
- b) Derive Newton's forward interpolation formula. 2
- c) Evaluate the integral $\int_0^{0.6} e^{-x^2} dx$ by Simpson $\frac{1}{3}$ rule. 3

- d) Apply Newton's divided difference formula to find the value of $f(9)$ from the following table: 7

x	5	7	11	13	17
$f(x)$	150	392	1452	2368	5202

OR

Find $\frac{dy}{dx}$ at $x = 1.1$ from the following table: 7

x	1.0	1.2	1.4	1.6	1.8	2.0
y	0	0.128	0.544	1.296	2.432	4.000

4. a) Find by Taylor's series method the value $y(0.1)$ correct to three decimal places from the differential equation:

$$\frac{dy}{dx} = x^2 y - y, y(0) = 1. \quad 2$$

- b) Write the working rule of Runge-Kutta method of fourth order for the numerical solution of differential equation. 2

- c) If θ is the angle between the two regression lines show that: 3

$$\tan \theta = \frac{1-r^2}{r} \cdot \frac{\sigma_x \sigma_y}{\sigma_x^2 + \sigma_y^2}.$$

- d) Using modified Euler's method, find the value of $y(0.3)$ from the equation: 7

$$\frac{dy}{dx} = x + y, y(0) = 1.$$

OR