

**BACHELOR OF TECHNOLOGY (C.B.C.S.) (2020 COURSE)**

**B.Tech.Sem - III E&C : : SUMMER - 2022**

**SUBJECT : ANALOG CIRCUITS & APPLICATIONS**

Day : Wednesday  
Date : 01-06-2022

**S-24594-2022**

Time : 02:30 PM-05:30 PM  
Max. Marks : 60

**N.B.:**

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Assume suitable data if necessary.

**Q.1** Draw the h-parameter equivalent circuit of the generalized transistor amplifier. Derive the expression and describe the significance of each parameter. **(10)**

**OR**

Which distortions are present in amplifiers? Discuss each distortion in brief. **(10)**

**Q.2 a)** What is mean by multistage amplifier? What are the requirements of multistage amplifiers? **(04)**

**b)** Draw and discuss the working of Darlington amplifier. **(06)**

**OR**

**a)** What is the need of coupling? Discuss direct coupling method in detail, also state its advantages and disadvantages. **(07)**

**b)** A multistage amplifier consists of three stages. The voltage gain of the stages are 30, 50, and 80. Calculate the overall gain in dB. **(03)**

**Q.3** A negative feedback amplifier in voltage series configuration feeds 10% of output back to the input. Voltage gain of an amplifier without feedback is 100. Input and output resistances are  $10K\Omega$  and  $1K\Omega$  respectively. Find percentage of reduction in voltage gain, input resistance and output resistance with feedback. **(10)**

**OR**

What is the effect of negative feedback on the bandwidth of an amplifier? Derive the expression for lower and upper frequency with feedback. **(10)**

**Q.4** Draw the circuit diagram for class B push-pull amplifier. Derive the expression for maximum efficiency. **(10)**

**OR**

**a)** A single transistor amplifier with transformer coupled load produces maximum amplitude in the output as,  $B_0=150mA$ ,  $B_1=120mA$ ,  $B_2=10mA$ ,  $B_3=4mA$ ,  $B_4=2mA$ ,  $B_5=1mA$ . **(06)**

i) Determine the percentage of Total Harmonic Distortion.

ii) Assume a second identical transistor is used along with a suitable transformer to provide push-pull operation.

Use above harmonic amplitudes to determine the new Total Harmonic Distortion.

**b)** What is mean by power amplifier? State its features. **(04)**

**Q.5** What is an oscillator? How does it differ from an amplifier? Draw and describe the circuit and working of Hartley oscillator. **(10)**

**OR**

**a)** Differentiate between RC Phase Shift oscillator and Wien Bridge oscillator. **(06)**

**b)** The parameters of a crystal oscillator equivalent circuits are  $L_s=0.8H$ ,  $C_s=0.08PF$ ,  $R_s=5K\Omega$ ,  $C_p=1PF$ . Determine the resonance frequency  $f_s$  and  $f_p$ . **(04)**

**Q.6** Define following performance parameters of a regulator. **(10)**

- |      |                           |     |                  |
|------|---------------------------|-----|------------------|
| i)   | Load regulation           | ii) | Line regulation  |
| iii) | Output Resistance         | iv) | Ripple Rejection |
| v)   | Voltage stability factor. |     |                  |

**OR**

A shunt regulator using a single transistor and a zener diode is required to maintain output voltage constant at 10V. The load current is limited to 100mA, input voltage is  $12.5V \pm 10\%$  and  $V_{BE}=0.4V$ . Design the circuit. **(10)**

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