Physics

B. N. Bandodkar College of Science, Thane

Physics: March-2017

USPH402

Time-2.30 Hrs **[Total Marks-75]**

N.B **All questions are compulsory.**
Figures to the right indicate maximum marks.
Use of Non-programmable calculator is permitted.

Q1 **A)** **Attempt any TWO.** 16

i) Draw the circuit diagram for CE Amplifier with base resistor bias (fixed bias) and obtain the expression for base current I_B.

ii) Draw the block diagram of amplifier as black box and define the terms current gain, voltage gain and power gain.

iii) Explain the term feedback. Draw the block diagram of an amplifier with feedback network and obtain the expression $A_{VF} = \frac{A_V}{1-\beta A_V}$

iv) With the help of suitable diagram explain the conditions for faithful amplification.

B) **Attempt any ONE.** 4

i) For a voltage divider bias R_1=6K,R_2=4K,R_C=R_E=5K,β=100and V_{CC}=30V.DetermineI_C and I_B.

ii) An amplifier has a gain of 120 without feedback. If 10% output is fed back to input so as to decrease the input .Determine its gain with feedback

Q2 **A)** **Attempt any TWO.** 16

i) With the help of neat circuit diagram, Explain UJT as an oscillator. Which property of UJT is utilized in the oscillator.

ii) What is an oscillator? How it is different from an amplifier?

iii) Show how an OP-AMP can be used as summing amplifier? With neat circuit diagram derive an expression for output of an amplifier.

iv) Explain OP-AMP as differentiator with neat diagram. Find an expression for output voltage and draw the input and output waveforms.

B) **Attempt any ONE.** 4

i) In a phase shift oscillator, R=1MΩ, C=0.001 μF. what is the frequency of an oscillation.

ii) OP-AMP is used as inverting amplifier. Determine feedback resistor R_f if gain of an amplifier is -2 and R_i=3MΩ.

Q3 A) Attempt any TWO. **16**

i) Explain the operation of monostable multivibrator using 555 Timer with a neat circuit diagram. Draw the required waveform. Obtain the expression for output pulse width.

ii) Construct RS flip-flop using NAND gate. Explain its operation with a proper truth table.

iii) What is a Binary number system? Write the stepwise procedure for converting a decimal mixed number into a binary mixed number .

iv) Obtain the 8-bit addition of (-18) and (-33), decimal numbers in 2's complement representation .Verify the answer by direct decimal addition.

B) Attempt any ONE. **4**

i) 555 Astable circuit has, R_1=75KΩ , R_2 =30 KΩ and C=47nF.What is the frequency of the output signal? What is the duty cycle?

ii) Convert $(175.23)_{10}$ to Octal number.

Q4 Attempt any THREE. **15**

i) Draw a typical practical circuit of a CE amplifier. What is phase reversal?

ii) Define the stability factors S_{ICO}, S_β and S_{VBE} and comment.

iii) Explain the Barkhousen criterion for sustainable oscillation.

iv) State the characteristics of an ideal OP-AMP?

v) Obtain a Hexadecimal Equivalent of $(256)_{10}$.

vi) Write a short note on –The excess-3 code.

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