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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

First Semester, B.E. - Semester End Examination; Dec - 2017/Jan - 2018

Basic Electronics

(Common to All Branches)

Time: 3 hrs *Max. Marks: 100*

***Note**: Answer **FIVE** full questions, selecting **ONE** full question from each unit.*

UNIT - I

1 a. Define Q-Point. Explain the importance of Q-point selection on the DC load line. 5

b. With the help of neat circuit diagram and waveform, derive an expression for the Ripple factor of HWR with capacitor filter. 8

c. In a full wave bridge rectifier, the transformer secondary voltage is 100 sin ωt. The forward resistance of each diode is 25 Ω with Load resistance 950 Ω. Calculate; 7

i) DC output voltage ii) Ripple factor

iii) Efficiency iv) PIV across diodes.

2 a. With necessary circuit diagram and waveforms, explain the working principle of center tapped transformer FWR: 8

b. Design a Zenor voltage regulator for the following specification :

Output voltage = 5 V, Load current = 20 mA, Zenor voltage = 500 mV, Input voltage = 12±3 V. 6

c. Write a note on Solar cell. 6

UNIT - II

3 a. Sketch and explain drain and transfer characteristics for an n-channel depletion type MOSFET. 8

b. Compare enhancement type n-channel MOSFET with p-channel using symbol and characteristics curve as a parameter. 6

c. Design a FET based phase shift oscillator with g_m = 5000 µsec, r_d = 40 kΩ, R = 10 kΩ for oscillator operation at 1 kHz and R_d for A > 29. 6

4 a. Sketch the transfer characteristics for an n-channel depletion type MOSFET with I_{DSS} = 10 mA and V_P = - 4 V. 7

b. State and explain Barkhausen criteria. 5

c. With the suitable diagram, explain FET based phase-shift oscillator. 8

UNIT - III

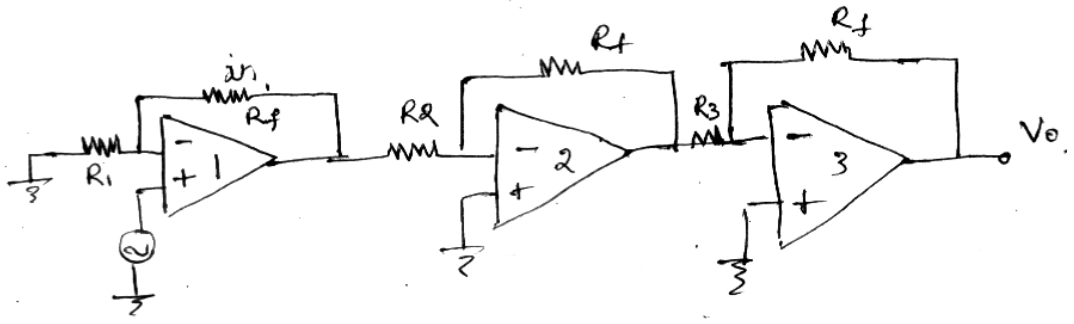
5 a. Develop a gain equation from an AC equivalent circuit of Op-Amp in inverting mode. 6

b. Explain i) Gain-Bandwidth ii) Slewrate iii) Maximum Signal frequency. 7

Contd…2

c. Determine the output voltage of an Op-Amp for input voltages of V_{i1} = 150 μV and V_{i2} = 140 μV. The amplifier has a differential gain of A_d = 4000 and the value of CMRR is : a = 100 and $b = 10^5$ — 7

6 a. In the circuit shown below R_f = 470 kΩ, R_1 = 4.3 kΩ, R_2 = 33 kΩ and R_3 = 33 kΩ. Find the output voltage for an input of 80 μv. — 6



b. With a neat circuit diagram, explain : — 8

i) Current controlled current source ii) Voltage controlled voltage source.

c. Write the Op-Amp based LPF and HPF. Also mention its frequency response. — 6

UNIT - IV

7 a. Using Boolean identities prove the following : — 4

i) $(A+B).(A+C) = A+BC$ ii) $ABC + A\bar{B}C + AB\bar{C} = AB + AC$

b. Perform the following : — 8

i) $658.825_{(10)}$ = ----------$_{(8)}$ ii) $725.25_{(8)}$ = - ----------$_{(10)}$ = ----------$_{(2)}$

iii) $0.0111_{(2)}$ = ----------$_{(10)}$.

c. Simplify and implement the following boolean expression using NOR gates only : — 8

i) $Y = \overline{(A+\bar{B}+C)(\bar{A}+B+C)(A+B)}$ ii) $Y = \bar{A}BC + A\bar{B}C + ABC$.

8 a. Design and implement full adder using two half adder. — 8

b. Subtract : — 6

i) $(11001\text{-}101101)_2$ using 2^s complement ii) 48-23 using 2^s complement.

c. List and explain the characteristics of digital ICs. — 6

UNIT - V

9 a. Define Amplitude Modulation. Derive an expression for total transmitted power of AM wave. — 10

b. With neat block diagram, explain superheterodyne receiver. — 10

10 a. With a neat diagram, explain LVDT. Also mention advantage and disadvantage of LVDT. — 10

b. Illustrate the working of monochrome cathode ray tube with neat diagram. — 10

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