2022

1st Semester Examination

ELECTRONICS

Paper : ELC 104

(Analog Electronics)

Full Marks : 40　　　　　　　　　　Time : Two Hours

The figures in the margin indicate full marks.
Candidates are required to give their answers
in their own words as far as practicable.

Answer any *four* questions each from Group-A and
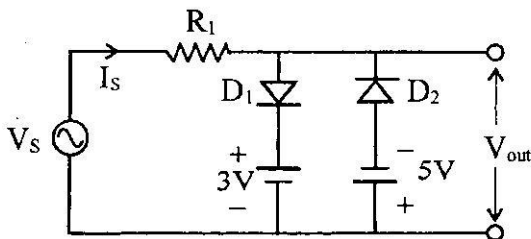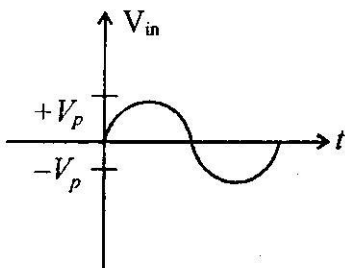Group-B; and *two* question from Group-C.

Group - A

Answer any *four* questions.　　　　　2×4=8

1. Write two advantages of MOSFET.　　　　2

2. Draw the circuit diagram to build a NAND gate using
   diode.　　　　　　　　　　　　　　　2

3. Write virtual ground concept in case of OP-AMP.　2

P.T.O.

4. Draw the output waveform for the circuit and input waveform are given below : 2


5. What is thermal runaway? 2

6. Draw the small signal model of a n-channel enhancement type MOSFET without channel length modulation effect. 2

Group - B

Answer any *four* questions. 4×4=16

7. Consider the circuit given below and find the value of R to obtain a current I_D of $80\,\mu A$. Also find the dc voltagte V_0. Assume the NMOS transistor threshold voltage $V_t = 0.6V$ and $\mu_n cox = 200\mu\,A/V^2$ $L = 0.8\,\mu m$, $W = 4\,\mu m$, neglect the channel length modulation effect (i,e assume $\lambda = 0$). 4

$V_{DD} = + 3V$

I_D

R

V_D
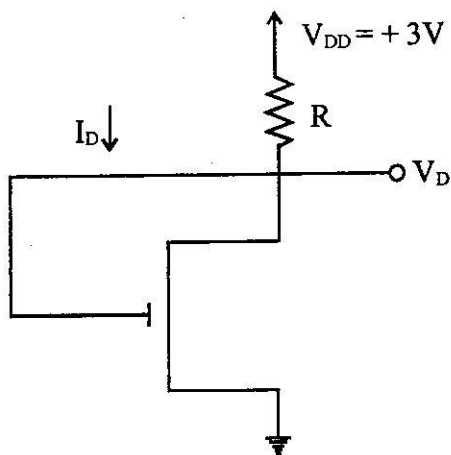
8. Draw voltage transfer curve of a MOSFET. Indicate and explain different operation regions of the MOSFET.

1+3

9. Draw and explain emitter follower circuit. 2+2

10. Explain log amplifier using proper circuit diagram. 2+2

11. Draw different topologies of a feedback amplifier. 4

12. Implement $Y = \left(\overline{AB + CD + E}\right)$ using CMOS logic. 4

Group - C

Answer any *two* questions : 8×2=16

13. Define Q point and its stabilization in a dc output characteristics. What are the different types of stabilization method? Explain voltage divider bias method using proper circuit diagram. 1+1+2+1+3

P.T.O.

14. Write ideal characteristics of Op-amp. Draw and explain instrumentation amplifier. 2+2+4

15. Draw and explain triangular wave generator circuit using Op-amp. Gives input-output waveforms. (2+4)+2

16. Draw and explain source follower amplifier using small signal model of a MOSFET. Find out the expression of input resistance, output resistance and gain. (2+3)+3

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