COLLEGE OF ENGINEERING, PUNE

(An Autonomous Institute of Government of Maharashtra.)
SHIVAJI NAGAR, PUNE - 411 005

END Semester Examination

(MX-531)   Principles of Electronics

Course: M.Tech   Branch: Mechatronics

Semester: Sem I

Year: 2014-2015   Max.Marks:60

Duration: Time:- 2 to 5 pm   Date
3 Hours   22 NOV 2014

Instructions: MIS No. [ ][ ][ ][ ][ ][ ][ ][ ]

1. Figures to the right indicate the full marks.
2. Mobile phones and programmable calculators are strictly prohibited.
3. Writing anything on question paper is not allowed.
4. Exchange/Sharing of anything like stationery, calculator is not allowed.
5. Assume suitable data if necessary.
6. Write your MIS Number on Question Paper

Questions Q1 to Q8 have 5 marks each.   Use LTSPICE for 4 questions to get 5 marks each.

Q1. Determine the value of "Rc" to get the ideal bias point. What is the Bias Point for selected "Rc"?

   Determine small signal ac gain (select suitable values of the capacitors)

Q2. Minimize the Boolean function: $Z = A'B'C + AC + BC + AB$

   (i) Using Boolean theorems   and   (ii) Using Karnaugh Map,

   Implement the resulting function using only IC 7400 Quad 2-input NAND gate

Q3. Determine the maximum value of the series resistor "Rs" for the zener voltage regulator

   Determine the current in the Zener diode for both extreme values of the supply voltage

Q4. Determine the output as a function of x, y and z [i.e. Find → Vout(x, y, z)]

Q5. Realize the function: $Y = [(AB' + C) . D]'$ using CMOS

Q6. Show how the piezoresistors located in a diaphragm-based pressure sensor

   While a single piezoresistor is enough to measure the pressure, explain why 4 are used?

   Hint: Draw the plan and elevation of the sensor to explain

Q7. Determine suitable values of "C" and "R2" to obtain a

   1KHz Square-wave output with peak values of +6V and -6V
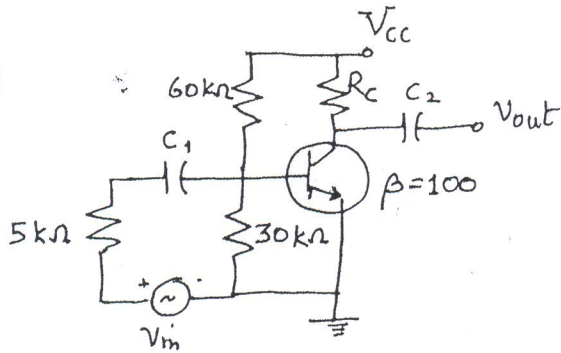
Q8. For the given multiplexer and De-Multiplexer,

   Determine the values of the select bits to obtain required outputs (see Fig 8)

P.T.O. for diagrams and circuits →
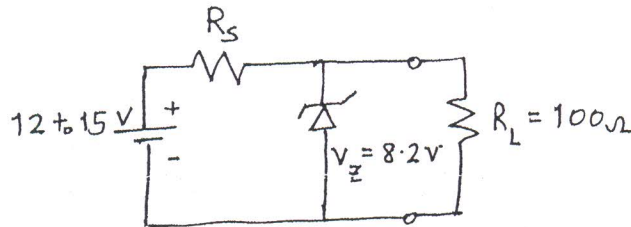
Figures for Question Paper

Fig 1

$V_{CC} = 9V$

$R_{B1} = 60\ k\Omega$

$R_{B2} = 30\ k\Omega$

$R_C = ?$

$\dfrac{V_{out}}{V_{in}} = ?$

Fig 3

$R_S = ?$

$I_{zener} = ?$ $??$
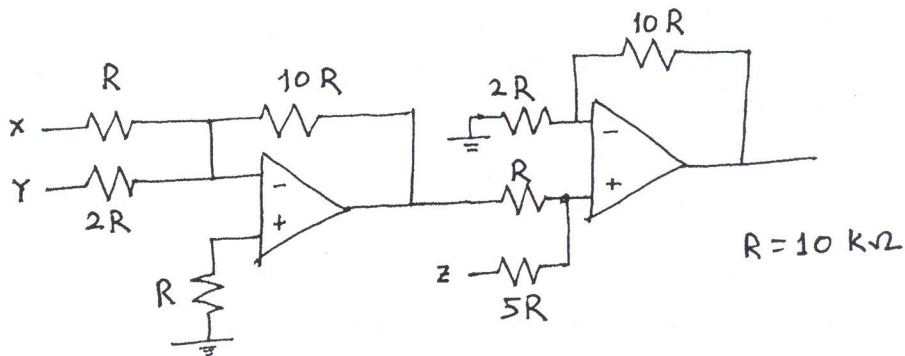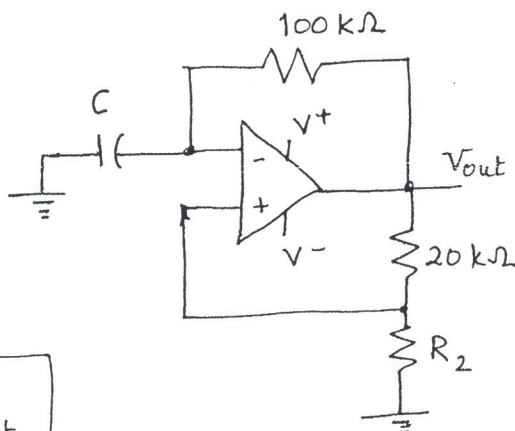
$= ?$

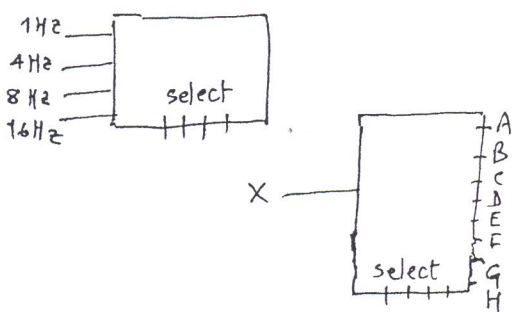**Fig 4**

$R = 10\ k\Omega$

Fig 7

$V^+ = ?$

$V^- = ?$

$C = ?$

$R_2 = ?$

Fig 8

P.T.O. for Questions →