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THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, DECEMBER 2007

EC 2K 303 – SOLID STATE DEVICES

Time : Three Hours   Maximum : 100 Marks

I.   (a)   What are Fermi level and Quasi Fermi level ? Explain.

    (b)   Explain about conductivity and mobility with their equations.

    (c)   What are the two types of capacitances of p-n junctions ? Explain them.

    (d)   Describe briefly the potential applications of Tunnel diode.

    (e)   Draw Ebels Moll model of BJT and explain it.

    (f)   Explain the concept of dynamic negative resistance in oscillators.

    (g)   Explain about the inversion layer in JFET.

    (h)   Draw the circuit symbols for E-MOSFET and D-MOSFET and explain. Differentiate them.

                                                      ($8 \times 5 = 40$ marks)

II.   (a)   (i)   Differentiate the following and explain.
                 1.   Direct from indirect band gap semiconductor.
                 2.   Intrinsic from extrinsic semiconductor.

        (ii)   Explain majority and minority carriers in a semiconductor.

                              Or

    (b)   (i)   Derive continuity equation.

        (ii)   Describe the action of p-n junction diode under forward bias and reverse bias.

III.   (a)   (i)   Explain the *two* types of capacitances of p-n junction.

        (ii)   Derive an expression for potential difference V_0 of open ended p-n junction.

                              Or

    (b)   With neat energy band diagrams explain the principle of operation of tunnel diode.

IV.   (a)   (i)   Explain the various regions of characteristic curve of BJT.

        (ii)   Define α, β and Γ of a transistor. Show how α and β are related to each other.

                              Or

    (b)   Explain in detail the construction and V-I characteristics of UJT. Mention its potential applications also.

V.   (a)   (i)   Explain the construction, static and dynamic characteristics of JFET.

        (ii)   Obtain an expression for V_p for JFET.

                              Or

    (b)   (i)   Draw the symbols of p-channel and n-channel MOSFETs. Explain them.

        (ii)   Explain the application of FET as VVR.

                                                      ($4 \times 15 = 60$ marks)