

**II B.Tech II Semester Supplementary Examinations,
November/December 2005
ELECTRONICS AND INSTRUMENTATION
(Aeronautical Engineering)**

Time: 3 hours**Max Marks: 80**

**Answer any FIVE Questions
All Questions carry equal marks**

1. (a) What is meant by Fermi level and explain how it will be for N-type, P-type and intrinsic semi conductors using suitable diagrams and expressions.
(b) Differentiate the PN junction diode and zener diode.
(c) Two large metal plates are separated by 1 cm, having a potential difference of 10V. An electron is released from lower potential electrode with an initial velocity, $V_0 = 10^6 \text{ m/sec}$ towards the higher potential electrode.
 - i. What is the electron's velocity when it reaches the +ve electrode.
 - ii. How much energy is conveyed to the electrode on impact. [6+5+5]
2. (a) Derive an expression to find out the path of an electron in a magnetic field.
(b) Compare the electric and magnetic deflection system in CRO.
(c) Explain the frequency and phase measurement using CRO lissajons figures. [6+6+4]
3. (a) Differentiate between Avalanche breakdown and zener breakdown.
(b) What is meant by tunnelling effect and explain the operation of a tunnel diode and its characteristics using energy-level diagrams.
(c) What is the speciality of a varactor diode and give its applications. [5+7+4]
4. (a) What is meant by the reverse-recovery time, t_{rr} ? Is it due to majority carriers or the minority carriers? Explain.
(b) How does the reverse saturation current depends upon the temperature.
(c) Explain the construction, working and V-I characteristics of UJT. [4+4+8]
5. (a) Differentiate between BJT, FET and MOSFET.
(b) Explain why the 3db frequency for current gain is not the same as that for voltage gain.
(c) Draw the small signal high frequency CE model of a transistor. [6+4+6]
6. (a) Explain the principle of flapper-nozzle system.
(b) Explain the booster relay principle and give its applications.
(c) A force of 500 N must be applied to open a valve. Find the diaphragm area if a control guage pressure of 60 Kpa must provide this force. [6+5+5]

7. (a) List the limitations of a baffle-nozzle system for the design of pneumatic transmission instruments.
- (b) Explain the principles of the following mechanical components and give their applications
- i. Bearings.
 - ii. Gears
 - iii. Driver
 - iv. Belt chain
 - v. lever
 - vi. Dash pots
- (c) Explain the following in detail
- i. Escapement
 - ii. Integrators. [4+6+6]
8. (a) A depletion mode FET has $I_{DSS} = 3\text{mA}$ and $V_p = -4.25\text{ V}$. Find I_D for $V_{GS} = -2.5\text{V}$
- (b) Explain the principle of working of a depletion type MOSFET and draw its V-I characteristics.
- (c) Show the biasing arrangements for a PNP transistor to work in an active region. [4+8+4]
