**AKGEC/IAP/FM/02**

**Ajay Kumar Garg Engineering College, Ghaziabad**

**Department of ECE**

**Sessional Test-2**

Course: B.Tech Semester: III

Session: 2017-18 Section: EC1, 2, 3, EI

Subject: EDC Sub. Code: REC302

Max Marks: 50 Time: 2 hour

***Note*** : Answer **all** the sections.

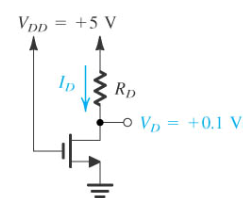
**Section-A**

1. Attempt **all** the parts. **(5x2 =10)**
2. An abrupt Si p-n junction has Na = 1018cm-3 on one side and Nd = 5 X 1015cm-3 on the other side. Calculate the Fermi-level position in p and n regions when KT= 0.0259 (ni=1.5 X 1010cm-3).
3. What is fill factor of solar cell? What is its importance?
4. What is aspect ratio of MOSFET? On What factor it depends?
5. What is body effect in MOSFET?
6. Define threshold voltage in MOSFET.

**Section-B**

1. Attempt **all** the parts. **(5x5 = 25)**
2. Draw V-I characteristics of illuminated junction. Explain the region of operation for different optoelectronic devices.
3. Derive the equation of contact potential in terms of Na and Nd for a p-n junction at equilibrium
4. Design the circuit given below to establish a drain voltage of 0.2V. Calculate the effective resistance between drain and source at this operating point. Assume Vt= 1V and Kn= 1mA/V2. Neglect channel modulation effect.

VDD= +4.5V



VD

1. With the help of voltage transfer curve, explain region of operation of MOSFET to work as amplifier and as switch.
2. What is channel modulation effect in MOSFET? Derive the expression of drain current in saturation region considering this effect.

**Section-C**

1. Attempt **all** the parts. **(2x7.5 = 15)**
2. Derive the equation for space charge region in both sides of p-n junction at equilibrium. Also draw the variation of charge density and electric field across the junction.
3. Draw the structure of MOSFET to explain its working. Derive the expression of drain current for small VDS.