Roll No.:.....

National Institute of Technology, Delhi

Name of the Examination: B. Tech.

Branch	**: EEE and ECE.**	**Semester**	**: 1st**
Title of the Course	**: Introduction to Electrical & Electronics Engineering**	**Course Code**	**: EEB100**

Time: 3 Hours **Maximum Marks: 50**

Note : 1. Do not write anything on the question paper except Roll number

2. Assume any data suitably if found missing

Section A: Answer all 10 multiple choice questions. Each question carries 01 mark. [10×1=10]

A1. A charge of $240C$ is transferred in $2\,\text{min}$, the current flowing is?

(a) $120A$ (b) $480A$ (c) $2A$ (d) $8A$

A2. The peak factor of a sine waveform is

(a) *1.11* (b) *1.414* (c) *2* (d) *1.5*

A3. The form factor of a half wave rectified sine wave is

(a) *2* (b) *1.11* (c) *1.414* (d) *1.57*

A4. If the doping level of a crystal diode is increased, the breakdown voltage

(a) Remains same (b) is decreased (c) is increased (d) none

A5. The number of depletion layers in a transistor is

(a) three (b) two (c) one (d) four

A6. A transistor is a _____ operated device

(a) current (b) voltage (c) both (d) none

A7. The equivalent resistance of the primary of a transformer having $K=5$ and $R_1=0.5\Omega$ when referred to secondary becomes ____ Ω

(a) *0.5* (b) *0.02* (c) *0.004* (d) *2.5*

P.T.O

A8. The primary and secondary induced e.m.fs E_1 and E_2 in a two-winding transformer are always

(a) equal in magnitude
(b) anti-phase with each other
(c) in-phase with each other
(d) determined by load on transformer

A9. The 2's complement of 1000_2 is

(a) *0111* (b) *0101* (c) *1000* (d) *0001*

A10. A flip flop which can have an uncertain output is:

(a) J-K flip flop (b) S-R flip flop (c) D flip flop (d) T flip flop

Section B: Answer any 4 questions. Each question carries 5 marks. **[4×5=20]**

B1. A $20\,kHz$ clock signal is applied to a J-K flip flop with J = K = 1. Sketch the output waveform and determine its frequency.

B2. Use the 1's and 2's complements for the following binary subtractions

(i) 1111-1011 (ii) 110011-100101 (iii) 100011-111010
(iv) 1101-1011 (v) 1000-11

B3. Explain how zenor diode can be used in voltage regulator with neat diagram.

B4. Derive the emf equation of transformer.

B5. Explain the working of simple a.c generator.

Section C: Answer any 2 questions. Each question carries 10 marks. **[2×10=20]**

C1. A $230/460\,V$ transformer has a primary resistance of $0.2\,\Omega$ and a reactance of $0.5\,\Omega$ and the corresponding values for the secondary are $0.75\,\Omega$ and $1.8\,\Omega$ respectively. Find the secondary terminal voltage when supplying (a) $10\,A$ at $0.8\,p.f$ lagging, (b) $10\,A$ at $0.8\,p.f$ leading.

C2. Three inductive coils, each with a resistance of $15\,\Omega$ and an inductance of $0.03\,H$ are connected (i) in star and (ii) in delta, to a 3-phase, $400V, 50\,Hz$ supply. Calculate for each of the above case (a) phase current and line current, (b) total power absorbed.

C3. Explain the characteristics of different types of DC generators.