Code No: RR222104 **Set No.1**

II B.Tech. II Semester Regular Examinations, April/May -2005
ELCTRICAL AND ELECTRONICS ENGINEERING
(Aeronautical Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain the current division in a parallel circuit.
   (b) A series circuit with a resistor of 100 ohm capacitor of 25 micro Farad and inductance of 0.15H is connected across 220V, 60Hz supply. Calculate
      i. current
      ii. power and
      iii. power factor in the circuit.

2. (a) Discuss various excitation for generators.
   (b) A 250V, short-shunt compound generator is delivering 80A. The armature, series and shunt field resistances are 0.05Ω . 0.03 Ω and 100Ω respectively. Calculate the voltage induced allowing a brush drop of 2 volts.

3. (a) Why is efficiency of transformer is generally high?
   (b) A 200kVA, single phase transformer has an efficiency of 98 percent at F.L. if the maximum efficiency occurs at 3/4 F.L. Calculate
      i. the iron loss,
      ii. the copper loss at F.L.
      iii. the efficiency at half − load. Assume a p.f. of 0.8 at all loads.

4. (a) The stator of a 3-phase, 8-pole synchronous generator driven at 750 rpm has 72 slots. The winding has been made with 36 coils having 10 turns per coil. Calculate the rms value of induced emf per phase if the flux per pole is 0.162 web, sinusoidally distributed. Assume that full pitch coils have been used.
   (b) The power input to the rotor of a 440V, 50Hz, 6-ple, 3-phase inductor motor is 80KW. The rotor electromotive force is observed to make 100 complete alternations per minute. Calculate
      i. Slip
      ii. rotor speed
      iii. rotor copper losses per phase
      iv. mechanical power developed and
      v. the rotor resistance per phase if the rotor current is 60A.

5. (a) State and explain the applications of P − N junction diode.
   (b) A silicon diode operates at a forward voltage of 0.4V. Calculate the factor by which the current will be multiplied by when temperature is increased from 25 to 150 C.

6. Explain clearly the following transistor operating regions.
   (a) Active
   (b) Saturation
   (c) Cut − off
7. (a) State and explain few applications of FET's.
   (b) Design a zener regulator to maintain constant voltage of 25V across the load resistance of 150 ohms. The supply voltage is ranging from 30V to 50V.
8. Write short notes on the following.
   (a) Delay line
   (b) Time base generator
   (c) CRO probes.

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Code No: RR222104 **Set No.2**

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ELCTRICAL AND ELECTRONICS ENGINEERING
(Aeronautical Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) How to determine the power factor of the load by using power measurement method.
   (b) A 3-phase, 500V motor load has a power factor of 0.4. Two wattmeters connected to measure the power show the input to be 30kW. Find the reading on each instrument.

2. (a) How do you predetermine the efficiency of a D.C. shunt motor? Explain.
   (b) The Armature winding of a 200V, 4-pole series motor is lap connected. There are 280 slots and each slot has 4 conductors. The current is 45A and the flux per pole is 18mWb. The field resistance is 0.3Ω , armature resistance is 0.5Ω . The iron and friction losses total 800W. The Pulley diameter is 0.41m. Find the pull in New-m at the rim of the pulley.

3. (a) Explain various types of transformers.
   (b) The following were obtained from test on a 30KVA, 3000/110V Transformer.
   O.C. Test : 3000V, 0.5A, 350W
   S.C. Test : 150V, 10A, 500W (HV side)
   Calculate the efficiency of the transformer at half full load 0.8 p.f. Also calculate the KVA output at which the efficiency is maximum.

4. (a) Calculate the rms value of the induced emf per phase of a 10-pole, 3-phase, 50 Hz alternator with 2 slots per pole per phase and 4 conductors per slot. The coil span is 150^0, the flux per pole is 0.12 Wb.
   (b) A 3-phase, star-connected alternator has the following data : Voltage required to be generated on open circuit = 400V (at 50Hz) ; speed = 500 rpm ; stator slots / pole / phase = 3; conductors / slot = 12. Calculate
      i. Number of poles and
      ii. Useful flux pole.

5. (a) Explain drift current mechanism in Semi − Conductors.
   (b) Give the expressions for different current component expressions in Semi − Conductors and explain.

6. Sketch and explain the input and output characteristics CE transistor configuration.

7. (a) Explain the zener and avalanche breakdown mechanisms.

(b) Give the applications of Varactor diodes .

8. Sketch the block diagram of CRO, explain every part in it in detail.

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Code No: RR222104 **Set No.3**

II B.Tech. II Semester Regular Examinations, April/May -2005
ELCTRICAL AND ELECTRONICS ENGINEERING
(Aeronautical Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain the graphical representation of resonance in series and parallel circuits.
   (b) A 20 ohm resistor is connected in series with an inductor, a capacitor and an ammeter across a 25V variable frequency supply. When the frequency is 40Hz, the current is at its maximum value of 0.5A and the potential difference across the capacitor is 150V. Calculate
      i. the capacitance of the capacitor
      ii. the resistance and inductance of the inductor.

2. (a) Explain the various parts of generator.
   (b) A shunt generator delivers 450A at 230V and the resistance of the shunt field and armature are 50Ω and 0.03Ω respectively. Calculate the generated e.m.f.

3. (a) How do you predetermine the efficiency of a transformer? Explain.
   (b) A 25kVA, 2200/220V, 50Hz, single phase transformer has the following resistance and leakage reactances. R_1=0.8 ohm, X_1=3.2 ohm, R_2=0.01ohm, X_2=0.03 ohm. Calculate the equivalent resistance and reactance referred to secondary side.

4. (a) A 3-phase star connected alternator has 8-poles and runs at 750 rpm. It has 24 slots per phase and 10 conductors per slot, the flux being 0.055 Wb/pole. Calculate the line voltage. Assume winding factor to be 0.96.
   (b) A 3-phase induction motor has a star-connected rotor. The rotor emf (between slip rings) at stand still is 50V. The rotor resistance and standstill reactance are 0.5 ohm and 3 ohm respectively. Find
      i. Rotor current per phase at starting and the slip rings short circuited.
      ii. Rotor current per phase starting if a star connected rheostat of resistance 6 ohm per phase is connected across the slip rings.
      iii. Full load rotor current and rotor power factor if the full-load slip is 4 percent.
      iv. Rotor emf per phase under full-load condition.

5. (a) Explain the energy band theory of crystals
   (b) State and express the temperature dependence of reverse saturation current of a P- N junction diode.

6. Explain following terms of an transistor.

(a) Construction Principle

(b) Difference in Doping order of the three regions

(c) Potential variation

7. Sketch and explain the drain and transfer characteristics of enhancement MOSFET.

8. Sketch the block diagram of CRT , explain every part in it in detail.

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Code No: RR222104 **Set No.4**

II B.Tech. II Semester Regular Examinations, April/May -2005
ELCTRICAL AND ELECTRONICS ENGINEERING
(Aeronautical Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What is Q-factor? Give its necessity? Explain.
   (b) A series R-L-C circuit consists of R=1000 ohm , L=100mH and C=10 pico Farads. The applied voltage across the circuit is 100V.
      i. Find the resonant frequency of the circuit
      ii. Find the quality factor of the circuit at the resonant frequency
      iii. At what angular frequencies do the half power points occur?
      iv. Calculate the bandwidth of the circuit.
2. (a) Explain the back emf in motor.
   (b) A long-shunt compound generator delivers a load current of 50A at 500V and has armature, series field and shunt field resistances of 0.05Ω , 0.03Ω and 250Ω respectively. Calculate the generated voltage and the armature current. Allow 1 V per brush for conduct drop.
3. (a) How do you predetermine the efficiency of a transformer? Explain.
   (b) A 25kVA, 2200/220V, 50Hz, single phase transformer has the following resistance and leakage reactances. R_1=0.8 ohm, X_1=3.2 ohm, R_2=0.01ohm, X_2=0.03 ohm. Calculate the equivalent resistance and reactance referred to secondary side.
4. (a) Calculate the pitch factor of an alternator whose armature is wound with coils of 9/10 pitch.
   (b) The power input to a 3-phase induction motor is 60KW. The stator losses total 1KW. Find the total mechanical power developed and the rotor copper loss per phase if the motor is running with a slip of 3 percent.
5. (a) Explain the variations of charge density , electric field and potential of open circuit P − N junction.
   (b) The resistivities of the two sides of a step graded germanium diode are 2 ohm − cm (p - side) and 1 ohm cm (n - side). Calculate the height of Eo of the potential energy barrier. I f n = 3800 cm^2 / volt sec , μ p = 1800 cm^2 / volt sec , ni = 2.5×10^{13} . Assume any necessary data.
6. (a) Explain transistor switching characteristics
   (b) Describe two types break downs in transistors.
7. (a) Explain the zener and avalanche breakdown mechanisms.

(b) Give the applications of Varactor diodes .

8. (a) Compare the electrostatic and magnetic deflection systems.
   (b) Explain horizontal deflection system of CRO.

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