FACULTY OF ENGINEERING

B.E. 2/4 (ECE) I-Semester (Old) Examination, July 2016

Subject: Electrical Technology

Time: 3 hours  Max. Marks: 75

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

1. Draw the schematic diagram of DC generator and list the various parts.
2. What do understand by commutation in DC machines?
3. In two wattmeter method the readings of two wattmeters are 8kW and 7kW, find the p.f.
4. Write the expressions for 3-phase active and reactive powers.
5. What is the purpose of core in the transformer?
6. Derive the condition for maximum efficiency in a transformer.
7. Explain the concept of rotating magnetic field in an 3-phase induction motor.
8. Compare the wound and cage rotor of a 3-phase induction motors.
9. Mention the advantages of hydro power plants.
10. Explain the advantages of high voltage transmission.

PART – B (50 Marks)

11. a) Explain the simple lap and wave windings of DC generators.
    b) Explain the armature reaction of a DC generators with help of neat schematic diagram.

12. a) Explain the speed control of DC motors.
    b) Determine the value of torque in N-m units established by the armature of a 4-pole motor having 760 conductors, two paths in parallel, 20 m Wb per pole when the total armature current is 50 A.

13. a) Derive the relationship between the phase and line quantities with help of phasor diagram for the 3-phase delta connected system.
    b) A 230 V, 3-phase star connected system having three identical impedances of $10\angle45^\circ$, calculate phase and line currents, power and power factor.

14. a) Explain the armature reaction of a 3-phase alternator with help of neat diagram.
    b) A 3-phase, 6 pole, star connected alternator revolves at 1000 rpm. The stator has 90 slots and 8 conductors per slot. The flux per pole is 0.06 Wb. Calculate the line voltage generated by alternator, if the winding factor is 0.97.

15. a) Explain the principle of operation of auto transformer with help of neat circuit diagram.
    b) Explain the transformer on lagging p.f load with help of neat phasor diagram.
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B.E. 2/4 (ECE) I - Semester (New) (Supplementary) Examination, June 2016
Subject : Electronic Devices

Time : 3 hours
Max. Marks : 75

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

1. The voltage across the Si diode is 0.7V at 300°K and 20mA current flows through it. Calculate reverse saturation current \( I_0 \) \( (V_T = 26mV) \).

2. Distinguish between Zener breakdown and avalanche breakdown mechanism in reverse biased PN junctions. Which breakdown voltage is higher and why?

3. A half wave rectifier circuit has a 25V rms sinusoidal AC input and 600Ω load resistance. Calculate the \( V_{DC} \), \( I_{DC} \) and PIV.

4. Explain the necessity of bleeder resistor in LC filter.

5. Define Emitter Efficiency (\( \eta \)), Transport Factor (\( \beta^* \)) and large signal current gain (\( a \)) of a transistor.

6. What is an early effect? What are the consequences of it?

7. Draw the small signal low frequency h-Model of a transistor in BC configuration.

8. Compare JFET and BJT with various features.

9. Draw the V-I characteristics of a DIAC.

10. Classify different types of MOSFETS.

PART – B (50 Marks)

11. a) Derive the expression for diffusion capacitance \( C_D \) in PN junction diode.

b) Draw the energy band diagram of PN junction diode and explain.

12. a) Find all performance parameters of a centre tapped full wave rectifier circuit.

b) An a.c supply of 230V is applied to a full-wave rectifier circuit through transformer of turns ratio 5 : 1. Assume the diode is an ideal one. The load resistance is 300Ω. Find (a) DC output voltage (b) PIV (c) Maximum, and (d) Average values of power delivered to the load.

13. a) Describe an experimental set up to obtain the output characteristics of a CE transistor configuration. Indicate and explain the various regions of operation on the output characteristics.

b) Calculate the collector current and emitter current for a transistor with \( \alpha = 0.09 \), and \( I_{CBO} = 100\mu A \), when the base current is 50\( \mu \)A.

14. a) What is the need for biasing? Define the three stability factors.

b) Consider the self-bias circuit where \( V_{CC} = 22.5 \) Volts, \( R_C = 5.6 \) KΩ, \( R_2 = 10 \) KΩ and \( R_1 = 90 \) KΩ, \( I_{fe} = 55 \), \( V_{BE} = 0.6V \). the transistor operates in active region. Determine (i) Operating point and (ii) Stability factor.
15 a) Draw the hybrid model for CE amplifier and derive for current gain, input impedance, voltage gain and output admittance.
   b) Why N-channel MOSFETS are preferred than P-channel MOSFETS.

16 a) Explain the construction and working of a N-channel JFET with drain and transfer characteristics.
   b) Define $g_m$, $r_d$ and $\mu$ of a JFET and derive the expression for $g_m$.

17 Explain short notes on the following:
   a) Bias compensation using diode
   b) SCR
   c) CCD
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B.E. 2/4 (ECE) I - Semester (Old) Examination, June 2016

Subject: Elements of Mechanical Engineering

Time: 3 Hours

Max. Marks: 75

Note: Answer all questions from Part-A and answer any five questions from Part-B.

PART - A (25 Marks)

1. What is the concept of system?
2. Distinguish 4-stroke and 2-stroke petrol engines.
3. What is the Newton’s law of cooling?
4. Give the classification of heat exchangers.
5. Explain ammonia-water absorption refrigeration system.
6. Define psychrometry and what is psychrometry chart.
7. Describe the three types of flames used in gas welding.
8. Distinguish hot and cold working of metals.
9. What are epicyclic gear trains?
10. Explain the terms creep and slip associated with belt drives.

PART - B (50 Marks)

11 (a) What is steady flow energy equation? Write down the steady flow energy equation for (i) turbine (ii) nozzle (iii) any heat transfer equipment. 

(b) A diesel engine develops 4 kW, its indicated thermal efficiency is 30% and mechanical efficiency is 80%. (i) The fuel consumption of engine in kg/h and Lit/h (ii) The indicated specific fuel consumption (iii) the brake specific fuel consumption. Assume the specific gravity of oil 0.87 and calorific value of oil 42,000 KJ/kg.

12 (a) State the Stefan-Boltzman law of radiation.

A radiator in a domestic heating system operates at a surface temperature of 55°C. Determine the rate at which it emits radiant heat per unit area if it behaves as a black body.

(b) An oil cooler, of the concentric tube type is used for cooling oil at 65.6°C to 54.4°C with water at 26.7°C with a temperature rises of 11.1°C. Assuming an overall heat transfer coefficient of 738 W/m²K based on the outer side area of the tubes determine the heat transfer area required for a design heat load of 190.5 kW for a single pass (i) parallel flow mode and (ii) counter flow mode.

13 (a) Sketch and explain the operation of vapour compression refrigeration system.

(b) A cold storage is to be maintained at -5°C while the surroundings are at 35°C. The heat leakage from the surroundings into the cold storage is estimated to be 29 kW. The actual COP of the refrigeration plant is one third that of an ideal plant working between the same temperatures. Find the COP Refrigeration (ideal), COP Heat Pump (ideal) and the power required in kW to drive the plant.

14 (a) Explain the working principle of die casting and its applications.

(b) Describe the working principle of turning, milling and grinding with a aid of sketches.
15 (a) Explain the Four-bar chain mechanism with suitable sketches.  
(b) Derive an expression for the length of belt in cross belt drive.  

16 (a) State and explain Second law of thermodynamics.  
(b) A gas initially at 14.3 bar and 360°C is expanded isothermally to a pressure of 2.24 bar. It is then cooled at constant volume till the pressure falls to 1.02 bar. Finally an adiabatic compression brings the gas back to the initial stage. The mass of the gas is 0.23 kg and Cp=1kJ/kgK. Draw the p-v diagram and determine (i) the value of adiabatic index of compression, and (ii) the change in internal energy of the gas during the adiabatic process.  

17 Write short notes on any four of the following:  
(a) Clearance volume in air compressors  
(b) Air refrigeration systems  
(c) Left-ward and right-ward welding  
(d) Kinematic pair  
(e) Ratio of tensions in belts
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Subject: Microprocessors & Microcontrollers

Time: 3 Hours

Max. Marks: 75

Note: Answer all questions from Part A. Answer any five questions from Part B.

PART – A (25 Marks)

1. What is the need of memory segmentation in 8086 microprocessor?

2. Explain the flag register of 8086.

3. Why AD0-AD7 lines are multiplexed in 8086.

4. Explain the following 8086 instructions
   i) LDS
   ii) LAHF
   iii) IMUL

5. What are the functions of SI and DI registers?

6. What is meant by assembly language program?

7. Write control word format of 8255 PPI.

8. What is microcontroller? How it is different from microprocessor?

9. Define the following 8051 instructions
   i) CJNE
   ii) SWAPA
   iii) JNB

10. Give the format of TCON register.

PART – B (50 Marks)

11. a) Discuss interrupt mechanism of 8086.
    b) Explain the addressing modes of 8086.

12. a) Write an ALP in 8086 to convert packed BCD to unpacked BCD.
    b) Explain about Debugging tools.

13. a) Interface the following memory IC’s with 8086
    i) Two chips of 16 K X 8 EPROM, select starting address suitably.
    ii) Two chips of 32K X 8 RAM. It must start at 00000H.
    b) How 8257 DMA controller is interfaced with 8086.

14. What is the difference between serial and parallel data transmission? Explain 8251 communication interface.

15. a) Describe memory organization of 8051.
    b) Write an ALP in 8051 to transfer ‘A’ serially at 4800 baud rate continuously.

16. Interface 8051 with seven segment display controller.

17. Write short notes on any two:
    i) Analog to digital converter
    ii) Stepper motor interface
    iii) Procedures and macros of 8086.

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Subject: Digital Integrated Circuits & Applications

Code No. 3134 / O

Max. Marks: 75

Note: Answer all questions from Part A. Answer any five questions from Part B.

PART – A (25 Marks)

1. Differentiate the Digital ICS according to their circuit complexity.
2. Define the following and given their topical values in TTL IC's
   a) $V_{IL}$  b) $V_{IH}$  c) $V_{OL}$  d) $V_{OH}$  e) Noise Margin
3. How many BCD counters are reassured to implement a 3.1/2 digit millimeter display.
4. Convert a JK-FF to D-FF.
5. Implement the function of $(A, B, C) = \Sigma_n (0, 1, 6, 7)$ using suitable multi-planer.
6. Draw CMOS driver to TTL interface. Why they require an interface explain?
7. What are the two major components of disk access time?
8. Draw a two input TTL NAND gate with token pole output. Explain the operation of token pole.
9. Differentiate between SRAM and DRAMS.
10. Draw the interface of TTL to CMOS.

PART – B (5x10 = 50 Marks)

11. a) Draw and explain the operation of a TTL 2 input OR Gate.
    b) Differentiate the features of TTL, family variants 74 L, 74 LS and 74 HC.
12. a) Write a short notes on Tri-state logic in TTL.
    b) Compare the characteristics of TTL, CMOS and ECL.
13. a) Realize a 16x1 multiplexer using 4x1 and 2x1 multiplexers.
    b) Design a 2 bit multiplier using logic gates.
14. a) Design a MOD-10 counter using 7490.
    b) Show how 74490's are cascaded to count 0-9999.
15. a) Design 8 K x 8 memory interface using 2 K x 8 PROMS. Draw the diagram showing the circuit.
    b) What are the advantages of Flash memory over EPROM? Explain different commands used in Flash memory.

...2.
A-45. 16 Design a sequence detector circuit to detect a serial input sequencing of 1010. It should produce an output 'L' whenever the input pattern is detected.

Input: 1 0 1 0 1 0 1 0 ...
Output: 0 0 0 1 0 1 0 1 ...

4L 17 Write a short note on any two from the following:
   a) Saturation logic family
   b) Carry look-ahead adder
   c) Open drain in CMOS logic family