Hall Ticket Number :										

R-15

Code: 5G254

III B.Tech. I Semester Supplementary Examinations May 2018

Electrical and Electronics Measurements

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Explain about classification of instruments
   b) Explain the essential features of indicating instruments

OR

2. a) Explain principle of operation of moving iron instrument
   b) Explain characteristic of PMMC meter

UNIT–II

3. a) Explain advantages and disadvantages of dynamometer wattmeter
   b) Explain errors in dynamometer and wattmeter

OR

4. a) Explain induction type of single phase energy meter with neat diagram
   b) Explain various types of power factor meters

UNIT–III

5. a) Explain the method of measurement of medium resistance
   b) Explain about Wheatstone bridge with circuit diagram and necessary derivation for measurement of unknown resistance.

OR

6. a) Explain the method of loss of charge method for measurement of high resistance.
   b) Explain Anderson bridge for measurement of inductions with necessary circuit diagram.

UNIT–IV

7. a) Explain the principle of operation of Crompton potentiometer.
   b) Explain practical applications of DC potentiometer

OR

8. a) Explain the procedure for standardization of AC potentiometer.
   b) Explain the procedure for determination of B-H curve

UNIT–V

9. a) Explain the principle of operation of CRT
   b) Explain the procedure to measure voltage and current using CRO.

OR

10. a) Explain about time base sweep or ramp generator.
    b) Explain the principle of operation of ramp type DVM.

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Hall Ticket Number :										

R-15

Code: 5G251

III B.Tech. I Semester Supplementary Examinations May 2018

Electrical Machines-III

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Explain how the induced emf is effected by (**i**) pitch factor and (**ii**) distribution factor. 7M

   b) The stator of a 3-ph, 16-pole alternator has 144 slots and 10 conductors per slot connected in two layers and the conductors of each phase are connected in series. If the speed of the alternator is 375 rpm. Find the line voltage if the flux per pole is 0.03 Wb sinusoidally distributed and if the coil span is 150^0 electrical. 7M

OR

2. a) Derive an expression for induced E.M.F per phase in a three phase alternator? Mention how different winding factors affect the induced e.m.f ? 7M

   b) Find the rms values of phase voltage for a 3-ph, 50 Hz, 20 pole 180 slot alternator having a single layer winding with full pitch coils, the coils being connected in 600 phase groups, each coil having 6 turns. All the coils of a phase are in series. Flux per pole=0.025 Wb. 7M

UNIT–II

3. a) What is Potier Triangle? Explain its use for finding voltage regulation. 7M

   b) The OC and SC test results for a 3-ph 50Hz,1500kva ,6600V,Y-connected alternator are as follows

Field AT/pole	0	3000	6000	16500	20672
Voc	0	900	1780	3820	4080
Isc	0	65.6	131.22	-----	-----

   The effective armature resistance/ph is 0.093 ohms and synchronous reactance as 8.5 ohms. Estimate the full load percentage regulation using mmf method at 0.8 pf lagging. 7M

OR

4. Explain clearly what is meant by synchronous impedance of an alternator and how it can be determined experimentally. How does the value of regulation as calculated by synchronous impedance method compared with that obtained from an actual load test and why? 14M

UNIT–III

5. a) Show that in order to obtain a constant voltage, constant frequency of a practical bus bar system, the number of alternators connected in parallel should be as large as possible 7M

   b) The EMFs of two alternators are $3000\angle 20^0$ V and $2900\angle 0^0$ V. Their synchronous impedances are (2 + j20) Ω/phase and (2.5 + j30) Ω/phase. The load impedance is (10 + j4) Ω/phase. Find the circulating current 7M

OR

6. a) What is meant by synchronization? Explain the way of synchronizing an alternator to the infinite bus bars. 7M

   b) Derive the expression for load sharing between dissimilar alternators. 7M

UNIT–IV

7. a) With the help of a neat Phasor diagram, explain the operation of synchronous motor 7M

   b) What is hunting in a synchronous motor? Explain how it can be suppressed. 7M

OR

8. a) Show that the locus of power of a synchronous machine is circle? Give the coordinates of the power circle. 7M

   b) A 3-phase star connected 440 V; the synchronous motor takes a power input of 5 Kw at rated voltage. Its synchronous reactance is 5 ohms per phase and resistance is negligible. If its excitation voltage is adjusted equal to rated voltage of 400V, compute the load angle, power factor and armature current 7M

UNIT–V

9. Explain about the necessity to provide compensating winding to ac series motor? Also briefly mention different schemes used for compensation? And list the common applications of AC series motors. 14M

OR

10. a) Using double field revolving theory, explain the torque-slip characteristics of a single phase induction motor and prove that it cannot produce any starting torque 7M

    b) What are different types of single phase motors and what are their applications? 7M

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Hall Ticket Number :										

R-15

Code: 5GC53

III B.Tech. I Semester Supplementary Examinations May 2018

Environmental Science

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Environmental science is multi-disciplinary in nature- Justify? 7M
   b) How would environmental awareness help to protect the environment? 7M

OR

2. a) Outline why public awareness is necessary for environmental protection? 7M
   b) Evaluate the causes of global environmental issues? 7M

UNIT–II

3. a) What are renewable resources? Explain them? 7M
   b) Explain the effects dams on forests and Tribal people? 7M

OR

4. a) Explain briefly Floods and draughts? 7M
   b) Explain the impact of traditional agriculture verses modern agriculture on environment? 7M

UNIT–III

5. What is an Ecosystem? Explain the structure and function of a forest ecosystem? 14M

OR

6. a) Explain
      i) Food chain
      ii) Food web 7M
   b) Explain various biodiversity conservation methods? 7M

UNIT–IV

7. a) What are the causes and effects of water pollution? 7M
   b) Summarize methods of control of thermal pollution? 7M

OR

8. a) Discuss the soil pollution? 7M
   b) How can the solid waste be manages? 7M

UNIT–V

9. a) What are the cause and effects of global warming? 7M
   b) Explain the salient features of Environmental protection act(1986)? 7M

OR

10. a) What is the impact of population on environment? 7M
    b) What are the measures to be taken to control HIV/AIDS? 7M

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Hall Ticket Number :										

R-15

Code: 5G359

III B.Tech. I Semester Supplementary Examinations May 2018

Linear and Digital Integrated Circuits Applications

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) What are the different linear IC packages?
   b) Explain how to get the square and square root of the given analog signal.

OR

2. a) List six characteristics of an ideal op-amp
   b) Draw the circuit of a log amplifier using two op-amps and explain its operation.

UNIT–II

3. a) What is the major difference between Digital and analog PLLs?
   b) Define capture range, lock range and pull-in-time.

OR

4. Draw the circuit of a Schmitt trigger using 555 timer and explain its operation.

UNIT–III

5. a) Describe the various types of electronic switches used in D/A converter.
   b) Classify DACs on the basis of their output

OR

6. a) Explain how dual-slope ADC provides noise rejection.
   b) Which is the fastest ADC and why?

UNIT–IV

7. a) Explain the concept of sinking and sourcing currents. How are they estimated for CMOS Families.?
   b) Draw and explain the circuit of two input CMOS NOR gate.

OR

8. a) Discuss the characteristics of CMOS family.
   b) What are the sources of stray capacitance in the logic circuit?

UNIT–V

9. a) Implement the following function using 3:8 Decoder
   $F_1=(A,B,C) = \sum m(2,4,6,7)$
   b) What do you mean by carry propagation delay?

OR

10. a) What is multiplexer? Draw the logic diagram of 8 to 1 line multiplexer.
    b) Design full adder using only NOR Gates.

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Hall Ticket Number :										

R-15

Code: 5G253

III B.Tech. I Semester Supplementary Examinations May 2018

Power Electronics

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Explain the switching characteristics of power IGBT. 7M

   b) What do you mean by commutation of SCR? Explain the class C commutation method for SCR with relevant circuit diagram and waveforms. 7M

OR

2. a) Calculate the number of SCRs, each with rating of 500V, 75A required in each branch of a series and parallel combination for a circuit with the total voltage and current rating of 7.5 kV and 1000A. Assume derating factor of 14%. 7M

   b) Why SCRs are required to be connected in parallel? What are the problems associated with parallel operation of SCRs? How they are eliminated? 7M

UNIT–II

3. a) What are the reasons for generation of over voltages in a SCR circuit? Explain the protection of SCR against over voltages with circuit diagram and relevant waveforms. 7M

   b) Draw RC triggering circuit and explain its working with relevant waveforms. 7M

OR

4. a) To provide reliable 'dv/dt' protection to an SCR used in a single phase fully controlled bridge rectifier, compute the required parameters for a snubber circuit. The SCR has maximum 'dv/dt' capability of 50V/μs. The input line to line voltage has a peak value of 380V and the source inductance is 0.1 mH. Assume a damping factor of 0.65. 7M

   b) Why is 'dv/dt' rating important for a SCR? Explain the method for improving this rating for SCR with relevant circuit diagram. 7M

UNIT–III

5. a) Discuss the working of a single phase mid-point AC-DC converter delivering power to an RLE load with a freewheeling diode across the load. Draw the waveforms of load voltage and load current assuming continuous conduction mode. Also derive the expression for average load voltage for this condition. 7M

   b) The load connected to a single phase fully controlled converter consists of a resistance of 5 Ohm, an inductive reactance and a battery of 36 V. The supply voltage is 230 V, 50 Hz. If the thyristor is triggered at a firing angle of 75^o and assuming that the current is continuous, determine the average load voltage and average charging current of the battery 7M

OR

6. a) Show that in a single phase full wave rectifier feeding power to an RL load, if the thyristor firing angle is made equal to the load impedance angle the load current will be purely sinusoidal. In such case derive the expression for the average value of load current in terms of the circuit parameters. 7M

   b) Compare a three pulse rectifier with a six pulse rectifier with relevant circuit diagram and waveforms. 7M

UNIT–IV

7. a) A Class A chopper circuit is operating on Time Ratio Control (TRC) principle at a frequency of 1 kHz on a 220V dc supply. If the load voltage is 180V, calculate the conducting and blocking period of thyristor in each cycle. 7M

   b) Draw the circuit of a two quadrant chopper and explain its working. 7M

OR

8. a) Compare between Time Ratio Control and Current Limit Control of dc chopper with relevant circuit diagram and waveforms. 7M

   b) A dc chopper(Class A) circuit connected to a 100V dc source supplies a resistive load of R=5 Ohm in series with an inductance of 40 mH. A freewheeling diode is connected across the load. The load current varies between the limits of 10A and 12A. Compute the time ratio of the chopper 7M

UNIT–V

9. a) Explain the operation of single-phase full bridge inverter with relevant circuit diagram and waveforms. 7M

   b) Explain the operation of single-phase series inverter with relevant circuit diagram and waveforms. What are its limitations? 7M

OR

10. a) Explain the operation of single-phase ac voltage controller with neat circuit diagram and output waveforms for R-L load. 7M

    b) Explain the working of single-phase bridge type cyclo converter with neat circuit diagram and waveforms. 7M

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Hall Ticket Number :										

R-15

Code: 5G252

III B.Tech. I Semester Supplementary Examinations May 2018

Transmission of Electric Power

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Derive an expression for the inductance of a double circuit line whose conductors are placed at the vertices of a regular hexagon. 7M

   b) Calculate the inductance per phase of a three-phase double circuit line if the conductors are spaced at the vertices of a hexagon of side 2 m each. The diameter of each conductor is 2.0 cm. 7M

OR

2. a) Derive an expression for the capacitance per km of a single phase line taking into account the effect of ground. 7M

   b) Calculate the capacitance per phase of a three-phase three-wire transposed system when the conductors are arranged at the corners of a triangle with sides measuring 1.0m, 1.5m, and 2.0m. Diameter of each conductor is 1.2 cm. 7M

UNIT–II

3. a) Derive the expressions for the ABCD constants for the nominal-π circuit of a medium transmission line. 7M

   b) A single-phase, 11 kV line with a length of 15 km is to transmit 500 kVA. The inductive reactance of the line is 0.6 Ω per km and the resistance is 0.25Ω per km. Calculate the efficiency and regulation for a p.f of 0.75 lag 7M

OR

4. a) Explain surge impedance loading in long transmission lines. 4M

   b) A three-phase transmission line is 400km long and delivers a load of 350MVA, 0.85p.f lag at 400kV. The ABCD constants of the line are A=D=$0.918\angle 1.5^0$; B=$175\angle 85^0$; C =$0.0019\angle 90^0$ mhos. Determine the following under full load and no load conditions

   i) Sending-end line to neutral voltage,
   ii) The sending-end current, and
   iii) The percent voltage regulation. 10M

UNIT–III

5. a) Explain how the sag of an overhead line can be calculated in case of supports at different levels. 7M

   b) Explain the effect of wind and ice loading are taken into account while determining the sag and stress of an overhead line conductor. 7M

OR

6. a) Explain various methods for equalizing the potential across the various units in an insulator string. 7M

   b) Each conductor of a three phase overhead line is suspended from a cross arm of a steel tower by a string of 4 suspension insulators. The voltage across the second unit is 14.2kV and across the third 20kV. Find the voltage between the conductors and the string efficiency. 7M

UNIT–IV

7. a) Discuss the phenomenon of wave reflection and refraction. Derive expressions for reflection and refraction coefficients. 7M

   b) A 200 kV, 3 μs, rectangular surge travels on a line of surge impedance of 400 ohms. The line is terminated in a capacitance of 3000 pf. Find an expression for voltage across the capacitance. 7M

OR

8. a) Draw equivalent circuit for finding the transmitted voltage and current surges on a forked line. Derive expressions for the transmitted voltage and currents 7M

   b) Two stations are connected together by an underground cable having a surge impedance of 60 ohms joined to an overhead line with a surge impedance of 400 ohms. If a surge having a maximum valve of 100 kV travels along the cable towards the junction with the overhead line, determine the value of the reflected and transmitted wave of voltage and current at the junction 7M

UNIT–V

9. a) State the classification of cables (according to voltage) and discuss their general construction. 7M

   b) A single core lead sheathed cable is graded by using three dielectrics of relative permittivity 5, 4, and 3 respectively. The conductor diameter is 1.8 cm and the inner radius of the sheath is 3 cm. Assuming that all the three dielectrics are worked at the same maximum potential gradient of 40 kV/cm, determine the potential difference in kV between the core and earthed sheath. 7M

OR

10. a) Derive an expression for the insulation resistance of a single core metal sheathed cable. 7M

    b) A 33kV, 3-phase, 2.5 km long feeder consists of single-core cables having a conductor radius of 12mm and an insulation thickness of 8mm.The dielectric has a relative permittivity of 3 and the power factor of the unloaded cable is 0.3. Determine the following

       (i) capacitance per phase ,
       (ii) charging current per phase,
       (iii) total charging kVAr,
       (iv) dielectric per phase and
       (v) maximum electric stress in the cable 7M

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