# (DEE 311)

**B.Tech. DEGREE EXAMINATION, DECEMBER – 2015**

**(Examination at the end of Third Year Third Semester)**

**ELECTRICALS AND ELECTRONICS**

**Paper – I : Linear Control Systems**

**Time : 3 Hours** **Maximum Marks: 75**

***Answer Question No.1 is compulsory*** ***(15×1 = 15)***

***Answer one question from each unit*** ***(4×15 = 60)***

***1)*** a) What is Bode (Magnitude plot)?

b) What are Eigen values?

c) What is the use of Nyquist plot?

d) What are frequency domains specification?

e) Explain what you understand by a signal flow graph.

f) Name the two types of electrical analysis for the mechanical systems.

g) Give an example of closed loop system.

h) List the types of stability.

i) What is meant by system?

j) Define open loop system.

k) What is a mathematical model?

l) What is phase margin?

m) What are the advantages of phase variable?

n) What is settling time?

o) What is rise time?

## UNIT - I

***2)*** a) Obtain the transfer function of diagram shown in fig.

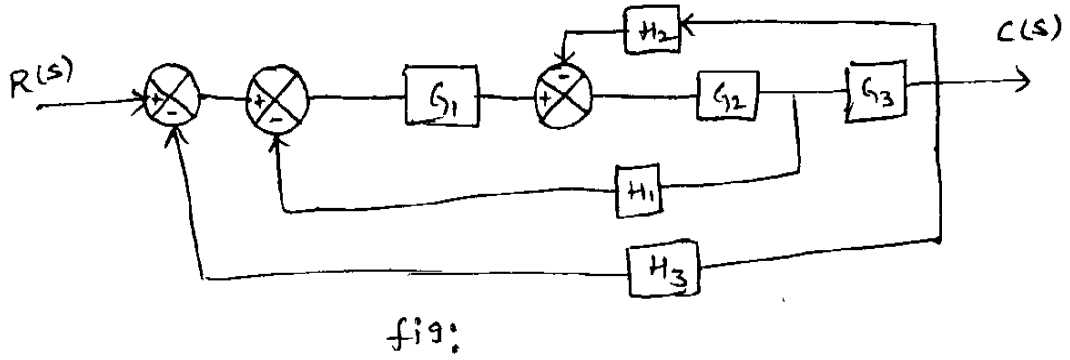


fig:

b) Distinguish between open loop and closed loop system.

OR

***3)*** a) What is a signal flow graph?

b) What are the basic properties of signal flow graph?

c) Write the Mason's gain formula.

## UNIT - II

***4)*** By means of routh criterion, determine the stabilities of the system represented by the characteristic equation $s^4+2s^3+11s^2+18s+18=0$. Comment on the location of the roots of the characteristic equation.

OR

***5)*** Explain the following terms.

a) Deky time

b) Rise time

c) Peak time

d) Maximum overshoot

e) Settling time

f) Steady state error

g) $K_p, K_v, K_a$.

## UNIT - III

***6)*** Sketch the root locus for $G(s) \cdot H(s) = \frac{k(s+2)(s+3)}{(s+1)(s-1)}$.

OR

***7)*** What are the various steps in the procedure for constructions root locus?

## UNIT - IV

***8)*** Explain lead-lag compensation techniques based on the frequency response approach.

OR

***9)*** a) State the properties of state transition matrix.

b) Explain controllability and observability.

# (DEE 312)

**B.Tech. DEGREE EXAMINATION, DECEMBER – 2015**

**(Examination at the end of Third Year Third Semester)**

**ELECTRICALS AND ELECTRONICS**

**Paper - II : Electronic Circuits-II**

**Time : 3 Hours** **Maximum Marks: 75**

---

***Answer Question No.1 is compulsory*** ***(15)***

***Answer one question from each unit*** ***(4×15 = 60)***

***1)*** a) What is a non-linear distortion.

b) Why are power transistors provided with heat sinks.

c) Give advantages of class B when compared to class A power amplifiers.

d) What are the disadvantages of negative feedback.

e) Define Barkhausen criterion.

f) List the merits of phase shift oscillator.

g) List the applications of multivibrators.

h) What do you mean by time delay unit in a multivibrator.

## UNIT - I

***2)*** a) Derive the equation for efficiency of class AB amplifier.

b) Write short notes on chopper amplifiers.

OR

***3)*** a) Discuss the thermal considerations in power amplifiers.

b) Show that the efficiency of a class A power amplifiers is 50%.

## UNIT - II

***4)*** a) Explain how negative feedback reduce distortion in an amplifier.

b) Draw a neat circuit and explain the operation of a colpitt's oscillator.

OR

***5)*** a) Explain the principle of operation of crystal oscillator.

b) Write short notes on stability in feedback amplifiers.

## UNIT - III

***6)*** a) Explain how Schmitt trigger circuit acts as a comparator.

b) Draw a neat figure of a single tuned amplifier and explain its working.

OR

***7)*** Explain

a) the operation of a Double tuned transformer amplifier.

b) Compare Bistable and Astable multivibrator.

## UNIT - IV

***8)*** Explain.

a) Shunt regulators using discrete components

b) Need for trapezoidal waveform for linearity correction.

OR

***9)*** Write short notes on:

a) AC switching mode power supply.

b) UPS

# (DEE 313)

**B.Tech. DEGREE EXAMINATION, DECEMBER – 2015**

**(Examination at the end of Third Year Third Semester)**

**ELECTRICALS AND ELECTRONICS**

**Paper – III : Generation of Electrical Power**

**Time : 3 Hours** **Maximum Marks: 75**

---

***Answer Question No.1 is compulsory*** ***(15)***

***Answer any one question from each unit*** ***(4×15 = 60)***

***1)*** Write brief notes on:

a) Define demand factor.

b) Define load factor.

c) What is super heater.

d) What is tariff.

e) What is meant by fuelcell?

f) What is two part tariff.

g) Explain the term modulator.

h) What is cavitation.

i) Define Runoff.

j) What is cold reserve.

k) Define peak Load.

l) How the power factor can be improved.

m) Define hydro graphs.

n) Define tidal energy.

o) What are the types of wind generator.

## UNIT - I

***2)*** a) Explain various sources of power generation methods.

b) What are the conditions required to select a site for a thermal station.

OR

***3)*** Explain the generation of power at thermal power plant with a neat diagram.

## UNIT - II

***4)*** Write short notes on the following:

a) Hydrology

b) Hydrographs

c) Mass curve

d) Characteristics of turbines.

OR

***5)*** a) Explain the principle of nuclear power station

b) Explain the boiling water reactor and CANDU reactor.

## UNIT - III

***6)*** a) Explain the principle of operation of gas turbine plant.

b) Explain the principle of operation of solar power plant.

OR

***7)*** a) Explain the principle of operation of wind power plant.

b) Explain the operation of fuel cells.

## UNIT - IV

***8)*** a) Derive an expression for the most economic power factor.

b) What are the reasons for low power factor.

OR

***9)*** a) Explain the methods of improving power factor.

b) Briefly explain various type of tariff's.

**(DEE 314)**

**B.Tech. DEGREE EXAMINATION, DECEMBER. - 2015**

**(Examination at the end of Third Year Third Semester)**

**ELECTRICALS AND ELECTRONICS**

**Paper - IV : Electrical Measurements**

**Time : 03 Hours** **Maximum Marks : 75**

***Answer Question No.1 is compulsory*** ***(15)***

***Answer One question from each unit*** ***(4×15=60)***

***1)*** a) What is sensitivity?

b) Why is induction principle is largely used in watt- hour meters than ammeters and voltmeters.

c) Give examples for recording type instruments.

d) How do you compensate temperature error in MI instrument?

e) What are the basic essential torques required for operating an instrument?

f) Define phase angle error?

g) Why shunts and multipliers are not suitable for extending the range of currents and voltages to a high level?

h) Why Hay's bridge is not suitable for measurement of coils whose Q is less than 10?

i) What is the purpose of a flux meter.

j) Draw B-H curve.

k) Give any two applications of CRO.

l) What is difference between LED and LCD?

m) What is a thermister?

n) What are the applications of strain gauge?

o) What are the advantages of chop mode in an oscilloscope?

## UNIT –I

***2)*** a) Describe the principle and operation of Dynamometer wattmeter. Also list out the advantages, disadvantages and applications of Dynamometer wattmeter.

OR

***3)*** Discuss the various types of synchronoscopes.

## UNIT –II

***4)*** Draw the equilant circuit and phasor diagram of a potential transformer. Derive the expressions for its ratio and phase errors. Describe the assumptions made for derivation of errors.

OR

***5)*** What are the different problem associated with measurement of low resistances. Explain the principle of working a kelvins Double Bridge and explain how the effect of contact resistance and resistance of leads is eliminated.

## UNIT –III

***6)*** Describe a method of experimental determination of flux density in aspecimen of magnetic material using a ballistic galvanometer. Explain how the correction of flux in the air space between the specimen and the coil is applied.

OR

***7)*** a) Describe the construction and working of an unshunted flux meter. Prove that the flux is proportional to the deflection of flux meter.

b) A flux meter is connected to a search coil having 500 turns and a mean area of 500mm$^2$. The search coil is placed at the solenoid 1 meter long, wound with 800 turns. When a current of 5A is reversed, there is a deflection of 25 scale divisions. Calculate the calibration in flux linkages per scale division.

## UNIT –IV

***8)*** a) Explain the functioning of a digital voltmeter.

b) Describe the advantages of LEDs

OR

***9)*** Draw and describe the following of thermistors:

a) Resistance - Temperature characteristics.

b) Voltage – Current characteristics and

c) Current – time characteristics.

☼ ☼ ☼

# (DEE 315)

**B. Tech. DEGREE EXAMINATION, DECEMBER – 2015**

**(Examination at the end of Third Year Third Semester)**

**ELECTRICALS AND ELECTRONICS**

**Paper – V : Transmission & Distribution**

**Time : 3 Hours** **Maximum Marks: 75**

---

***Answer Question No. 1 is compulsory.*** ***(15)***

***Answer any ONE question from each unit.*** ***(4 × 15 = 60)***

***1)*** a) What are the constant of a transmission line?

b) Define skin effect.

c) Define voltage regulation.

d) What is meant by Corona?

e) Define insulator.

f) Define string efficiency.

g) Define surge impedance loading.

h) What are stringing charts?

i) What are dampers?

j) Define Kelvin's law.

k) What is grading of cables?

l) What is sending and receiving end?

m) What is transmission capacity of a line?

n) What is Ferranti effect?

o) What are the factors affecting sag?

## UNIT - I

***2)*** a) Derive the expressions for inductance and capacitance of single phase system.

b) Explain the effect of ground on capacitance.

OR

***3)*** a) Explain the concept of GMR and GMD in the calculations of transmission line inductance.

b) What are the advantages of bundled conductors?

## UNIT - II

***4)*** a) Classify the transmission lines based on line length and operating voltages.

b) What is Ferranti effect? Deduce an expression for voltage rise of an unloaded line.

OR

***5)*** a) Derive an expression for sag and tension when the supports are at unequal heights.

b) Describe the phenomenon of corona. Explain the factors affecting corona.

## UNIT - III

***6)*** a) Explain the following – feeder, distributor and service mains.

b) Derive an expression for the voltage drop of a two-wire DC distribution system with a uniformly distributed load fed at one end.

OR

***7)*** a) Briefly discuss the classification of substations.

b) Briefly discuss the equipments of substations.

## UNIT – IV

***8)*** a) Name the different types of insulators used in power systems. Give the application of each insulator.

b) Describe the main constructional features of pin and string insulator.

OR

***9)*** a) Derive the formula for insulation resistance and capacitance of a single core cable.

b) How are cables classified? Give the application of each cable.

●●●●●

# (DEE 316)

**B.Tech. DEGREE EXAMINATION, DECEMBER – 2015**

**(Examination at the end of Third Year Third Semester)**

**ELECTRICALS AND ELECTRONICS**

**Paper - VI : Electro Mechanics-III**

**Time : 3 Hours** **Maximum Marks: 75**

---

***Answer Question No.1 is compulsory*** ***(15)***

***Answer ONE question from each unit*** ***(4×15 = 60)***

***1)*** a) What are the two types of turbo-alternators?

b) How can a d.c generator converted into an alternator?

c) How is the armature reaction in an alternator at lagging loads?

d) What is hunting?

e) Write any two applications of synchronous motor.

f) What may be the reasons for faulty starting of a synchronous motor?

g) What is a synchronous motor?

h) What are the different torques in a synchronous motor?

i) Define torque angle.

j) Why synchronous machine is called as a doubly excited machine?

k) What for zero power factor method is used for an alternator?

l) How can a universal motor be reversed?

m) What are the different types of stepper motors?

n) What are the advantages of Repulsion motors?

o) What are the applications of variable reluctance stepper motor?

## UNIT - I

***2)*** a) Derive the expression for induced emf in a synchronous generator.

b) A 3-$\phi$, 16-pole alternator has a star connected winding with 144 slots and 10 conduction per slot. The flux per pole is 0.03 wb. Sinusoidally distributed and speed is 375 rpm. Find the frequency, rpm and the line and phase emf. Assume full pitched coil.

OR

***3)*** a) What is armature reaction? Discuss about armature reaction at unity, zero powerfactors leading and lagging with the help of neat diagrams.

b) Discuss the reasons for variation in terminal voltage when alternator is on load.

## UNIT - II

***4)*** a) Explain the procedure for synchronizing the alternators.

b) Draw and explain the phasor diagrams of a salient pole synchronous machine.

OR

***5)*** a) A 3-MVA, 6-pole alternator runs at 1000 rpm on 3.3 kV bus bars. The synchronous reactance is 25%. Calculate the synchronising power and torque per mechanical degree of displacement when the alternator is supplying full-load at 0.8 lag.

b) Explain the effect of change in excitation on parallel operation of alternators.

## UNIT - III

***6)*** a) Draw and explain the phasor diagrams of synchronous motor with different excitations.

b) Discuss about the different torques developed in a synchronous motor.

OR

***7)*** a) Explain briefly the effect of excitation on armature current and power factor.

b) Discuss briefly about constant power lines in a synchronous motor.

## UNIT - IV

***8)*** a) Explain the principle of operation and working of reluctance motor.

b) List out the applications of hysteresis motor.

OR

***9)*** a) Explain the construction and working of permanent magnet stepper motor.

b) Discuss the advantages, disadvantages and applications of permanent magnet stepper motor.

●●●●●

# (DEE 321)

**B. Tech. DEGREE EXAMINATION, DECEMBER – 2015**

**(Examination at the end of Third Year Fourth Semester)**

**ELECTRICALS AND ELECTRONICS**

**Paper – I : Linear IC's & Applications**

**Time : 3 Hours** **Maximum Marks: 75**

---

*Answer Question No.1 compulsory.* ***(15)***

*Answer One question from each unit.* ***(4×15=60)***

***1)*** a) Define Bias current and offset current.

b) Define gain Band width

c) What are the op-amp error sources.

d) Mention any two linear & two non-linear applications of an OP-AMP.

e) Differentiate OP-AMP and comparator.

f) Why window detector is required & where it is used.

g) Explain the Resolution & precision characteristics of converters.

h) What do you mean by monolithic PLL? Mention some monolithic ICS.

i) Describe the PIN diagram of 555 Timer.

j) Purpose of voltage regulators.

k) Why Butterworth filter is preferred over Chebyshev.

l) What are the limitations of Active filters.

m) What does the order of a filter represents , justify your answer.

n) Define Noise Margin.

o) Define Lock range, capture range.

## UNIT-I

***2)*** a) With neat block diagram explain the function of various building blocks of an OP-AMP.

b) Design a current to voltage converter using OP-AMP and explain how it can be used to measure the output of a photocell.

OR

***3)*** a) Define slew rate and derive the expression for it. List causes of the slewrate and explain its significance in applications.

b) Design a differentiator to differentiate an input signal that varies in frequency from 10Hz to about 1KHz. Draw its output waveform if $\sin 2\pi \times 1000\, t$ signal is applied.

## UNIT-II

***4)*** a) Derive the frequency of oscillation of a RC phase shift oscillator and explain the operation of the circuit.

b) Discuss about comparator characteristics and limitations of op-amps as comparators.

OR

***5)*** a) Design a saw Tooth wave form generator using OP-AMP and plot the wave forms for the given specifications frequency : 5KHz; $V_{sat} = \pm 15$ V (Assume necessary data).

b) Discuss about

i) Zero crossing detector

ii) Window detector

## UNIT-III

***6)*** a) What is a clipper? With circuit diagram, explain the operation of positive and negative clippers.

b) Explain the operation of the fastest analog to digital converter. What is the main draw back of this converter? Compare this converter with other types.

OR

***7)*** a) What is a clamper? With circuit diagram explain its operation.

b) What is a sample- and –hold circuit? Draw the circuit diagram and explain its operation.

c) Discuss about weighted resistor DAC and mention its advantages and disadvantages.

## UNIT-IV

***8)*** a) Design a monostable multivibrator using 555 timer to produce a pulse width of 100 msec.

b) Design a wide band-pass filter with $f_L = 200\text{Hz}$. $F_H = 1\text{KHz}$ and a pass –band gain = 4. Draw the frequency response and calculate 'Q' factor for the filter.

OR

***9)*** a) Draw & design a PLL circuit using I 565 to get

i) Free running frequency = 4.5 KHz.

ii) Lock range of 2 KHz and

iii) Capture range = 100Hz.

Assume a supply voltage of $\mp$ 10 V.

b) Draw the circuit of 723 voltage Regulator and explain its operation.

c) Describe the designing procedure of 2 nd order LPF.

◀▶◀▶◀▶

# (DEE 322)

**B.Tech. DEGREE EXAMINATION, DECEMBER – 2015**

**(Examination at the end of Third Year Fourth Semester)**

**ELECTRICALS AND ELECTRONICS**

**Paper - II : Microprocessors & Interfacing**

**Time : 3 Hours** **Maximum Marks: 75**

---

***Answer Question No.1 is compulsory*** ***(15)***

***Answer ONE question from each unit*** ***(4×15 = 60)***

***1)*** a) Define memory.

b) What is a CPU?

c) What is meant by bit and byte?

d) What do you mean by clock speed?

e) What does 'SF' flag perform?

f) Where do you use 'RESET' 'IN'?

g) Give an example of 'Implied' addressing mode.

h) List software interrupts.

**UNIT - I**

***2)*** a) Compare 8 bit processors and 16 bit processors from the architectural view.

b) Give the explanation for

i) DO-WHILE

ii) FOR

OR

***3)*** a) Explain the addressing modes of 8086.

b) Explain the 8086 architecture using Pin diagram.

## UNIT - II

***4)*** a) Explain the coding template for ADD instruction of 8086.

b) Discuss addressing memory of SDK 86.

OR

***5)*** a) Explain the write cycle operation with a neat timing diagram in minimum mode.

b) Write an ALP to find the largest among a given array of 16 bit numbers.

## UNIT - III

***6)*** a) Explain the differences between memory and I/O interfacing.

b) Explain D/A converter operation for interfacing.

OR

***7)*** a) Explain BSR mode operation.

b) What is the use of wait cycles. Compare wait and idle cycles.

## UNIT - IV

***8)*** a) Briefly discuss RS232C.

b) Explain the architecture of 8086 in maximum mode.

OR

***9)*** a) Draw and explain the block diagram of 8259.

b) Explain any three modes of operation of 8253/8254.

# (DEE 323)

**B.Tech. DEGREE EXAMINATION, DECEMBER – 2015**

**(Examination at the end of Third Year Fourth Semester)**

**ELECTRICALS AND ELECTRONICS**

**Paper - III : Digital Signal Processing**

**Time : 3 Hours** **Maximum Marks: 75**

---

***Answer Question No.1 is compulsory*** ***(15)***

***Answer ONE question from each unit*** ***(4×15 = 60)***

***1)*** a) What is a S/H circuit.

b) List properties of fourier transform.

c) Give applications of Z-transform.

d) Define Linearity and Duality of a signal.

e) Give the conditions for stability of a LTI system.

f) Sketch x(3n) if x(n) = {1, 2, 5, −1}.

g) Give specific applications of Bartlett triangular window.

h) What is an Anti-aliasing filter.

## UNIT - I

***2)*** a) Sketch the signal and find its energy or power $x(n) = 8(0.5)^n u(n)$.

b) Determine Z-transform, ROC and pole – zero locations of $-\alpha^n u(-n-1)$.

OR

***3)*** a) Check whether the system $y(n) = 3x(n-2) + 3x(n+2)$ is causal.

b) An LTI system is described as $y(n) = \frac{1}{4}y(n-2) + x(n)$. Find the impule response $h(n)$ using Z transform.

## UNIT - II

***4)*** a) Distinguish between DFT and DTFT.

b) Implement the decimation in time FFT algorithm for N = 16.

OR

***5)*** a) If $x(n)$ denotes a finite length sequence of length N, show that $x((-n))_N = x((N-n))_N$.

b) Explain the inverse FFT algorithm to compute inverse DFT of a N = 8. Draw the flow graph for the same.

## UNIT - III

***6)*** a) Discuss the various properties of Bilinear transformation method.

b) Find H(Z) using impulse invariant method for $H(S) = 1/(S+0.5)(S^2+0.5S+2)$.

OR

***7)*** a) Convert the following analog filter transfer function using backward difference method.

H(S) = 1/(S+0.2). Consider T = 1sec.

b) Discuss about the pole locations for the Digital Chebyshev filters.

## UNIT - IV

***8)*** a) Consider the system

$y(n) = y(n-1) + 2y(n-2) + x(n)$

Find H(Z) and realise using cascade form.

b) Compare IIR and FIR filters.

OR

***9)*** a) An LTI system is described by $y(n) = a_1 y(n-1) + x(n) + b_1 x(n-1)$.

Realize in direct form-I structure and convert it to direct form – II structure.

b) Show that an FIR filter is linear phase if $h(n) = h(N-1-n)$.

☛ ☛ ☛

# (DEE 324)

**B.Tech. DEGREE EXAMINATION, DECEMBER – 2015**

**(Examination at the end of Third Year Fourth Semester)**

**ELECTRICALS AND ELECTRONICS**

**Paper - IV : Power Electronics**

**Time : 3 Hours** **Maximum Marks: 75**

---

***Answer Question No.1 is compulsory*** ***(15)***

***Answer ONE question from each unit*** ***(4×15 = 60)***

***1)*** a) Draw snubber circuit for a SCR.

b) What is IGBT?

c) List the different classes of choppers.

d) What are the advantages of PWM technique.

e) Give the applications of cycloconverters.

f) Name the various digital firing schemes.

g) Draw the circuit of dual converter.

h) What is natural commutation?

i) Give two advantages of CSI.

j) Advantage of free wheeling diode.

k) Significance of source inductance.

l) What are the two types of TRC?

m) What is meant by PWM control in dc chopper?

n) What is meant by Mc Murray inverter?

o) List out different commutation techniques.

## UNIT - I

***2)*** Explain the operation of MOSFET and IGBT.

OR

***3)*** a) Discuss about the series operation of thyristors.

b) Explain in detail the two-transistor model of SCR.

## UNIT - II

***4)*** a) Explain with waveforms and equations, The operation of single phase full converters fed with RL load.

b) Discuss the PWM control used for power factor improvement.

OR

***5)*** a) Briefly explain the operation of single phase dual converter.

b) Write a note on the effect of bad productance in converters.

## UNIT - III

***6)*** Describe the operation of series inverter with aid of diagrams. Describe an expression for output frequency, current and voltages. What are the disadvantages of basic series inverter?

OR

***7)*** Explain the operation of 3phase bridge inverter for 180º mode of operation with aid of phase and line voltage waveforms.

## UNIT - IV

***8)*** Explain in detail the principle of operation of single phase cycloconverters.

OR

***9)*** Describe the principle of step up chopper. Derive an expression for the average output voltage interms of input dc voltage and duty cycle.

☛ ☛ ☛

# (DEE 325)

**B.Tech. DEGREE EXAMINATION, DECEMBER – 2015**

**(Examination at the end of Third Year Fourth Semester)**

**ELECTRICALS AND ELECTRONICS**

**Paper - V : Utilization of Electrical Power**

**Time : 3 Hours** **Maximum Marks: 75**

---

***Answer Question No.1 is compulsory*** ***(15)***

***Answer any ONE question from each unit*** ***(4×15 = 60)***

***1)*** a) What is illumination?

b) Define polar curves.

c) Define crest speed.

d) Define electric drive.

e) Define load equalization.

f) Define Stefan's law.

g) What is braking?

h) Bring out the advantages of electrical heating.

i) What are different types of arc welding?

j) Define luminous flux.

k) Define luminous intensity.

l) What do you mean by tractive effect?

m) What is overload capacity of inducting motors?

n) What is MHCP?

o) What is resistance welding?

## UNIT - I

***2)*** a) Comparison between AC drive and DC drive.

b) What is an Electric drive. Classify various types of electric drives and discuss their merits and demerits.

OR

***3)*** What are different classifications of load and how they affect the motor selection? What is the main requirement to accelerate the load of high moment of inertia.

## UNIT - II

***4)*** a) What are the advantages of electric traction.

b) Explain various current collecting systems.

OR

***5)*** a) Explain the speed time curve of traction.

b) Factors affecting the schedule speed.

## UNIT - III

***6)*** a) What are the advantages of electric heating.

b) What are the properties of heating element?

OR

***7)*** a) Give the comparison between resistance welding and arc welding.

b) Describe the principle and working of the Ajax-Wyatt furnace.

## UNIT - IV

***8)*** a) What are the various factors to be considered in the design of factory lighting.

b) Explain in detail about flood lighting.

OR

***9)*** a) Explain the laws of illumination.

b) A lamp is taking a current of 0.6A at 230V and 125MHCP. Find its efficiency in MHCP per watt and lumen per watt if spherical reduction factor is 0.77.

☛ ☛ ☛

# (DEE 326)

**B.Tech. DEGREE EXAMINATION, DECEMBER – 2015**

**(Examination at the end of Third Year Fourth Semester)**

**ELECTRICALS AND ELECTRONICS**

**Paper - VI : Switch Gear & Protection**

**Time : 3 Hours** **Maximum Marks: 75**

---

***Answer Question No.1 is compulsory*** ***(15)***

***Answer any ONE question from each unit*** ***(4×15 = 60)***

***1)*** a) Define Relay.

b) Explain soil resistivity.

c) Define amplitude comparators.

d) Define setting value.

e) Define Reach.

f) Define earth resistance.

g) What is meant by arc?

h) What are the advantages of grounding?

i) Give the characteristics of IDMT relay.

j) List the properties of $SF_6$ gas.

k) Give the characteristics of DMT relay.

l) Define restraiking voltage.

m) Define operating time.

n) Explain arc quenching.

o) Define recovery voltage.

## UNIT - I

***2)*** a) Draw the constructional details of non-directional induction relay.

b) Draw and explain the schematic of an impedance relay and its operating characteristics on R-X diagram.

OR

***3)*** Explain briefly electromechanical relays with neat sketch.

## UNIT - II

***4)*** a) Explain current chopping in circuit breakers and how it can be minimised.

b) What are the elementary principles of arc phenomenon.

OR

***5)*** Describe the construction and working of $SF_6$ circuit breaker with multiple breaks. What are its merits and demerits.

## UNIT - III

***6)*** a) Explain the biased differential protection scheme employed for protection of alternators.

b) Explain the protection scheme for generator-transformer unit protection.

OR

***7)*** a) What are the objectives of earthing?

b) Explain solid grounding with neat sketch.

## UNIT - IV

***8)*** a) What are the merits and demerits of static relays.

b) Compare between electromechanical relays and static relays.

OR

***9)*** a) What are the different types of differential relays.

b) Explain inverse time over current relays.