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Code No:**R32011** **R10** **Set No. 1**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015
GEOTECHNICAL ENGINEERING –I
(Civil Engineering)

Time: 3 hours **Max. Marks:75**

Answer any FIVE Questions
All Questions carry equal marks
Ordinary and Semi-log Graph Papers are to be supplied in the Examination Hall

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1 a) Write short note on formation of soils 7

b) A sample of sand above the water table was found to have a natural moisture content of15% and a unit weight of 18.84 kN/m^3. Laboratory tests on a dried sample indicatedvalues of e_{min} = 0.50 and e_{max} =0.85 for the densest and loosest states respectively.Compute the degree of saturation and the relative density. Assume G_s = 2.65. 8

2 a) Write briefly about the Liquid limit test conducted in the laboratory. 7

b) During the determination of the shrinkage limit of a sandy clay, the following laboratorydata was obtained:

Wet weight of soil + dish = 87.85 g
Dry weight of soil + dish = 76.91 g
Weight of dish = 52.70 g
The volumetric determination of the soil pat:
Weight of dish + mercury = 430.8 g
Weight of dish = *244.62 g* 8

Calculate the shrinkage limit, assuming G_s = 2.65

3 a) In a falling head permeability test, if the time intervals for the head to fall from h_1 to h_2 and h_2 to h_3 are same. Show that the h_2 is the geometrical mean of h_1 and h_3. ($h_2 = \sqrt{h_1 * h_3}$) 7

b) A soil strata consists of 3 layers of thickness 1 m , 1,5 m and 1.9m having the coefficients of permeability of 2.3 X 10^{-3} cm/s, 1.85 X 10^{-3} and 3.5 X 10^{-4} cm/s respectively. Estimate the average coefficient of permeability in the direction. (i) parallel and (ii) normal to the flow. 8

4 a) What are the specifications of soil used as filters? Why these specifications are required. 7

b) A stratum of sand 2.5 m thick overlies a stratum of saturated clay 3 m thick. The water table is 1 m below the surface. For the sand, G_s = 2.65, e = 0.50 and for the clay G_s = 2.72, e = 1.1. Calculate the total and effective vertical stresses at depths of 1 m, 2.5 m and 5.5 m below the surface assuming that the sand above the water table is completely dry. 8

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5 a) Derive the governing differential equation for a stress at any point below the ground with line load by considering stress at any pint with a point load. 8

b) A rigid footing of 3 m diameter carries a column load of 1500 kN at foundation level. Compute the increase in stress due to the column load at a radial distance of 5 m and vertical downward from foundation level of 2m. 7

6 a) Briefly discuss about the effect of Compaction of Engineering Properties 6

b) The following results were obtained from a standard compaction test on a soil

Mass (g)	2010	2092	2114	2100	2055
Water Content (%)	12.8	14.5	15.6	16.8	19.2

The value of G_s is 2.67. Plot the dry density – water content curve and give the optimum water content and maximum dry density? Plot also the curves of 0%, 5% and 10 % air content and give the value of air content at maximum dry density. The volume of the mould is 1000 cm^3 9

7 a) Briefly explain any one method to compute the coefficient of consolidation. 7

b) In an oedometer (consolidation) test a specimen of saturated clay 20 mm thick reaches 50% consolidation in 30 min. How long it will take a layer of this clay 5 m thick to reach 90 % of the consolidation under the same stress and drainage conditions? How long would it take the layer to reach 50 % consolidation? 8

8 a) What are the different types tri-axial compression tests are available based on drainage conditions. Explain them in brief. 7

b) Pore pressure measurements were made during undrained tri-axial tests on samples of compacted fill material from an earth dam after saturating them in the laboratory. The results were as follows.

Property Measured (kN/m^3)	I Test	II Test
Lateral Earth Pressure	150	550
Total Vertical Pressure	450	1250
Pore Water Pressure	35	112

Determine the apparent cohesion and the angle of shearing resistance as referred to (i) Total Stress and (ii) Effective stress. 8

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1 a) What are the different structures of clay minerals are available? Discuss them. 7

b) An undisturbed sample of soil has a volume of 29 cm^3 and weighs 48 g. The dry weight ofthe sample is 32 g. The value of G_s = 2.66. Determine the (i) natural water content, (ii) insitu void ratio, (iii) degree of saturation, and (iv) saturated unit weight of the soil. 8

2 a) Define Consistency Limits? Why they are required to find in geotechnical Engineering? What are they? 7

b) Liquid limit test on a given sample gave the following values

Water Content (%)	47.5	49.5	51.9	53.9
Number of Blows	38	27	20	43

Plot the values on semi log-sheet and determine the liquid limit and flow index. 8

3 a) What are the limitations of Darcy's Law? Explain the concept of flow of water through soil. 7

b) In a falling head permeameter, the sample used is 20 cm long having a cross-sectional areaof 24 cm^2. Calculate the time required for a drop of head from 25 to 12 cm if the cross-sectionalarea of the stand pipe is 2 cm^2. The sample of soil is made of three layers. Thethickness of the first layer from the top is 8 cm and has a value of $k_1 = 2 \times 10^{-4}$ cm/sec, thesecond layer of thickness 8 cm has $k_2 = 5 \times 10^{-4}$ cm/sec and the bottom layer of thickness4 cm has $k_3 = 7 \times 10^{-4}$ cm/sec. Assume that the flow is taking place perpendicular to thelayers (Fig. 1). 8

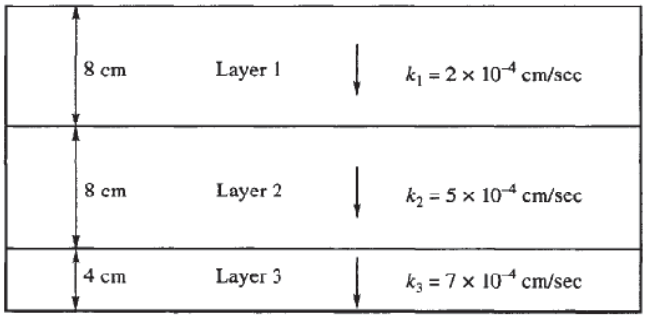

Fig. 1

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4 a) What is flow net? What are its characteristics? Discuss its uses? 7

b) From the flow net diagram drawn for seepage flow through an earth dam the flowing data is obtained. Compute the seepage through the body of the dam per unit length. Number of flow lines = N_f = 2.1, Number of equi-potential drops = 10. coefficient of permeability = 1.35 X 10^{-5} cm/sec. head causing seepage flow, h = 13.5 m. 8

5 a) Derive the governing differential equation for a stress at any point below the ground with circular load by considering stress at any pint with a point load. 8

b) A monument 1500 kN is erected on the ground surface. Considering the load as concentrated, determine the vertical pressure directly under the monument at a depth of 6 m below the ground surface. Also calculate the vertical pressure at a point, which is at a depth of 10 m and a horizontal distance of 3 m from the axis of the load. 7

6 a) Discuss about the compaction control in the field. 7

b) In a compaction test the optimum moisture content (OMC) = 11.0%, and the maximum dry density = 1.98 t/m^3. At the OMC the degree of saturation = 91%. Determine the greatest dry density that it is possible for this soil to have when the moisture content is 11%. 8

7 a) Explain the Consolidation process with Spring Analogy Mechanism. 6

b) The fallowing results were obtained from an oedometer test on a specimen of saturated clay:

Pressure (kN/m^2)	27	54	107	214	429	214	107	54
Void ratio	1.243	1.217	1.144	1.068	0.994	1.001	1.012	1.024

A layer of this clay 8 m thick lies below a 4 m depth of sand, the water table being at the surface. The saturated unit weight for both soils is 19 kN/m^3. A 4 m depth of fill of unit weight 21 kN/m^3 is placed on the sand over an extensive area. Determine the final settlement due to consolidation of the clay. If the fill were to be removed some time after the completion of consolidation, what would eventually take place due to swelling of the clay? 9

8 a) Draw stress strain relations of dense and loose sand from shear strength tests and explain. 5

b) Define critical void ratio. What is its importance? 5

c) Explain the Different types of failure of Soil specimen during the triaxial test and explain. 5

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1 a) Write detailed note on minerals available in soil. 7

b) A clay sample is found to have a mass of 423.53 g in its natural state. It is then dried in anoven at 105 °C. The dried mass is found to be 337.65 g. The specific gravity of the solids is2.70 and the density of the soil mass in its natural state is 1700 kg/m^3. Determine the watercontent, degree of saturation and the dry density of the mass in its natural state. 8

2 a) Discuss briefly about HRB classification of soils. 7

b) A dried soil of 128.4 gm were subjected to a mechanical analysis and hydrometer analysis together with the following result: Sieve analysis gave the following quantities 8

Retained Sieve	2.00 mm	0.60 mm	0.150 mm	0.075 mm	0.03 mm	0.003 mm
Retained Soil	0	42.1	24.2	16.6	28.3	17.2

Draw the grading curve and classify the material according IS Classification.

3 a) Derive the relation between the superficial velocity of flow to the seepage velocity of the flow. 7

b) The data given below relate to two falling head permeameter tests performed on two different soilsamples:
stand pipe area = 4 cm^2; sample area = 28 cm^2; sample height = 5 cm; initial head in the stand pipe =100 cm and final head = 20 cm; time required for the fall ofwater level in test 1, t = 500 sec and time required for the fall ofwater level in test 2, t = 15 sec.
(i) Determine the values of k for each of the samples. If these two types of soils form adjacentlayers in a natural state with flow (ii) in the horizontal direction, and (iii) flow in the verticaldirection, determine the equivalent permeability for both the cases by assuming that the thickness of each layer is equal to 150 cm. 8

4 a) Write short note on Quick sand condition. Derive the governing differential equation for critical hydraulic gradient. 8

b) What are the different corrections to be made to the phreatic line? And how the same is carriedout. 7

5 a) Derive the governing differential equation for a stress at any point along the center line below the ground with strip load by considering stress at any pint with a point load. 7

b) Three parallel strip footings (Fig. 1) 3 m wide each and 5 m apart center to center transmit contact pressures of 200, 150 and 100 kN/m^2 respectively. Calculate the vertical stress due to the combined loads beneath the centers of each footing at a depth of 3 m below the base. Assume the footings are placed at a depth of 2 m below the ground surface. Use Boussinesq's method for line loads. 8

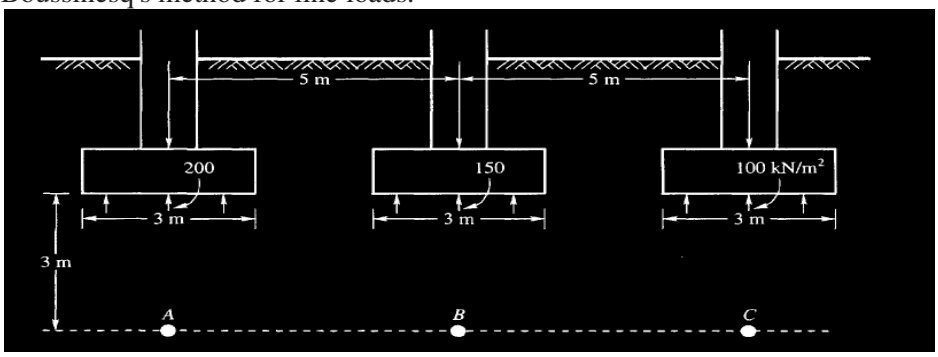

Fig. 1

6 a) What are the factors affecting compaction? Discuss. 6

b) The following results were obtained from a standard compaction test on a soil

Mass (g)	1850	1910	1950	1940	1910
Water Content (%)	14	16	18	20	22

9

The value of G_s is 2.67. Plot the dry density – water content curve and give the optimum water content and maximum dry density? Plot also the curves of 0%, 5% and 10 % air content and give the value of air content at maximum dry density. The volume of the mould is 1000 cm^3

7 a) Define the stress history? What is its importance? Discuss the procedure of estimating the presonsildation pressure given by Casagrande. 8

b) A Normally consolidated clay layer of 10 m thickness has a unit weight of 20 kN/m^3 and specific gravity 2.70. The liquid limit of the clay is 65%. A structure constructed on the clay increase the overburden pressure by 10%. Estimate the ultimate consolidation settlement 7

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8 a) What are the different strength tests available in the laboratory based on drainage conditions. Explain them in detail when do you prefer the corresponding tests by simulating the field conditions? 7

b) The results below were obtained at failure in a series of consolidated undrainedtriaxial tests, with pore water pressure measurement, on specimens of fully saturated clay. Determine the values of the shear strength parameters C^1 and φ^1. If a specimen of the same soil were consolidated under an all round pressure of 250 kN/m^2 and the principal stress difference applied with the all round pressure changed to 350 kN/m^2, what would be the expected value of principal stress difference at failure? 8

Cell Pressure, σ_3 (kN/m^2)	150	300	450
Deviator stress ($\sigma_1 - \sigma_3$) (kN/m^2)	103	202	305
Pore water pressure, u (kN/m^2)	82	169	252

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	a)	Write short note on Adsorbed water in soil	7
	b)	A partially saturated soil sample has a natural water content of 15% and a bulk unit weight of 20 kN/m^3. Compute the degree of saturation, void ratio and porosity if the specific gravity of solids is 2.7. If subsequently the soil gets submerged compute its unit weight.	8
2	a)	Discuss about the hydrometer analysis test. What are the corrections to be applied to the hydrometer readings? Why?	7
	b)	A 500 g sample of dry soil was used for a combined sieve and hydrometer analysis (152 H typeHydrometer, L =16.3-0.16417R). The soil mass passing through the 75 *fi* sieve = 120 g. Hydrometer analysis wascarried out on a mass of 40 g that passed through the 75 µsieve. The average temperature recordedduring the test was 30°C. Given: G_s = 2.55, C_m(meniscus) = 0.50, C_o = +2.5, η = 8.15 x 10~3 poises. The actual hydrometer reading R = 15.00 after a lapse of 120 min after the start of the test.Determine the particle size D and percent finer P%.	8
3	a)	What is capillary Rise? Derive the equation for the same.	8
	b)	In a falling head permeability test, the time taken for the head to fall from h_1 to h_2 is t. If thetest is repeated with the same initial head h_1, what would be the final head in a time interval of t/2?	7
4	a)	What are Total, neutral and effective stresses? Explain them with an example.	7
	b)	A soil profile consists of a surface layer of sand 6 m thick (γ = 15.8 kN/m^3), an intermediate clay layer 2 m thick (γ_{sat} = 19.75 kN/m^3), and a bottom layer of gravel 4 m thick (γ_{sat} = 21.8 kN/m^3). The water table is at the top of the clay layer. Determine the effective stress at various layers when a surcharge of 100 kN/m^2 is placed at the ground surface	8
5	a)	Discuss about the construction of New marks Influence Chart. What are the uses of New mark's Influence chart?	7
	b)	A long masonry wall footing carries a uniformly distributed load of 200 kN/m 2. If the width of the footing is 4 m, determine the vertical pressures at a depth of 3 m below the (i) center, and (ii) edge of the footing.	8

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6 a) Explain the mechanism of compaction. 6

b) The following results were obtained from a standard compaction test on a soil

Mass (g)	1850	1940	1980	1960	1930
Water Content (%)	24	27	29	32	34

9

The value of G_s is 2.67. Plot the dry density – water content curve and give the optimum water content and maximum dry density? Plot also the curves of 0%, 5% and 10 % air content and give the value of air content at maximum dry density. The volume of the mould is 1000 cm^3

7 a) List the basic assumptions on which Terzaghi's theory of consolidation is based. 6

b) Data obtained from a laboratory consolidation test are tabulated as follows:

Test pints	1	2	3	4	5	6
σ' (kPa)	20	50	100	200	400	800
Total ΔH (mm)	0.23	0.87	1.90	3.62	5.55	7.25

9

G_s = 2.70, H_0 (initial thickness at zero pressure) = 22.5 mm, w = (moisture content at the beginning of the test) = 0.78. Plot the e – logσ' curve and calculate C_c.

8 a) Define Mohr's rupture envelope. Explain the theory of failure on which this line is based. 7

b) Discuss the procedure of conducting direct shear test? What are the results we can estimate from this test? What are its limitations? 8

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Code No: **R32021** **R10** **Set No. 1**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015

ELECTRICAL MACHINE DESIGN

(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

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1 a) Explain in detail about the design factors of Electrical Machines. [8]

b) Explain in detail about the basic principles used in the design of electrical machines. [7]

2 a) With suitable examples, explain about full pitch coil, fractional pitch coil, concentrating winding and distributed winding. [8]

b) Draw the winding diagram for a 4 pole, 12 slot simplex lap connected DC generator with commutator having 18 segments. [7]

3 a) Explain in detail about the design of field systems of DC Machines. [7]

b) Find the armature voltage drop of a 300 kW, 500 volt, 6 pole lap connected DC generator having 150 slots with 8 conductors per slot. Area of each conductor is $20mm^2$ and length of mean turn is 2 m. The resistivity is 0.021 $\Omega\ m^{-1}\ mm^2$. [8]

4 a) Explain in detail about the factors that help in choosing different types of transformers. [8]

b) Explain in detail about the core design of the transformers. [7]

5 a) Derive the relationship between the current densities of primary and secondary windings of transformers. [7]

b) Determine the dimensions of core and yoke for a 200 kVA, 50 Hz single phase core type transformer. A cruciform core is used with distance between adjacent limbs equal to 1.6 times the width of core laminations. Assume voltage per turn 10 V, maximum flux density 1 Wb/m^2, window space factor 0.32, current density 4 A/mm^2, and stacking factor = 0.9. The net iron area is 0.56 d^2 in a cruciform core where d is the diameter of circumscribing circle. Also the width of the largest stamping is 0.85d. [8]

6 a) Explain in detail about the choice of specific electric and magnetic loadings for Induction Machines. [7]

b) A 15 kW, 440 V, 4 pole, 50 Hz, 3 phase induction motor is built with a stator bore 0.24 m and a core length of 0.15. The specific electric loading is 20000 ampere conductors per meter. Using the data of this machine, determine the core dimensions of a 11 kW, 460 V, 6 pole, 50 Hz three phase induction motor. Assume a full load efficiency of 85 % and power factor of 0.9 for each machine. The winding factor is 0.955. [8]

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7 a) Explain the different factors that should be considered while estimating the length of air gap in induction machines. [7]

b) A 90 kW, 500 V, 50 Hz, 3 phase, 8 pole induction motor has a star connected stator winding accommodated in 63 slots with 6 conductors per slot. The slip ring voltage on open circuit is to be about 410V. Find number of slots, number of conductors per slot, coil span and slip ring voltage on open circuit. Assume efficiency = 0.85, power factor = 0.9. [8]

8 a) Explain in detail about the stator design of synchronous machines. [7]

b) Determine the main dimensions for a 1000 kVA, 50 Hz, 3 phase, 375 rpm alternator. The average air gap flux density is 0.5 Wb/m^2 and the ampere conductors per meter are 25000. Use rectangular poles and assume a suitable value for ratio of core length to pole pitch in order that bolted on core construction is used for which the maximum permissible peripheral speed is 60 m/s. The run-away speed is 1.8 times the synchronous speed. [8]

Code No: **R32021** **R10** **Set No. 2**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015

ELECTRICAL MACHINE DESIGN

(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 75**

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*****

1 a) Explain in detail about the major considerations to evolve a good design of Electrical Machines. [8]

b) Explain in detail about the cooling techniques used in electrical machines. [7]

2 a) With the neat sketch explain about simplex lap and simplex wave winding. [8]

b) Draw the winding diagram for a simplex lap wound 24 slot, 4 pole DC armature with 24 commutator segments. [7]

3 a) Explain in detail about the choice of armature windings in DC Machines. [7]

b) A 5 kW, 250 V, 4 pole, 1500 rpm shunt generator is designed to have a square pole face. The loadings are: [8]
Average flux density in the air gap = 0.3 Wb/m^2 and ampere conductors per meter = 10000. Assume full load efficiency = 0.9 and ratio of pole arc to pole pitch = 0.7. Find the main dimensions of the machine.

4 a) Give the detailed comparison of power and distribution transformers. [8]

b) Explain in detail about the yoke design of the transformers. [7]

5 a) Write the output equations of single and three phase transformers and explain different parameters. [7]

b) Calculate approximate overall dimensions for a 200 kVA, 6600/440 V, 50 Hz, 3 phase core type transformer. The following data may be assumed: EMF per turn = 9V; maximum flux density = 1 Wb/m^2; current density = 2 A/mm^2; window space factor = 0.3, overall height = overall width; stacking factor = 0.9; Use a 3 stepped core. [8]
For a three stepped core:
Width of largest stamping = 0.9 d and Net iron area = 0.6 d^2 where d is the diameter of the circumscribing circle.

6 a) Explain in detail about the stator design of three phase induction machine. [7]

b) Estimate the stator core dimensions and number of stator conductors for a 100 kW, 3300 V, 50 Hz, 12 pole star connected slip ring induction motor. [8]
Assume:
Average gap density = 0.45 Wb/m^2, ampere conductors per meter = 25000, efficiency = 0.89, power factor = 0.9 and winding factor = 0.95. The slot loading should not exceed 500 ampere conductors.

7 a) Explain in detail about different factors that should be considered while designing the rotor slots of squirrel cage rotor. [7]

b) A 3 phase, 2 pole, 50 Hz squirrel cage induction motor has a rotor diameter 0.17 m and core length 0.1 m. The peak density in the air gap is 0.45 Wb/m^2. The rotor has 33 bars, each of resistance 110 μΩ and a leakage inductance 2 μH. The slip is 5%. Calculate the rotor output and torque exerted. Neglect the resistance of end rings. [8]

8 a) Explain in detail about the choice of specific electric and magnetic loadings for Synchronous Machines. [7]

b) Find the main dimensions of a 2500 KVA, 187.5 rpm, 50 Hz, 3 phase, 3 kV, salient pole synchronous generator. The generator is to be a vertical, water wheel type. The specific magnetic loading is 0.65 Wb/m^2 and the specific electric loading is 35000 A/m. Use circular poles with ratio of core length to pole pitch = 0.65. Specify the type of pole construction used if the run-away speed is about 2 times the normal speed. [8]

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III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015

ELECTRICAL MACHINE DESIGN

(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions
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*****

1 a) Explain in detail about the limitations in the design of Electrical Machines. [8]

b) Explain in detail about different causes for the temperature rise in the electrical machines. [7]

2 a) By taking a suitable example, define back pitch, front pitch, winding pitch and commutator pitch. [8]

b) Find out whether the following windings are symmetrical or not [7]
(i) 6 pole, 37 slot, 2 coil sides per slot, simplex wave winding
(ii) 8 pole, 126 slot, 6 coil sides per slot, duplex wave winding

3 a) Explain in detail about the choice of specific electric and magnetic loadings for DC Machines. [7]

b) A design is required for a 50 kW, 4 pole, 600 RPM, DC shunt generator, the full load terminal voltage being 200 V. If the maximum gap density is 0.8 Wb/m^2 and the ampere conductors per meter are 25000, calculate suitable dimensions of armature core to give a square pole face. Assume that the full load armature voltage drop is 3% of the rated terminal voltage, and the field current is 1% of the rated full load current. Ratio of pole arc to pole pitch is 0.7. [8]

4 a) Give the comparison of single phase and three phase transformers in detail. [8]

b) Explain in detail about different methods of cooling of transformers. [7]

5 a) Explain different steps in the design of transformers. [7]

b) The current densities in the primary and secondary windings of a transformer are 2.2 and 2.1 A/mm^2 respectively. The ratio of transformation is 10:1 and the length of the mean turn of the primary is 10% greater than that of secondary. Calculate the resistance of secondary winding referred to primary and secondary. Given that the primary winding resistance is 10Ω. [8]

6 a) Explain in detail about different factors that affect while designing the stator slots of induction machines. [7]

b) Find the main dimensions of a 15 kW, 3 phase, 400 V, 50 Hz, 2810 rpm, squirrel cage induction motor having efficiency of 0.92 and a full load power factor of 0.85. [8]
Assume:
Specific magnetic loading = 0.4 Wb/m^2; specific electric loading = 20000 A/m.
Take the rotor peripheral speed as approximately 20 m/s at synchronous speed.

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7 a) Explain in detail about different factors that should be considered while designing the rotor slots of wound rotor induction machines. [7]

b) A 3 phase, 2 pole, 50 Hz squirrel cage induction motor has a rotor diameter 0.15 m and core length 0.1 m. The peak density in the air gap is 0.5 Wb/m^2. The rotor has 33 bars, each of resistance 100 μΩ and a leakage inductance 2 μH. The slip is 6%. Calculate the peak value of current in each bar and rotor copper loss. Neglect the resistance of end rings. [8]

8 a) Write the output equation of Synchronous Machines and explain in detail about different parameters. [7]

b) Find the main dimensions of a 100 MVA, 11 kV, 50 Hz, 150 rpm, 3 phase water wheel generator. The average gap density is 0.6 Wb/m^2 and ampere conductors per meter are 35000. The peripheral speed should not exceed 60 m/s at normal running speed in order to limit the run-away peripheral speed. [8]

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III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015

ELECTRICAL MACHINE DESIGN

(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions

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*****

1 a) Explain in detail about the modern manufacturing techniques of Electrical Machines. [8]

b) Explain in detail about different ways of heat dissipation in electrical machines. [7]

2 a) Define the terms 'Coil', 'Turn', 'Conductor' and 'Coil side'. [5]

b) Draw the winding diagram in radial form for a 4 pole, 12 slot simplex lap connected DC generator with commutator having 12 segments. Indicate the position of brushes. [10]

3 a) Explain in detail about the constructional details of DC Machines [7]

b) Calculate diameter and length of armature for a 7.5 kW, 4 pole, 1000 rpm, 220 V shunt motor. Given: full load efficiency = 0.9, maximum gap flux density = 0.9 Wb/m^2, specific electric loading = 25000 ampere conductors per meter, field form factor = 0.7. Assume that the maximum efficiency occurs at full load and the field current is 2.5% of rated current. The pole face is square. [8]

4 a) Give the comparison of core type and shell type transformers in detail. [7]

b) Give the detailed comparison of natural and forced cooling techniques of transformers by considering different mediums. [8]

5 a) Explain about different types of windings used in core type of transformers. [7]

b) A 300 kVA, 6600/400 V, 50 Hz, delta/star 3-phase core type transformer has the following data: [8]
Width of HV winding = 24 mm, width of LV winding = 15 mm; height of coils = 0.5 m, length of mean turn = 0.9 m, HV winding turns = 800, width of duct between LV and HV windings = 15 mm
Calculate the leakage reactance of the transformer referred to LV side and HV side separately.

6 a) Write the output equation of three phase induction machine and explain different factors that will determine the output. [7]

b) Determine the main dimensions of a 3.7 kW, 400 V, 3 phase, 4 pole, 50 Hz squirrel cage induction motor to be started by a star delta starter. [8]
Assume: Average flux density in the gap = 0.4 Wb/m^2, ampere conductors per meter = 20000, efficiency = 0.9, power factor = 0.9, winding factor = 0.955, stacking factor= 0.9.

7 a) Explain in detail about the procedure of calculating short circuit (blocked rotor) current in induction machines. [7]

b) A 11 kW, 3 phase, 6 pole, 50 Hz, 220 V, star connected induction motor has 54 stator slots, each containing 9 conductors. Calculate the values of bar and end ring currents. The number of rotor bars is 64. The machine has an efficiency of 0.9 and a power factor of 0.8. The rotor MMF may be assumed as 80 % of stator MMF. Also find the bar and end ring sections if the current density is 4 A/mm^2. [8]

8 a) Define short circuit ratio and explain the effects of short circuit ratio on Machine performance. [7]

b) Determine a suitable number of slots and conductors per slot, for the stator winding of a 3 phase 3300 V, 50 Hz, 300 rpm alternator. The diameter is 2.2 m and the axial length of core is 0.36 m. The maximum flux density in the air gap should be approximately 0.95 Wb/m^2. Assume sinusoidal flux distribution. Use single layer winding and star connection for stator. [8]

Code No: **R32026** **R10** **Set No. 1**

III B.Tech II Semester Regular/ Supplementary Examinations, May/June - 2015

MANAGEMENT SCIENCE

(Common to EEE, ECE, CSE, CHEM, EIE, BME, IT)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

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1 a) What is the significance of Hawthorne experiments for management? [8]

b) Define Management and explain its functions. [7]

2 a) Explain the significance of statistics in quality control. [7]

b) Explain the variables that go into the determination of Economic Order Quantity. [8]

3 a) What do you understand by Human Resource Management? [8]

b) Define Human Resource Development? Outline its concept. [7]

4 The following table gives the information about various activities of a project network. [15]

Activity	Normal Time	Normal Cost	Crash Time	`Crash Cost
1-2	9	8000	7	10000
1-3	5	5000	3	8000
2-3	7	7000	5	8600
2-4	8	6000	6	7000
3-4	6	9000	4	11400

The indirect cost per day is 2,600/-. Determine the optimum cost and duration of the project.

5 a) How do you formulate and implement strategy? Explain. [8]

b) What is the need for corporate planning process? [7]

6 a) What is Ethics? Explain the importance of ethics in financial management. [8]

b) "Ethical financial management practices lead an organization to greater heights" Discuss. [7]

7 a) Briefly explain the various techniques of business communication. [8]

b) What are the problems faced while meeting the cross cultural communication? [7]

8 a) Define Total Quality Management and explain its significance. [8]

b) Write notes on six sigma. [7]

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Code No: **R32026** **R10** **Set No. 2**

III B.Tech II Semester Regular/ Supplementary Examinations, May/June - 2015

MANAGEMENT SCIENCE

(Common to EEE, ECE, CSE, CHEM, EIE, BME, IT)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

*****

1 a) Explain the nature and importance of management. [8]

b) What are the challenges you have to face as a manager? [7]

2 a) Describe the basic procedure to be followed in adopting work study techniques for Sound results. [8]

b) What is inventory? Explain the need for inventory control. [7]

3 a) Explain the functions of personnel management. [8]

b) Evaluate the different sources of recruitment. [7]

4 A project consists of nine activities and three time estimates. Find [15]
a) Expected time variance
b) Network diagram
c) Calculate Earliest times, Latest times and floats
d) Critical path and duration

Activity	Optimistic Time	Most likely Time	Pessimistic Time
1-2	3	6	15
1-6	2	5	14
2-3	6	12	30
2-4	2	5	8
3-5	5	11	17
4-5	3	6	15
6-7	3	9	27
5-8	1	4	7
7-8	4	19	28

5 a) What are the factors of external and internal environmental to be considered for Formulating the strategy? Explain. [8]

b) Describe the process of strategic management. [7]

6 a) Write about the importance of ethics in marketing? [7]

b) What are the basic principles of business ethics? [8]

7	a)	Briefly explain the various techniques of business communication.	[8]
	b)	Explain the problems and challenges of cross cultural communication.	[7]
8	a)	What is Enterprise Resource Planning? Explain.	[7]
	b)	Explain the merits and demerits of Enterprise Resource Planning.	[8]

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Code No: **R32026** **R10** **Set No. 3**

III B.Tech II Semester Regular/ Supplementary Examinations, May/June - 2015

MANAGEMENT SCIENCE

(Common to EEE, ECE, CSE, CHEM, EIE, BME, IT)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

*****

1 a) Describe the theory of scientific management and explain how it was criticized. [8]

b) What is matrix organization and what is its uniqueness? [7]

2 a) What do you mean by EOQ? Derive the formula for determining the EOQ. [8]

b) Define Control charts and explain its types. [7]

3 a) What do you understand by marketing mix? [8]

b) Explain briefly the basic elements in marketing mix. [7]

4 A small project is composed of the following activities whose time estimates are given below. [15]

Activity	Predecessor	Optimistic Time	Most likely Time	Pessimistic Time
A	-	2	4	6
B	A	8	12	16
C	A	14	16	30
D	B	4	10	16
E	C, B	6	12	18
F	E	6	8	22
G	D	18	18	30
H	F, G	8	14	32

i) Draw the network and find the critical path.
ii) Compute the expected project completion time.
iii) Calculate Earliest times and Latest times

5 a) Define strategic management and describe the process of strategic management. [8]

b) How do you carry out SWOT analysis for a manufacturing unit? [7]

6 a) What is Ethics? Explain the importance of ethics in HRM. [8]

b) Write about the importance of ethics in marketing. [7]

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7 a) Explain the various elements of writing a good report. [8]
b) What are the skills required to effective presentation? [7]

8 Write a notes on : a) Supply Chain Management [8]
b) Performance Management. [7]

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Code No: **R32026** **R10** **Set No. 4**

III B.Tech II Semester Regular/ Supplementary Examinations, May/June - 2015

MANAGEMENT SCIENCE

(Common to EEE, ECE, CSE, CHEM, EIE, BME, IT)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

*****

1 a) Why is management considered as a profession and what factors make it a profession? [8]

b) Distinguish between Theory – X and Theory – Y. [7]

2 a) What is meant by materials management? State its advantages and disadvantages. [8]

b) Explain the types of ABC analysis. [7]

3 a) State the importance and methods of job evaluation. [8]

b) Define training and explain its methods. [7]

4 A PERT network has the following activities with their time estimates given below. You are required to calculate the expected time of activities, draw the network and find the critical path and its duration. [15]

Activity	Optimistic Time	Most likely Time	Pessimistic Time
0-1	2	3.5	8
0-2	3	3.75	6
0-3	1	2.5	7
1-2	3	7.5	9
1-4	4	5.5	10
2-4	2	5	8
3-4	2	2.75	5
3-5	3	6	9
4-5	2	5	8

5 a) What do you understand by the concept of strategy? Discuss the concept of Mission And Vision. [8]

b) Explain strategy variations and Generic strategy alternatives. [7]

6 a) Discuss about the basic principles of business ethics. [8]

b) Explain the importance of Ethics in business management? [7]

7 a) Explain various methods of interviews in detail. [8]

b) What is conference and briefly explain the video conferences. [7]

8 Write a notes on: a) Capability Maturity Model [8]

b) Balanced Score card [7]

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Code No: **R32024** **R10** **Set No. 1**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015

MICROPROCESSORS AND MICROCONTROLLERS

(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

*****

1	a)	Differentiate between Microprocessor and Microcontroller. Mention few applications.	[8]
	b)	With the help of functional diagram explain the operation of 8086 microprocessor	[7]
2	a)	Explain any three string manipulation instructions of 8086.	[8]
	b)	Describe the function of the following pins in8086 maximum mode of operation i) TEST ii) $RQ_0/\overline{GT_0}$ and $RQ_1/\overline{GT_1}$.	[7]
3	a)	Write a program to find the sum of squares of first ten numbers.	[7]
	b)	Explain the following assembler directives in detail. i) ENDP ii) LABEL iii) EQU iv) ASSUME	[8]
4	a)	Explain about the Architecture of 8255 PPI along with operating modes.	[8]
	b)	Interface DAC AD7523 with 8086 CPU running at 8 MHz and write an Assembly Language Program to generate a saw tooth waveform using this circuit.	[7]
5	a)	Describe the important features of 8257 DMA.	[8]
	b)	Discuss about the operational command words of 8259 and draw its frame format.	[7]
6		How does the timer overflow interrupt differ from the real-time clock interrupts? Give four applications of the real-time clocked interrupt.	[15]
7	a)	Discuss about the addressing modes of 8051 micro controller.	[7]
	b)	Explain the following instructions of 8051 micro controller. i) ORL ii) CLR iii) RLC iv) CPL	[8]
8	a)	Discuss in detail about parallel I/O ports in 8051 micro controller and explain how these ports are accessible for specific applications.	[8]
	b)	Draw the relay's and latch interfacing diagram with the 8051 microcontrollers and explain its operation.	[7]

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Code No: **R32024** **R10** **Set No. 2**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015

MICROPROCESSORS AND MICROCONTROLLERS

(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks

*****

1 a) Draw the Register organisation of 8086 microprocessor and explain its operation. [7]

b) What is BIU and give the special processor activities of 8086? [8]

2 a) What is meant by an addressing mode? Explain the different addressing modes supported by 8086 with suitable examples. [8]

b) Draw timing diagram for maximum mode of operation in 8086 micro processor. [7]

3 a) Explain the following assembler directives: [8]
i) END ii) ORG iii) PTR iv) OFFSET

b) Write ALP to interfacing stepper motor with 8086 microprocessor. [7]

4 a) Differentiate between the mode 1 and mode 2 operation of 8255. [8]

b) Explain how 8255 PPI is interfaced with 8086 microprocessor. [7]

5 a) Explain the cascaded mode operation of 8259 with a neat block diagram. [7]

b) Explain how static RAM are interfaced to 8086. Give necessary interface diagram assuming appropriate signals and memory size. [8]

6 a) Why the synchronous serial data communication much more efficient than asynchronous serial data communication explain in detail. [7]

b) Explain the details of different kinds of memories given in 8051 microcontroller. [8]

7 a) Explain the interfacing of 7-segment display with 8051 microcontroller [7]

b) Explain instruction set of 8051 micro controller [8]
i) MOV ii) PUSH iii) INC iv) ANL

8 Write short notes on the following: [15]
(a) 8279 Keyboard and display controller (b) MACROs and procedures.

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Code No: **R32024** **R10** **Set No. 3**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015

MICROPROCESSORS AND MICROCONTROLLERS

(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

*****

1	a)	What do mean by pipelined architecture? How it is implemented in 8086.	[7]
	b)	Explain the logical rotate instructions of 8086 with examples.	[8]
2	a)	Discuss briefly about the addressing modes of 8086 with examples.	[8]
	b)	Explain the minimum mode operation of 8086 with the help of a PIN diagram.	[7]
3	a)	Explain the following assembler directives in detail. i) ENDP ii) LABEL iii) EQU iv) ASSUME	[8]
	b)	Explain the Algorithm for the execution of WHILE loop.	[7]
4	a)	Explain I/O modes of operation of 8255 PPI.	[7]
	b)	Write an ALP for 8051 to find the sum of a series of 8-bit numbers.	[8]
5	a)	Describe the procedure of interfacing static memories with a CPU.	[7]
	b)	Interface a 8 X 8 matrix key board to 8051 using 8279. Display the key number on the 7 segment display interfaced to 8051 through 8279.	[8]
6	a)	What is interrupt priority of 8051 and how can one resolve it? Also give methodologies that a CPU can utilize.	[8]
	b)	Draw the pin diagram of 8051 controller and explain the functions of each pin.	[7]
7	a)	Briefly list out the relevant features of 8051 microcontroller.	[7]
	b)	Explain special function registers of 8051 microcontroller i) SCON ii) IE iii) TMOD iv) PCON	[8]
8		Write short notes on the following: a) Memory mapping techniques in 8086 b) Timers and Counters in 8051 microcontroller c) Instruction formats of 8086.	[15]

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Code No: **R32024** **R10** **Set No. 4**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015

MICROPROCESSORS AND MICROCONTROLLERS

(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

*****

1	a)	Describe about the physical memory organization in an 8086 system	[7]
	b)	Give the differences between microprocessors and microcontrollers?	[8]
2	a)	List out and explain instruction formats of 8086 microprocessor	[8]
	b)	Draw the timing diagram for the memory write cycle operation in the minimum mode of 8086 processor.	[7]
3	a)	Develop an assembly language program to multiply two BCD numbers of 2-digits each.	[7]
	b)	Explain the following assembler directives. i) END ii) ORG iii) EQU iv) ASSUME	[8]
4	a)	Draw the internal block diagram of 8255 PPI and explain its operation.	[8]
	b)	Draw the frame format of I/O mode in 8255 and explain the operation of each field in detail.	[7]
5	a)	Draw the circuit diagram to interface the DAC to the microcontroller and explain.	[7]
	b)	Distinguish between synchronous and asynchronous serial data transmission techniques.	[8]
6		Draw the 8051 microcontroller internal architecture and explain its operation in detail.	[15]
7	a)	Write 8051 program to multiply the unsigned number in register R2 by the unsigned number on port 2 and put the result in external RAM locations 1000H (MSB) and 1001H (LSB).	[8]
	b)	How do you enable communication among processes by using interrupts? Discuss?	[7]
8		Write short notes on the following: a) Relay's and latch interfacing with the 8051 microcontrollers b) Mode-1 Baud rates and serial data mode-2 multiprocessor mode c) MACROs.	[15]

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Code No: **R32025** **R10** **Set No. 1**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015

POWER SEMICONDUCTOR DRIVES

(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

*****

1 a) Explain stator voltage control method for speed control of Induction motor with the help of speed-torque characteristics. [8]

b) A 400 V, 15 kW, dc shunt motor takes 42 A, and runs at a speed of 1200 r.p.m. The shunt field resistance is 200 Ω. Assume that the load torque varies as the square of the speed. Neglect iron and friction losses, and also the armature reaction. Calculate the voltage to be applied to the armature for 1000 rpm and the control been accomplished by Ward-Leonard method. [7]

2 a) Draw the circuit diagram of a single phase semi-converter fed dc series motor and explain its operation with the help of associated voltage and current waveforms assuming continuous conduction. [8]

b) A separately excited dc motor is running on no-load with weak field. If field current is increased, explain various operations the motor will have before it settles at a new steady-state speed. [7]

3 a) Compare between semi-converters and full-converters. [4]

b) Explain the motoring operation of a three-phase semi-converter fed d.c. motor with the help of voltage and current waveforms when α is 30^0. Assume continuous conduction. [11]

4 a) With suitable block diagram, explain the operation of a closed-loop control of rectified fed dc drive. [8]

b) Bring out the comparison between conventional and static Ward Leonard schemes. [7]

5 a) Explain how motoring operation of a dc series motor can be obtained using chopper control. [8]

b) A 220 V, 24 A, 1000 rpm, separately excited dc motor has an armature resistance of 2Ω. Motor is controlled by a chopper with frequency of 500 Hz and source voltage of 230 V. Calculate the duty ratio for 1.2 times rated torque and 500 rpm. [7]

6 a) Show that variable frequency control yields higher torque to current ratio during starting. [7]

b) Explain the operation of a VSI fed induction motor drive. [8]

7 With the help of a neat schematic, discuss the operation of a Static Scherbius drive. Derive the speed-torque expression and draw its speed-torque characteristics. [15]

8 A 400 kW, three-phase, 3.3 kV, 50 Hz, unity power factor, four-pole, star-connected synchronous motor has the following parameters: R_a=0, X_s= 12 Ω, rated field current =10 A. [15]

The machine is controlled by variable frequency control at a constant V/f ratio. Calculate:

(i) The torque and field current for rated armature current, 900 rpm and 0.8 leading power factor, and

(ii) The armature current and power factor for regenerative braking torque equal to rated motor torque, 900 rpm and rated field current.

Code No: **R32025** **R10** **Set No. 2**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015

POWER SEMICONDUCTOR DRIVES

(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

*****

1 a) Explain why variable frequency control of Induction motor is more efficient than stator voltage control. [8]

b) Discuss in detail the field flux control method for DC shunt motor speed control. [7]

2 a) What are the drawbacks of rectifier fed DC drives? [5]

b) The speed of a separately excited DC motor is controlled by a single-phase full-controlled bridge rectifier, with the field also being controlled by a full-converter. The field current is set to the maximum possible value. The supply voltage to the armature and field converters is 220 V, 50 Hz. The armature resistance R_f is 150 Ω and the motor voltage constant *k* is 1.1 V-s/A-rad. The armature current I_a corresponding to the load demand is 25 A. The viscous friction and no-load losses are negligible. The inductances of the armature and field circuits are sufficient to make the armature and field currents continuous and ripple free. If the delay angle of the armature converter is 45^0 and the armature current is 25 A, determine (i) the torque developed by the motor, (ii) the speed, and (iii) the input power factor of the drive. [10]

3 Explain the motoring operation of a three-phase full-converter fed d.c. motor with the help of voltage and current waveforms when α is 30^0. Assume continuous conduction. [15]

4 a) Describe regenerative braking of a dc shunt motor by drawing the speed-torque characteristics.

b) A 220 V, 1500 rpm, 50 A separately excited dc motor with armature resistance of 0.5 Ω is fed from a circulating current dual converter with ac source voltage (line) =165 V. Assuming continuous conduction, determine converter firing angles for

(i) Motoring operation at rated motor torque and 950 rpm

(ii) Motoring operation at rated motor torque and -950 rpm

5 a) Explain how Regenerative braking operation of a separately excited dc motor can be obtained using chopper control.

b) A 230 V, 960 rpm and 200 A separately excited dc motor has an armature resistance of 0.02 Ω. The motor is now operated in dynamic braking with chopper control with a braking resistance of 2 Ω.

(i) Calculate duty ratio of chopper for a motor speed of 600 rpm and braking torque of twice the rated value.

(ii) What will be the motor speed for a duty ratio of 0.6 and motor torque equal to twice its rated torque?

6 a) Explain how a voltage source inverter –fed induction motor is operated in dynamic braking. [8]

b) With suitable block diagram, explain the closed-loop operation of induction motor drive. [7]

7 a) Explain how super synchronous braking can be achieved by injecting voltage in rotor circuit of a slip ring induction motor. [6]

b) A three-phase bridge inverter is used to run a three-phase induction motor rated at 440 V, 15 A, 1440 rpm. The maximum to minimum speed ratio required is 10:1. Find the minimum and maximum dc input voltage for the inverter. The inverter is operated in 180^0 conduction mode. If this voltage is to be obtained from three-phase full-controlled bridge converter fed from 440 V mains, calculate the firing angles needed. [9]

8 Write a short notes on [15]

(i) Variable frequency control of synchronous motor

(ii) Four quadrant operation of a dc motor with field current reversal

Code No: **R32025** **R10** **Set No. 3**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015

POWER SEMICONDUCTOR DRIVES

(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

*****

1 a) Explain the speed control of Induction motor by injection of emf in to rotor circuit. [8]

b) A 230 V, 1000 r.p.m., 105 A separately excited DC motor has an armature resistance of 0.06 Ω. Calculate the value of flux as a percent of rated flux for motor speed of 1500 rpm when load is such that the developed motor power is maintained constant at rated value for all speeds above rated speed. [7]

2 a) Draw the speed-torque curves of single-phase half-controlled rectified fed separately excited DC motor and explain the same. [5]

b) The speed of a separately excited DC motor is controlled by a single-phase full-controlled bridge rectifier, with the field also being controlled by a full-converter. The field current is set to the maximum possible value. The supply voltage to the armature and field converters is 220 V, 50 Hz. The armature resistance R_f is 150 Ω and the motor voltage constant *k* is 1.1 V-s/A-rad. The armature current I_a corresponding to the load demand is 25 A. The viscous friction and no-load losses are negligible. The inductances of the armature and field circuits are sufficient to make the armature and field currents continuous and ripple free. If the delay angle of the armature converter is 30^0 and the armature current is 25 A, determine (i) the speed, and (ii) if the polarity of the motor back e.m.f. in the above case is reversed by reversing the polarity of the field current, determine the delay angle of the armature converter to maintain the armature current at the same value of 25 A and power fed back to the supply due to regenerative braking of the motor. [10]

3 Explain the braking operation of a three-phase full-converter fed dc motor. Also draw the voltage and current waveforms when α is 120^0 assuming continuous conduction. [15]

4 Explain four quadrant operation of a separately excited dc motor by dual converter using non-circulating current control method. Draw necessary waveforms. [15]

5 a) With suitable block diagram explain the closed-loop control scheme for control below and above base speed for chopper fed dc drive [8]

b) A 220 V, 960 rpm and 200 A separately excited dc motor has an armature resistance of 0.02 Ω. The motor is fed from a chopper which provides both motoring and braking operations. The source has a voltage of 220 V. Assuming continuous conduction [7]
(i) Calculate duty ratio of chopper for motoring operation at rated torque and 400 rpm.
(ii) Calculate duty ratio of chopper for braking operation at rated torque and 300 rpm

Code No: **R32025** **R10** **Set No. 3**

6 a) Explain the operation of AC voltage controller fed Induction motor to obtain motoring and braking operation. [9]

b) Draw and explain the speed-torque curves with variable frequency control for operation with constant (V/f) ratio. [6]

7 a) With the help of a neat schematic discuss the operation of a Static Kramer drive. [10]

b) Draw the speed-torque characteristics of induction motor with variable rotor resistance and explain why this method is inefficient. [5]

8 a) What is the difference between true synchronous mode and self control mode for variable frequency control of synchronous motor? [8]

b) Explain closed loop control operation of a synchronous motor drive. [7]

Code No: **R32025** **R10** **Set No. 4**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015

POWER SEMICONDUCTOR DRIVES

(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks

*****

1 a) Explain speed control of Induction motor by rotor resistance control. [8]

b) A series motor when running at 600 r.p.m. takes a current of 25 A at 400 V. Its armature and series field resistances are 0.2 Ω and 0.1 Ω respectively. If the speed is to be increased to 800 r.p.m. by increasing the supply voltage, determine the new supply voltage and current if the field is unsaturated. Assume that the torque varies as the cube of the speed. [7]

2 a) Explain the operation of a single phase full-converter fed separately excited DC motor assuming continuous conduction. [8]

b) A 230 V, 750 rpm, 25 A, dc series motor is driving at rated conditions a load whose torque is proportional to speed squared. Armature resistance is 0.5Ω and field resistance is 0.5 Ω. Calculate the motor terminal voltage and current for a speed of 600 rpm assuming that flux is proportional to field current. Compute the firing angle delay at this speed if the motor armature is fed by a single-phase half-controlled converter. [7]

3 Explain the braking operation of a three-phase semi-converter fed d.c. motor with necessary waveforms. Derive the speed-torque relation assuming continuous conduction. [15]

4 a) Describe dynamic braking of a dc separately excited motor by drawing the speed-torque characteristics. [8]

b) A 220 V, 1500 rpm, 50 A separately excited dc motor with armature resistance of 0.5Ω is fed from a circulating current dual converter with ac source voltage (line) 165V. Assuming continuous conduction, determine converter firing angles for [7]

(i) Braking operation at rated motor torque and 900 rpm
(ii) Braking operation at rated motor torque and -900 rpm

5 a) Explain how motoring and regenerative braking operations of a separately excited dc motor in the forward direction can be obtained using a single chopper circuit. Draw the necessary speed-torque characteristics. [10]

b) Describe relative merits and demerits of chopper fed dc drives. [5]

6 A 440 V, 3-phase, 50 Hz, 6-pole, 950 rpm, delta connected induction motor has following parameters referred to the stator: [15]

$R_s = 2.0\Omega, R_r^{'} = 2.0\Omega, X_s = 3.0\Omega, X_r^{'} = 4.0\Omega$

When driving a fan load at rated voltage it runs at rated speed. The motor speed is controlled by stator voltage control. Determine

i) Motor terminal voltage, current and torque at 750 rpm

ii) Motor speed, current and torque for the terminal voltage of 300 V

7 a) With the help of a neat schematic discuss the operation of a Static rotor resistance control method for induction motor speed control. [10]

b) Explain how sub synchronous braking can be achieved by injecting voltage in rotor circuit. [5]

8 a) Explain the operation of self-controlled synchronous motor drive using VSI. [8]

b) Explain how operation of a synchronous motor shifts from motoring to regenerative braking. [7]

Code No: **R32022** **R10** **Set No. 1**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015
POWER SYSTEM ANALYSIS
(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks

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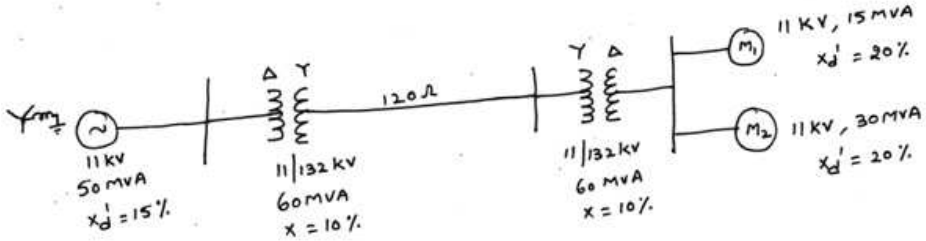
1 a) What is per unit system? How is the base quantities selected? [5]

b) Draw the per unit impedance diagram for the power system shown in figure below. [10]



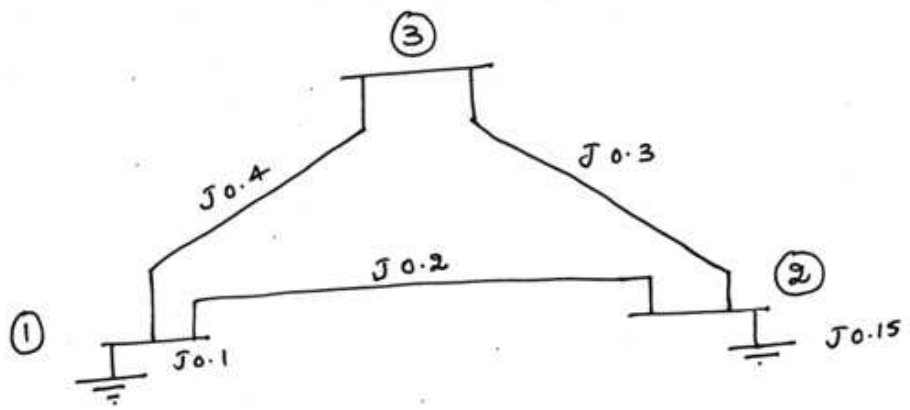
2 a) Starting from first principle show that a diagonal element of Y_{bus} equals the sum of admittances connected to that bus and an off diagonal element equals the negative of the sum of the admittances directly connected between the buses. [6]

b) Give an algorithm for a load flow study of a power system using G-S method. [9]

3 a) Write comparisons and differences between G-S and N-R Power flow methods. [6]

b) Derive the power flow equation for decoupled load flow method. [9]

4 Construct the bus impedance matrix for the network shown in below figure. All impedances are in P.u [15]



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Code No: **R32022** **R10** **Set No. 1**

5 a) Explain the symmetrical fault analysis using Z_{bus}. [6]

b) A 50 MVA, 13.2 kV generator, with reactance [9]
$x_d^{"} = 20\%,\ x_d^1 = 35\%$ *and* $x_d = 100\%$ is connected to a 50 MVA, 13.2/132 kV transformer, with x=10%. It is operating on no load at rated voltage. Find the sustained S.C current, the initial symmetrical rms current and the maximum possible DC component, if the S.C occurs on the LV side of the transformer.

6 Three identical Y-Connected resistors form a load bank with a three phase rating of 400V, 100 kVA. Unbalanced voltages are applied to the load bank as follows. [16]
$|V_{ab}| = 320V, |V_{bc}| = 480V, |V_{ca}| = 400V$ The neutral of the load is not connected to neutral of the system. Determine the line voltages and currents into the load in P.u.

7 Two 11kV, 20 MVA, 3ϕ, star connected generators operates in parallel. The positive, negative and zero sequence reactance of each being respectively, j 0.18, j 0.15, j0.1P.u. The star point of one the generator is isolated and that of the other is earthed through a 2Ω resistor. A single line to ground fault occurs at the terminals of one of the generator. Determine i) fault current ii) current in ground resistor and iii) voltage a cross grounding resistor. [16]

8 a) Distinguish between steady state, transient and dynamic stability. Derive power angle equation. [8]

b) Explain the different methods to improve the transient stability. [7]

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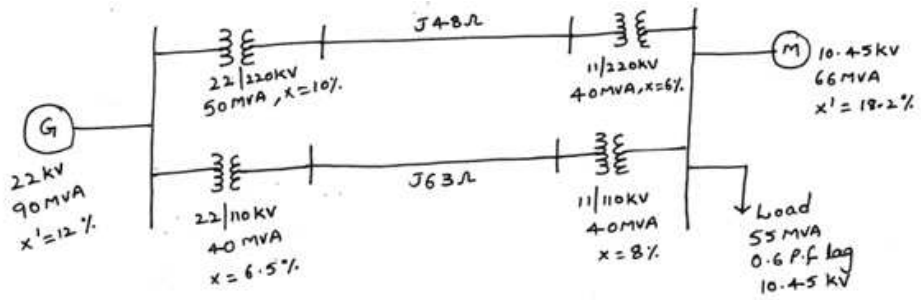
Code No: **R32022** **R10** **Set No. 2**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015
POWER SYSTEM ANALYSIS
(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
*****

1 Draw the P.u impedance diagram for the power system shown in the figure below. [16]



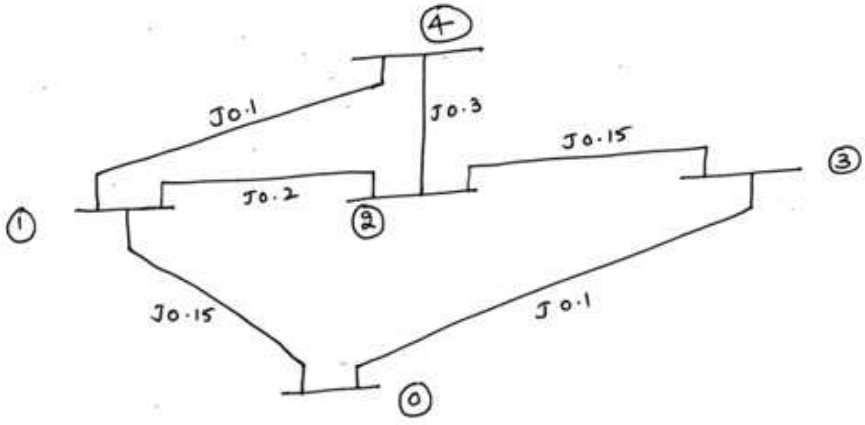
2 a) Discuss the step by step method of formation of Y_{bus}. [6]

b) Explain the G-S method for solution of non-linear equations of a power system. [9]

3 a) Derive the power flow equations of N-R method using rectangular coordinates. [8]

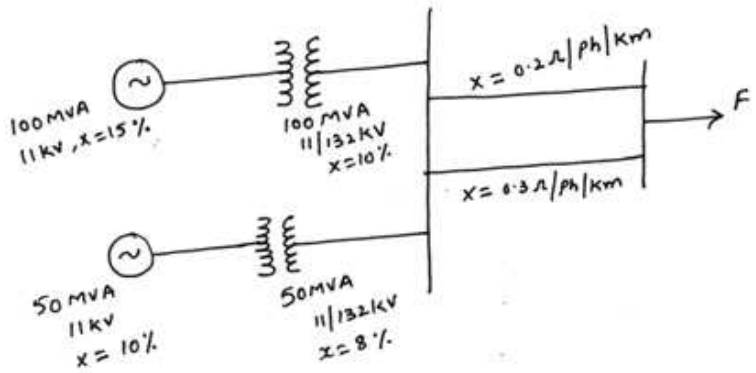
b) Write an algorithm for decoupled load flow method by considering all types of buses. [7]

4 Form the bus impedance matrix for the network shown in below figure. [15]



Code No: **R32022** **R10** **Set No. 2**

5 The following figure shows a generating station feeding a 132 kV system. Determine the total fault current fault level and fault current supplied by each alternator for a 3-phase fault at the receiving end bus. The line is 250 kM long. [15]



6 a) Explain the physical significance of symmetrical components. [7]

b) Three identical Y-connected resistors from a load bank with a three phase rating of 3.2kV, 750 kVA. The applied voltages are $|V_{ab}| = 3.84kV, |V_{bc}| = 2.56kV, |V_{ca}| = 3.2kV$. Find the line voltages and currents in P.u using symmetrical components. [8]

7 a) Distinguish between symmetrical and unsymmetrical faults. [6]

b) A 20 MVA, 11kV generator solidly grounded neutral has a subtransient reactance of 0.25 P.u. The negative and zero sequence reactances are j0.14, j 0.07 respectively. A SLG fault occurs at the terminals of an unloaded generator. Determine the fault current and line to line voltages. [9]

8 a) Describe the steady state stability power limit with necessary expressions. [7]

b) Using equal area criterion, derive an expression for critical clearing angle for a system having a generator feeding a large system though a double circuit line. [8]

Code No: **R32022** **R10** **Set No. 3**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015
POWER SYSTEM ANALYSIS
(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 75**

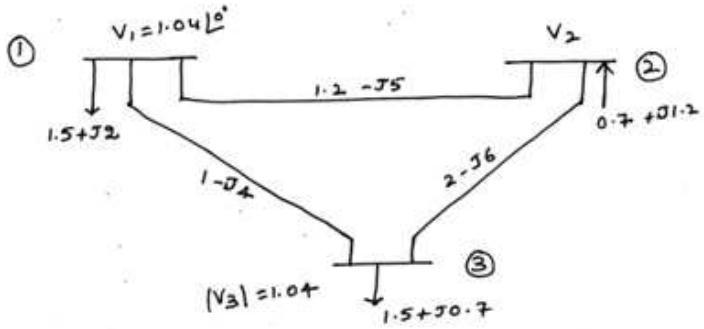
Answer any FIVE Questions
All Questions carry equal marks

*****

1 a) What are the steps needed for developing P.u impedance diagram of a given power system. [6]

b) Two generators rated at 10 MVA, 13.2 kV and 15 MVA, 13.2 kV respectively are connected in parallel to a bus. The bus feeds two motors rated 8 MVA and 12 MVA respectively with rated voltage 12.5 kV. The reactance of each generator is 15% and that of each motor is 20% on its own rating. Draw reactance diagram. [9]

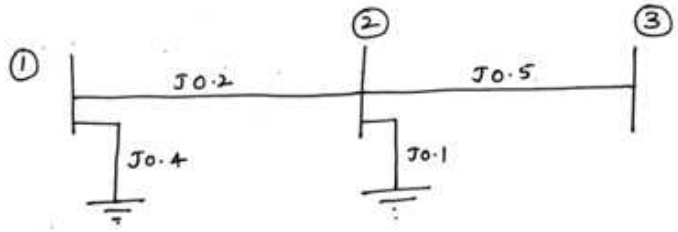
2 A three bus system is shown in below figure. Calculate the bus 2 voltage at the end of first iteration by G.S method. All values are in P.u [15]



3 a) Derive the necessary equations for elements of Jacobian using polar coordinates. [9]

b) Compare the G-S and N-R methods of load flow studies. [6]

4 Form the bus impedance matrix of the system shown in below figure. [15]



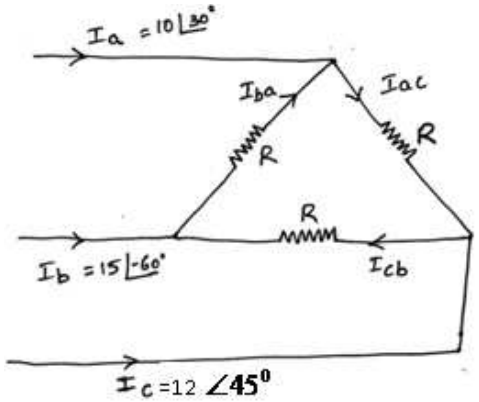
5 a) What are the steps needed for symmetrical fault calculations? [7]

b) What do you mean by synchronous machine reactance and explain its significance. [8]

Code No: **R32022** **R10** **Set No. 3**

6 a) Derive the expression for 3-Phase power in terms of symmetrical components. [7]

b) A balance delta connected load is fed from unbalanced 3-Phase supply as shown in below figure. Find i) Symmetrical components of line currents ii) Symmetrical components of delta currents. [8]



7 a) Derive the necessary equation to determine the fault current for SLG fault, draw a diagram showing the interconnection of sequence networks. [8]

b) A double line to ground fault occurs on a feeder. The sequence impedances upto fault points are (0.3 + j0.6), (0.3+j 0.55) and (1+ j 0.78) p.u. The fault resistance is 0.66 p.u. If voltage is $1\angle 0^0$, find fault current and voltage of faulty phases at fault point. [7]

8 a) How can the transient stability of a system be improved? Discuss the traditional as well as new approaches to the problem. [8]

b) Find the rotor acceleration of a 50 Hz, 2 pole turbo generator rated 33 kV having 800 MJ of stored energy, if the mechanical input is suddenly raised to 120 MW for an electrical load of 70 MW. [7]

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Code No: **R32022** **R10** **Set No. 4**

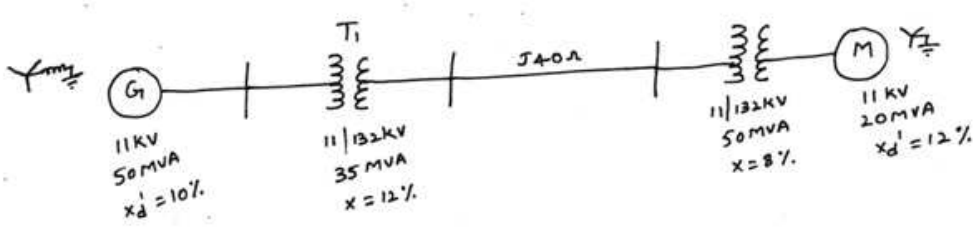
III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015
POWER SYSTEM ANALYSIS
(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
*****

1 a) What are the advantages of per-unit quantities. [6]

b) Draw the p.u impedance diagram for the power system shown in below figure. [9]



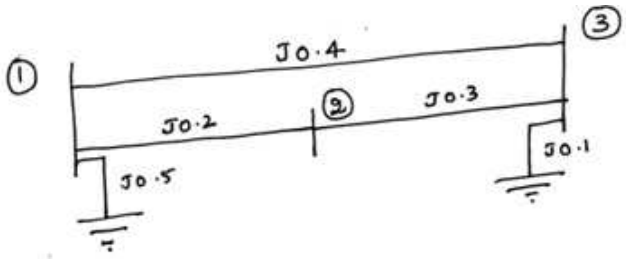
2 a) Define i) Graph, ii) Tree and iii) incidence matrix. [5]

b) A two bus system is shown in below figure. Calculate the voltage at the end of second iteration by G-S method. The elements of bus admittance matrix are [10]
$Y_{11} = Y_{22} = 1.5 \angle -86^0$ *p.u and* $Y_{21} = Y_{12} = 1.8 \angle 110^0$ *Pu*

3 a) Derive equations for elements of Jacobin for fast decoupled method. State the assumptions that are considered. [9]

b) Write an algorithm for N-R load blow method using rectangular coordinates. [6]

4 Form the bus impedance matrix of the system shown in below figure. [15]



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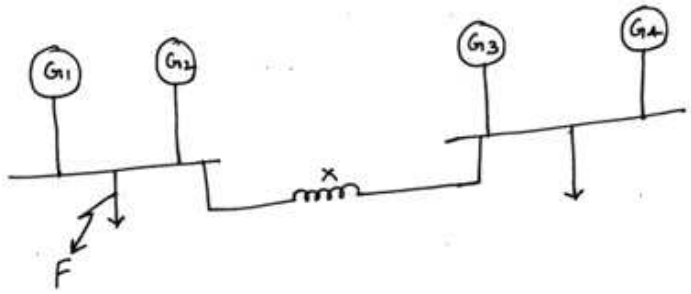
Code No: **R32022** **R10** **Set No. 4**

5 Figure shows a system having 4 alternators each rated at 11 kV, 50 MVA and each having a subtransient reactance of 15%. Find a) fault level for a fault on one of the feeders(near the bus) with zero value of reactance X (b) the reactance of the current limiting reactor X to limit the fault level to 800 MVA for a fault on one of the feeder(near the bus). [15]



6 a) Explain the principle of symmetrical components. Derive the necessary equations to convert phase quantities into symmetrical components. [9]

b) One conductor of a three phase line is open. The current flowing through the line 'a' is 5A. Assuming line 'c' is open, find symmetrical components of the line currents. [6]

7 a) In what respects are the fault calculations, for a fault on the alternator terminals, different from the fault calculations for a fault in a power system network. [7]

b) An alternator has the following sequence impedances [8]
$Z_1 = 0 + J1.0,\ Z_2 = 0.1 + J0.2, Z_0 = 0 + J1.0 ohm$. The line to neutral voltage at the generator terminals is 1000 V. A fault between yellow and blue phases occurs. Determine the fault current and phase voltage of the healthy phase.

8 a) Starting from first principle derive the swing equation of a synchronous machine. [7]

b) Explain the concept of equal area criterion. How can it be used to study transient stability? [8]

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Code No: **R32023** **R10** **Set No. 1**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015

UTILIZATION OF ELECTRICAL ENERGY

(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

*****

1 a) Explain the heating and cooling curves of Motor and how will you determine the heating time constant. [8]

b) Explain in detail about load Equalization. [7]

2 a) List the advantages of electric heating. [7]

b) A low frequency induction furnace operating at 10 V in the secondary circuit takes 500 KW at 0.6 Power factor, when the hearth is full. If the secondary voltage be maintained at 10 V, estimate the power absorbed and the power factor, when the hearth is half full. Assume the resistance of the secondary circuit to be thereby halved and reactance to remain the same. [8]

3 a) What is resistance welding? What are its limitations? [6]

b) With necessary figures, explain the process of carbon arc welding and metallic arc welding. [9]

4 Explain the following terms: [15]
i)Rousseau diagram ii) Illumination iii) Luminance
iv) Maintenance factor v) Depreciation factor.

5 a) Define glare and how can it be overcome. [7]

b) Explain high pressure mercury discharge lamp with a neat diagram. [8]

6 Derive the equation for the maximum speed attained from a trapezoidal speed time curve. [15]

7 a) Explain the mechanics of train movement. [7]

b) An electric train weighting 350 tonnes runs 10 % up gradient with following speed time curve. [8]
i) Uniform acceleration of 1.8Kmphps for 30 seconds.
ii) Constant speed for 40 Seconds
iii) Coasting for 30 Seconds
iv) Braking at 2.5 Kmphps to rest.
Calculate the specific energy consumption if tractive resistance is 45 N/tone, rotational inertia effect 10 %, overall efficiency of transmission and motor is 75 %.

8 Write short notes on the following : [15]
a) Demand side management and b) Energy star rating of equipment.

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Code No: **R32023** **R10** **Set No. 2**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015

UTILIZATION OF ELECTRICAL ENERGY

(Electrical and Electronics Engineering))

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

*****

1	a)	Explain the classification of electric drives based on the time on which the load exists on the drive.	[8]
	b)	Explain the staring and running characteristics of motor used for Industrial loads.	[7]
2	a)	What do you mean by resistance heating and classify them and explain the each type.	[8]
	b)	Explain the causes of failure of heating elements.	[7]
3	a)	Explain in detail about Spot Welding with a neat diagram.	[7]
	b)	What are the advantages and disadvantages of flash butt welding over simple butt welding?	[8]
4	a)	Enumerate the various types of electric lamps in common use.	[9]
	b)	Two lamp posts are 20 m apart and are fitted with a 125 CP lamp each at a height of 5.8 m above ground. Calculate the illumination on the ground (i) under each lamp (ii) midway between the lamps.	[6]
5	a)	Explain briefly the classification of Light fittings or Luminaries.	[7]
	b)	Explain the working of a fluorescent tube with the help of the circuit diagram giving the function of various parts. How is Stroboscopic effect eliminated in fluorescent tube lighting?	[8]
6	a)	List the advantages and disadvantages of Electric drive.	[7]
	b)	Explain the desirable characteristics that should be present in traction motors.	[8]
7		Derive the necessary equation for the Total Tractive effort required for moving traction unit and its train.	[15]
8		Write short notes on the following : a) Energy Efficient Motors and b) Demand response of DSM.	[15]

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Code No: **R32023** **R10** **Set No. 3**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015

UTILIZATION OF ELECTRICAL ENERGY

(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

*****

1	a)	Explain the factors affecting selection of motor for Electric drives based on industrial usage.	[8]
	b)	Draw and Explain the performance curves of a DC Series motor suited for various electric drives.	[7]
2	a)	Classify the different heating methods and explain each type briefly.	[7]
	b)	A piece of insulating material is to be heated by dielectric heating. The size of the piece is 100 Sq. cm area and 2.5cm thick. A frequency of 25 mega cycles is used and the power absorbed is 350 W. Calculate the voltage necessary for heating and the current that flows in the material. The material has relative permittivity of 5.1 and power factor of 0.055.	[8]
3	a)	List the distinct advantages of coated electrodes with respect to normal electrodes.	[7]
	b)	Compare Resistance and Arc Welding in detail.	[8]
4		Explain the following terms: i)Plane angle ii) Solid angle iii) Polar curve iv) Mean Horizontal Candle Power v) Reduction factor.	[15]
5	a)	Explain with a neat circuit diagram, the operation of a fluorescent lamp.	[7]
	b)	An illumination on the working plane of 80 lux is required in a room 75m x 16m in size. The lamps are required to be hung 4.5 m above the work bench. Assuming a suitable space height ratio, a utilization factor of 0.55, a lamp efficiency of 14 lumens per watt and a candle power depreciation of 22 %, estimate the number, rating and disposition of lamps.	[8]
6	a)	Explain the typical speed time curve of a train running on main line.	[8]
	b)	List the factors affecting the schedule speed.	[7]
7	a)	What is the coefficient of Adhesion? How does it effect slipping of driving wheels of traction unit?	[8]
	b)	Describe the procedure of calculating the specific energy consumption of an electric train.	[7]
8		Write short notes on the following : a) Different Energy Efficient techniques and ii) Star rating of equipment.	[15]

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Code No: **R32023** **R10** **Set No. 4**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015

UTILIZATION OF ELECTRICAL ENERGY

(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

*****

1	a)	Define Electric drive and give its classification and explain the each category of Electric drive	[8]
	b)	Explain the effect of temperature rise in Electrical machines and how can it be overcome.	[7]
2	a)	List the important requirements of a good heating material.	[7]
	b)	Explain with a neat sketch the working of Ajax Wyatt furnace and also give the applications of this furnace.	[8]
3	a)	Explain the requirements of a Good Weld.	[7]
	b)	Explain why a drooping characteristic of supply voltage is essential for maintaining a steady arc in case of electric arc welding and explain how this characteristic is obtained in case of a dc source and ac source.	[8]
4	a)	What is a polar curve? How is it useful to illumination engineer?	[7]
	b)	A filament lamp of 560 W is suspended at a height of 5 meters above working plane and gives uniform illumination over an area of 8.5 m diameter. Assume efficiency of reflector as 70 %. Determine the illumination on the working plane. Efficiency of lamp is 0.92 Watt per candle power.	[8]
5	a)	Enumerate the various factors to be considered while designing street lighting	[8]
	b)	Explain the design considerations followed for flood lighting installation.	[7]
6	a)	Compare between AC and DC system used in traction systems.	[8]
	b)	Explain the terms average speed and schedule speed of a speed time curve.	[7]
7	a)	Explain the term coefficient of adhesion and the factors affecting slip of traction unit.	[8]
	b)	What is the difference between Dead weight and Accelerating weight of a locomotive?	[7]
8		Write short notes on the following : a) Star rating of the equipment and b) Energy efficiency technique.	[15]

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