Code No: RT21015 **R13** SET - 1

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
SURVEYING
(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Explain the principle on which chain survey is based. (3M)
   b) Distinguish clearly between chain surveying and traverse surveying. (4M)
   c) Define contour and contour intervals. (4M)
   d) Define swinging the telescope and transiting the telescope. (4M)
   e) Write about GPS. (3M)
   f) How do you determine the capacity of a reservoir? (4M)

PART -B

2. a) Discuss in brief the different sources of errors in surveying. (8M)
   b) Describe briefly the use of various accessories of a plane table. (8M)

3. a) The following lengths and bearings were recorded in running a theodolite traverse in the counter clockwise direction, the length of CD and bearing of DE having been omitted. (10M)

Line	Length in m	R.B
AB	281.4	S 69^0 11’ E
BC	129.4	N 21^0 49’ E
CD	?	N 19^0 34’ W
DE	144.5	?
EA	168.7	S 74^0 24’ W

Determine the length of CD and the bearing of DE.

   b) What is local attraction? How is it detected and eliminated? (6M)
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4. a) What are the different errors in theodolite work? How are they eliminated? (10M)
   b) Explain how a subtense bar is used with a Theodolite to determine the horizontal distance between two points. (6M)

5. Write about parts of the Transit Theodolite. Explain in detail. (16M)

6. a) What is Simpson's rule? Derive an expression for it. (8M)
   b) Calculate the volume of earth work by Prismoidal formula in a road embankment with the following data: (8M)

Chainage along the centre line	0	100	200	300	400
Ground levels	201.70	202.90	202.40	204.70	206.90

Formation level at chainage 0 is 202.30 top width is 2.00 ft side slopes are 2 to 1. The longitudinal gradient of the embankment is 1 in 100 rising. The ground is assumed to be level all across the longitudinal section.

7. a) A railway embankment 400 m long is 12 m wide at the formation level and has the side slope 2 to 1. The ground levels at every 100 m along the centre line are as under: (8M)

Distance	0	100	200	300	400
R. L.	204.8	206.2	207.5	207.2	208.3

The formation level at zero chainage is 207.00 and the embankment has a rising gradient of 1 in 100. The ground is level across the centre line. Calculate the volume of earthwork.

   b) Derive TRAPEZOIDAL FORMULA (Average end area Method). (8M)

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Code No: RT21015 **R13** SET - 2

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
SURVEYING
(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Discuss in brief the principles of surveying. (3M)
   b) Define the true bearing and magnetic bearing. (4M)
   c) Define the following terms Benchmark, Parallax. (4M)
   d) What are 'face left' and 'face right' observations? Why is it necessary to take both face observations? (4M)
   e) Write about total stations. (4M)
   f) What is a Prismoid? (3M)

PART -B

2. a) What is back bearing and what are the advantages of observing it in a traverse? (8M)
   b) For the following traverse, find the length of DE so the A, E and F may be in the same straight line: (8M)

Line	Length in meters	R. B.
AB	200	S 84^0 30' E
BC	100	N 75^0 18' E
CD	80	N 18^0 45' E
DE	-	N 29^0 45' E
EF	150	N 64^0 10' E

3. Describe the 'height of instrument' and 'rise and fall' methods of computing the levels. Discuss the merits and demerits of each. (16M)

4. Explain how you would measure with a Theodolite (16M)
   a) The horizontal angle by repetition.
   b) The Vertical angle.
   c) The Magnetic bearing of line.

5. Explain the temporary adjustments of a transit theodolite (16M)

6. The tangents to a railway meet at an angle of 148^0. Owing to the position of a building, a curve is to be chosen that will pass near point 10 metres from the point of intersection of the tangents on the bisector of the angle 148^0. Calculate the suitable radius of the curve. (16M)

7. Derive an expression for trapezoidal formula for volume. Compare it with the prismoidal formula. (16M)

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Code No: RT21015 **R13** SET - 3

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
SURVEYING
(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Differentiate clearly between plane and geodetic surveying. (3M)
   b) What is local attraction? How is it detected and eliminated? (4M)
   c) Define the following terms: Line of collimation, Level surface. (4M)
   d) What are the different errors in theodolite work? (4M)
   e) Mention different types of curves with figures. (3M)
   f) How do you determine the earth work for a borrow pit? (4M)

PART -B

2. a) Give, in a tabular form, the difference between prismatic compass and surveyor's compass. (6M)
   b) From a point C, it is required to set out a line CD parallel to a given line AB, such that ABD is a right angle. C and D are not visible from A and B, and traversing is performed as follows: (10M)

Line	Length in m	Bearing
BA	-	360^0 0'
BE	51.7	290^0 57'
EF	61.4	352^0 6'
FC	39.3	263^0 57'

Compute the required length and bearing of CD.

3. What are the different types of leveling staff? State the merits and demerits of each. (16M)

4. a) Describe the conditions under which tacheometric surveying is advantageous. Explain how you would obtain in the field the constants of a techeometer (10M)
   b) Two distances of 50 and 80 metres were accurately measured out, and the intercepts on the staff between the outer stadia webs were 0.496 at the former distance and 0.796 at the latter. Calculate the techeometric constants. (6M)
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5. What are the different errors in survey measurements? Describe the method most commonly used in chain surveying. (16M)

6. What are the common difficulties in setting out simple curves? Describe briefly the methods employed in overcoming them. (16M)

7. Calculate the volume of earth work by Prismoidal formula in a road embankment with the following data: (16M)

Chainage along the centre line	0	100	200	300	400
Ground levels	201.70	202.90	202.40	204.70	206.90

Formation level at chainage 0 is 202.30, top width is 2.00 ft side slopes are 2 to 1. The longitudinal gradient of the embankment is 1 in 100 rising. The ground is assumed to be level all across the longitudinal section.

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Code No: RT21015 **R13** SET - 4

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
SURVEYING
(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Distinguish clearly between cumulative and compensating errors. (3M)
   b) Distinguish clearly between closed traverse and open traverse. (4M)
   c) Define the following terms vertical line, bubble line. (4M)
   d) State what errors are eliminated by repetition method. (3M)
   e) Write about geodetic survey. (4M)
   f) Explain about Embankment with sketch (4M)

PART -B

2. a) Determine the values of included angles in the closed compass traverse ABCD conducted in the clockwise direction, given the following fore bearings of their respective lines: (8M)

Line	F.B.
AB	40^0
BC	70^0
CD	210^0
DA	280^0

   Apply the check.
   b) What is error of closure? How is it balanced graphically? (8M)

3. Describe with the help of sketches the characteristics of contours. (16M)

4. a) What are the different accessories of plane table survey? (8M)
   b) Differentiate between prismatic compass and surveyors compass. (8M)

5. Explain how you would determine the constants of a tachometer. What are the advantages of an analytical lens used in a tachometer? (16M)

6. The chainage at the point of intersection of the tangents to a railway curve is 3876 links, and the angle between them is 124^0. Find the chainage at the beginning and end of the curve if it is 40 chains radius, and calculate the angles which are required in order to set out this curve with a chain tape only. (16M)

7. A series of offsets were taken from a chain line to a curved boundary line at intervals of 15 metres in the following order. 0, 2.65, 3.80, 3.75, 4.65, 3.60, 4.95, 5.85 m. Compute the area between the chain line, the curved boundary and the end offsets by a) average ordinate rule, b) trapezoidal rule, and c) Simpson's rule. (16M)

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Code No: RT21025 **R13** SET - 1

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
ELECTRO MAGENETIC FIELDS
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Discuss about electric potential. (3M)
   b) Write about dielectric constant and dielectric strength. (4M)
   c) Explain about magnetic flux and magnetic flux density. (4M)
   d) Discuss about force on a moving charge. (4M)
   e) What is mutual inductance? Explain. (3M)
   f) Explain the concept of displacement current. (4M)

PART –B

2. a) Derive the expression for electric field intensity due to surface charge placed on x = 0 plane. (8M)
   b) Given $V = 5x^3y^2z$ and $\varepsilon = 2.25\varepsilon_0$, find (8M)
   (i) **E** at point P(-3, 1, 2) (ii) ρ_v at P.

3. a) Derive the boundary conditions for electric fields. (8M)
   b) Derive the expression for capacitance of a coaxial capacitor of inner radius 'a', outer radius of 'b' and length L. (8M)

4. a) State and explain Ampere's circuit law. (8M)
   b) A square conducting loop 3 cm on each side carries a current of 10 A. Calculate the magnetic field intensity at the center of the loop. (8M)

5. a) With necessary equations, Explain about force between two differential current elements. (8M)
   b) A small circular loop of radius 10 cm is centered at the origin and placed on the z = 0 plane. If the loop carries a current of 1 A along $\mathbf{a}_\varphi$, calculate: (8M)
   (i) The magnetic moment of the loop
   (ii) magnetic field intensity at (2, 2, 2)

6 Calculate the self inductance per unit length of an infinitely long solenoid. (16M)

7. a) Explain about all Maxwell equations along with word statements. (8M)
   b) In a medium is characterized by $\mu = \mu_0$, $\varepsilon = \varepsilon_0$ and $\sigma = 0$. If $\mathbf{E} = 20 \sin (10^8 t - \beta z)$ $\mathbf{a}_y$ V/m. calculate β and **H.** (8M)

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Code No: RT21025 **R13** SET - 2

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
ELECTRO MAGENETIC FIELDS
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Write about line charge, surface charge and volume charge. (4M)
   b) Calculate the capacitance of a parallel plate capacitor having a mica dielectric $\varepsilon_r = 6$, a plate area of 6.45×10^{-3} m^2 and a separation of 0.254 mm. (4M)
   c) Write about point form of ampere's circuit law. (4M)
   d) Discuss about force on differential current element. (4M)
   e) What is internal inductance and external inductance? Explain. (3M)
   f) Distinguish the terms static fields and time varying fields. (3M)

PART –B

2. a) Derive the Relationship between electric field and electric potential. (8M)
   b) A Charge of -0.3 μC is located at A(25, -30, 15) (in cm) and a second charge of 0.5 μC is at B(-10, 8, 12) cm. Find **E** at (i) the origin (ii) P(15, 20, 50) cm (8M)

3. a) Discuss about behavior of conductors in presence of an electric field. (8M)
   b) The point charges -1 nC, 4 nC and 3 nC are located at (0, 0, 0), (0, 0, 1) and (1, 0, 0) respectively. Find the energy in the system. (8M)

4. a) Derive the expression for magnetic field intensity due to infinite sheet of current. (8M)
   b) A current filament carrying a current 15 A in $\mathbf{a_z}$ direction lies along entire Z-axis. Find **H** in Cartesian coordinates at (i) (2, 0, 4) (ii) (2, -4, 4) (8M)

5. a) With necessary equations, explain the concept of Magnetization in materials. (8M)
   b) Explain how a small current loop can be treated as a magnetic dipole. (8M)

6. Determine the self inductance of a coaxial cable of inner radius 'a' and outer radius 'b'. (16M)

7. a) Discuss about transformer EMF and motional EMF. (8M)
   b) A parallel plate capacitor with plate area of 5 cm^2 and plate separation of 3 mm has a voltage 50 sin 10^3t V applied to its plates. Calculate the displacement current assuming $\varepsilon = 2\varepsilon_0$. (8M)

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Code No: RT21025 **R13** SET - 3

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
ELECTRO MAGENETIC FIELDS
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) What is Gauss Law? Explain. (3M)
   b) What is meant by boundary condition? How they are useful? Explain. (4M)
   c) Explain the concept of non existence of isolated magnetic pole. (4M)
   d) Explain about Lorentz force equation. (3M)
   e) Write analogy between electric and magnetic circuits. (4M)
   f) Write Maxell equations in point form. (4M)

PART -B

2. a) Derive the expression for electric field intensity due to line charge. (8M)
   b) Two point charges -4μC and 5μC are located at (2, -1, 3) and (0, 4, -2) respectively. Find the potential at (1, 0, 1) assuming zero potential at infinity. (8M)

3. a) Derive the expression for equation of continuity. (8M)
   b) Determine the relaxation time for each of the following media: (8M)
   (i) Hard rubber ($\sigma = 10^{-15}$ S/m, $\varepsilon = 3.1\ \varepsilon_0$)
   (ii) Mica ($\sigma = 10^{-15}$ S/m, $\varepsilon = 6\ \varepsilon_0$)
   (iii) Distilled water ($\sigma = 10^{-4}$ S/m, $\varepsilon = 80\ \varepsilon_0$)

4. a) State and explain Boit-Savart's Law. (8M)
   b) Planes z = 0 and z = 4 carry current $\mathbf{K} = -10\ \mathbf{a_x}$ A/m and $\mathbf{K} = 10\mathbf{a_x}$ A/m, respectively. Determine **H** at (1, 1, 1) and (0, -3, 10). (8M)

5. a) Discuss about Torque on a current loop placed in a magnetic field. (8M)
   b) A charged particle has mass 2 kg and charge 3 C. it starts at point (1, -2, 0) with velocity $4\mathbf{a_x} + 3\mathbf{a_z}$ m/s in an electric field $12\ \mathbf{a_x} + 10\ \mathbf{a_y}$ V/m. At time t = 1s, determine (8M)
   (i) The acceleration of the particle (ii) Its velocity

6. Explain the concept of self inductance and mutual inductance. (16M)

7. a) What is poynting theorem and poynting vector? Explain. (8M)
   b) In a certain material, $\mu = \mu_0$, $\varepsilon = \varepsilon_0\varepsilon_r$ and $\sigma = 0$. If $\mathbf{H} = 10 \sin (10^8 t - 2x)\ \mathbf{a_z}$ A/m. find $\mathbf{J_d}$, **E** and ε_r. (8M)

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Code No: RT21025 **R13** SET - 4

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
ELECTRO MAGENETIC FIELDS
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) State and explain Coulomb's law. (4M)
   b) Discuss about convection current. (3M)
   c) What is law of conservation of magnetic flux? Explain. (4M)
   d) Define magnetic dipole and dipole moment. (3M)
   e) Explain the concept of flux linkage and inductance. (4M)
   f) Write Maxwell equations for time varying fields. (4M)

PART -B

2. a) Explain the Laplace and Poisson's equations for electrostatic fields. (8M)
   b) Using Gauss Law, derive the expression for the electric field intensity at any point inside and outside of a sphere of radius 'a' due to a uniform spherical charge distribution of volume charge density of 'ρ'. (8M)

3. a) What is meant by electric dipole? Derive the expression for electric field intensity due to electric dipole. (8M)
   b) Two dipoles with dipole moments -5 $\mathbf{a_z}$ nC/m and 9 $\mathbf{a_z}$ nC/m are located at points (0, 0, -2) and (0, 0, 3) respectively. Find the potential at the origin. (8M)

4. a) Derive the expression for magnetic field due to an infinitely long straight filament carrying a direct current I. (8M)
   b) Calculate the value of vector current density in Cartesian coordinates at P(2, 3, 4) if $\mathbf{H} = x^2z\,\mathbf{a_y} - y^2x\,\mathbf{a_z}$ (8M)

5. a) What are the different classifications of materials in terms of magnetic properties? Explain. (8M)
   b) An electron with velocity $\mathbf{u} = (3\mathbf{a_x} + 12\mathbf{a_y} - 4\mathbf{a_z}) \times 10^5$ m/s experiences no net force at a point in magnetic field $\mathbf{B} = 10\,\mathbf{a_x} + 20\,\mathbf{a_y} + 30\,\mathbf{a_z}$ mWb/m^2. Find **E** at that point. (8M)

6. Derive the expression for energy in a magnetostatic field. (16M)

7. a) What is the inconsistency in Ampere's circuit law? Explain. (8M)
   b) A conductor with cross sectional area of 10 cm^2 carries a conduction current $0.2\sin 10^9 t$ mA. Given that $\sigma = 2.5 \times 10^6$ S/m and $\varepsilon_r = 6$, calculate the magnitude of the displacement current density. (8M)

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Code No: RT21032 **R13** SET - 1

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
MECHANICS OF SOLIDS
(Com. to ME, AME, AE, MTE)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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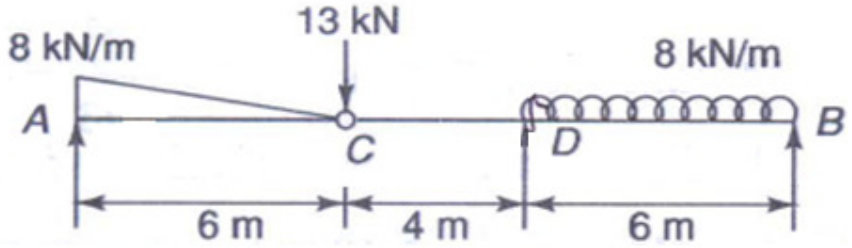
PART –A

1. a) Define and Explain Principal stresses and principal planes?
   b) Derive the Relation between Shear force, Bending Moment and Rate of loading at a section Of a beam
   c) Draw the Shear stress diagrams for I- section and T- section.
   d) A beam 4m long, simply supported at its ends, carries a point load W at its center. If the slope at the beam is not to exceed 1^0 , find the deflection at the center of the beam.
   e) Derive the equations of longitudinal and circumferential stress.
   f) Derive the equation of maximum torque transmitted by a circular solid shaft.
   (3M+3M+4M+4M+4M+4M)

PART-B

2. a) Two vertical rods one of steel and the other of copper are each rigidly fixed at the top and 50cm apart. Diameters and lengths of each rod are 2cm and 4cm respectively. A cross bar fixed to the rods at the lower ends Carries a load of 5000N such that the cross bar remains horizontal even after loading. Find the stress in each rod and position of the load on the bar. Take E_s = 2.x 10^5 N/mm^2, E_c = 1x 10^5 N/mm^2
   b) A round bar of length L and diameter D is subjected to an axial pull *P*. Find the change in volume of the bar. Poisson's ratio = *1/m*, young's modulus = *E*. (8M+8M)

3. a) Draw the sheer force and bending moment diagrams for the beam shown in fig. and also find out the Maximum bending moment and point of contra flexure.



   b) A simply supported beam of length 5m carries a uniformly increasing load of 800N/m run at one end to 1600N/m run at the other end. Draw the sheer force and bending moment diagrams for the beam. Also calculate the position and magnitude of maximum bending moment. (10M+6M)

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4. a) A timber beam 150mm wide and 200mm deep is to be reinforced by bolting on two steel flitches each 150mm by 12.5mm in section. Calculate the moment of resistance in the following cases; (i) flitches attached symmetrically at the top and bottom
(ii) flitches Attached symmetrically at the sides. Allowable stress in timber is 6N/mm^2. What is the maximum stress in the steel in each case? Take E_s = 2x 10^5 N/mm^2, E_t = 1x 10^{4}N/mm^2.

b) A rectangular beam 300mm deep is simply supported over a span of 4m. Determine the U.D.L per meter which the beam may carry, if the bending stress should not exceed 120 N/mm^2. Take I = 8x 10^6 mm^4. (10M+6M)

5. a) Derive the Relation between slope, deflection and radius of curvature.
b) Derive the deflection of a simply supported beam carrying a uniformly distributed load. (10M+6M)

6. a) A thin cylindrical pressure vessel of diameter 2.5m and thickness of 18mm is subjected to an internal pressure of 1.2N/mm^2. In addition, the vessel is also subjected to an axial tensile load of 2800kN. Determine the normal and shear stresses on a plane at an angle of 60^o to the axis of the vessel and also find the maximum shear stress.
b) Find the ratio of thickness to internal diameter for a tube subjected to internal pressure, when the pressure is 5/8 of the maximum permissible circumferential stress. Find the increase in internal diameter of such a tube 100mm internal diameter, when the internal pressure is 90N/mm^2. Take E= 2×10^{5}N/mm^2, and Poisson's ratio= 0.286 (8M+8M)

7. a) A hallow shaft of diameter ratio 3/8 is to transmit 375kW power at 100 rpm. The maximum torque being 20%greater than the mean, the shear stress is not exceed to 60 N/mm^2 and twist in a length of 4 m not to exceed 2^0. Calculate its external and internal diameters which would satisfy both the above conditions. Assume modulus of rigidity G = 0.85x 10^5 N/mm^2.
b) A compression member of 500 mm effective length consists of solid aluminum rod of 25 mm diameter in order to reduce the weight of the member by 25%, the solid rod is replaced by the hallow aluminum rod of 25 mm external diameter. Determine the critical loads for the two members and also find % reduction in the critical load when the hallow member is provided. Take E= 7.28x 10^4 N/mm^2 (8M+8M)

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Code No: RT21032 **R13** SET - 2

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
MECHANICS OF SOLIDS
(Com. to ME, AME, AE, MTE)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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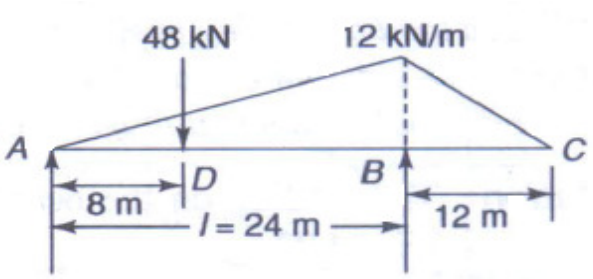
PART –A

1. a) Define Proof resilience and modulus of Resilience?
   b) Define and Explain Shear force and Bending Moment?
   c) Define Pure bending and Write the Assumptions for theory of Simple Bending.
   d) Write the methods of determining Slope and Deflection at a section in a loaded beam
   e) What are the types of stresses in the cylinders? Explain any one of the stress.
   f) Calculate the safe compressive load on a hollow cast iron column of one end is fixed and other hinged of 15 cm external diameter, 10 cm internal diameter and 10 m in length. Use Euler's formula with a factor of safety of 5 and E=95kN/mm^2. (4M+4M+4M+3M+3M+4M)

PART-B

2. a) Derive relation between E & G
   b) Draw Mohr's circle when the component is subjected state of pure shear (8M+8M)

3. a) Draw the shear force and bending moment diagram for given figure. Also find the maximum bending moment and point of contraflexure.



   b) A horizontal beam 10m long is carrying a uniformly distributed load of 1kN/m. The beam is supported on two supports 6m apart. Find the position of the supports, so that bending moment on the beam is as small as possible. Also draw the shear force and bending moment diagrams. (8M+8M)
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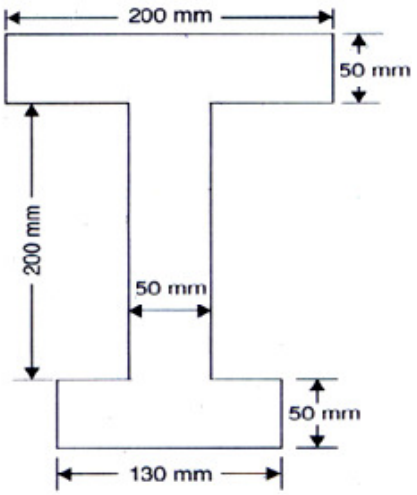
4. a) A beam of cross-section of an isosceles triangle is subjected to a shear force of 30kN at a section where base width=150mm and height=450mm. Determine
   (i) horizontal shear stress at the neutral axis
   (ii) the distance from the top of the beam where shear stress is maximum
   (iii) value of maximum shear stress.
   b) The shear force acting on the beam at an I- section with unequal flanges is 50kN.The section is shown in figure. The moment of inertia of a section about N.A is 2.849×10^4. Calculate the shear stress at the N.A. and also draw the shear stress distribution over the depth of the section. (8M+8M)



5. a) A beam of length 6m is simply supported at its ends and carries two point loads of 48kN at a distance of 1m and 3m respectively from the left support. Find (i) Deflection under each load (ii) Maximum deflection (iii) the point at which maximum deflection occurs. Given $E=2\times10^5$ N/mm^2 and $I=85\times10^6$mm^4.
   b) A horizontal beam of symmetrical section simply supported at the ends, carries a load whose intensity varies uniformly from 18kN/m at one end to 72kN/m at the other. Find the central deflection if the span is 6m, the section is 450mm deep and the maximum bending stress is 90N/mm^2. Take E = 200 kN/mm^2. (8M+8M)

6. a) A shell 3.25m long, 1m in diameter is subjected to an internal pressure of 1N/mm^2. If thickness of the shell is 10mm, find the circumferential and longitudinal stresses. And also find the maximum shell stress and the changes in the dimensions of the shell. Take E = 2×10^5 N/mm^2, 1/m = 0.3.
   b) A riveted boiler 2.25m in diameter has to sustain and internal pressure of 0.56 N/mm^2. The efficiency of the riveted joints is 70% and a safe stress of 60N/mm^{2}is allowed in a material. Find the thickness of the shell and the necessary pitch of rivets for the longitudinal joints, which is a single riveted butt joint. Take diameter of rivet =$6\sqrt{t}$ and where t is thickness of the plate. (10M+6M)

7. a) Determine the diameter of a solid shaft which will transmit 300 kW at 250 rpm. The maximum shear stress should not exceed 30 N/mm^2 and twist should not more than 1^0 in a shaft length of 2 m. Take C = 1x10^{5}N/mm^2
   b) A column of timber section 15cm x 20cm is 6 meters long both ends being fixed. If the young's modulus for Timber = 17.5 kN/mm^2, determine
   (i) Crippling load (ii) Safe load for the column if factor of safety = 3. (8M+8M)

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Code No: RT21032 **R13** SET - 3

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
MECHANICS OF SOLIDS
(Com. to ME, AME, AE, MTE)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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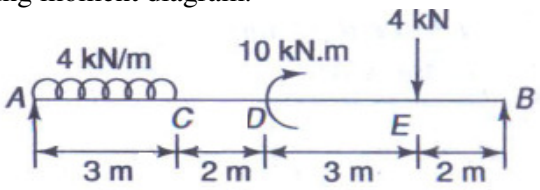
PART – A

1. a) Draw the Stress- Strain diagram for Mild Steel, Cast Iron and Plastic
   b) Define beam? Write classification of beams and loads acting on the beams.
   c) Write the formulas of section modulus for Hollow Rectangular section and Circular section
   d) Determine the slope and deflection of a simply supported beam carrying a point load at the center by MOHR'S theorem.
   e) A water main 80cm diameter contains water at a pressure head of 100m. If the weight density of water is 9810N/m^3, find the thickness of the metal required for the water main. Given the permissible stress as 20 N/mm^2.
   f) What are the assumptions made in the derivation of shear stress produced in a circular shaft Subjected to Torsion? (4M+3M+4M+4M+4M+3M)

PART - B

2. a) A piece of material is subjected to three mutually perpendicular tensile tresses and the strains in the three directions are in the ratio 3:4:5. If the value of Poisson's ratio is0.2857, find the ratio of the stresses and their values when the greatest stress is 90N/mm^2.
   b) Draw Mohr's circle when the component is subjected to state of pure shear. (8M+8M)

3. a) A beam of 10m length is acted upon by forces and a couple as shown in figure. Draw the shear force and bending moment diagram.



   b) A beam of 8m span is hinged at each end. It carries a uniformly distributed load of 2kN/m on the left half of the beam along with a 25kN load at 6m from the left-hand end. In addition the beam is also subjected to couples of 20kNm in counter clockwise direction at left-hand support and 30kNm in the clockwise direction at the right hand support. Determine the reactions at the ends and draw the sheer force and bending moment diagrams indicating the principal values. (8M+8M)

4. a) An I-section beam 350mm×150mm has a web thickness of 10mm and a flange thickness of 20mm. If the shear force acting on the section is 40kN, find the maximum shear stress developed in the section. Sketch the shear stress distribution across the section. Also calculate the total shear force carried by the web.
   b) Derive the expression for the bending stress $M/I = \sigma/y = E/R$. (10M+6M)
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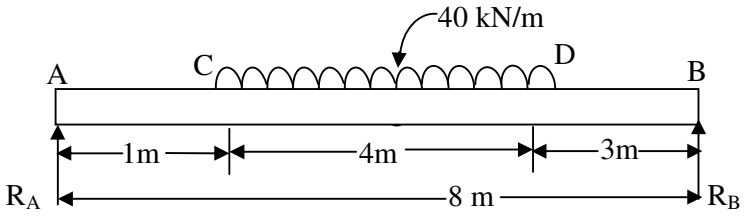
5. a) A beam of length 8m is simply supported at its ends. It carries a uniform distributed load of 40kN/m as shown in figure. Determine the deflection of beam at its mid-point and also the maximum deflection and its position. Take E=2×10^5 N/mm^2 and I=4.3×10^8 mm^4.



b) A horizontal beam AB is simply supported at A and B, 6m apart. The beam is subjected to a clockwise couple of 300kNm at a distance of 4m from the left end. IfE=2×10^5 N/mm^2 and I=2×10^8 mm^4. Determine (i) Deflection at the point where couple is acting
(ii) the maximum deflection. (8M+8M)

6. a) A cylindrical shell 1m long, 180mm internal diameter, thickness of metal 8mm is filled with a fluid at atmospheric pressure. If an additional 20,000mm^3 of the fluid is pumped in to the cylinder. Find the pressure exited by the fluid on the wall of the cylinder and also find the hoop stress is induced take E=2×10^5 N/mm^2 and 1/m = 0.3
b) A thick spherical shell of 100mm internal diameter is subjected to an internal fluid pressure of 30N/mm^2. If Permissible tensile stress is 80N/mm^2 find the thickness of the shell.
(8M+8M)

7. a) A hallow shaft, having an internal diameter 40% of its external diameter transmits 562.5 kW power at 100 rpm. Determine the external diameter of the shaft if the shear stress is not exceed 60N/mm^2 and the twist in a length of 2.5 m should not exceed 1.3 degrees. Assume maximum torque= 1.25 mean torque and C= 9x10^4 N/mm^2
b) Derive an expression for crippling load when one end of the column is fixed and the other end is free. (8M+8M)

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Code No: RT21032 **R13** SET - 4

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
MECHANICS OF SOLIDS
(Com. to ME, AME, AE, MTE)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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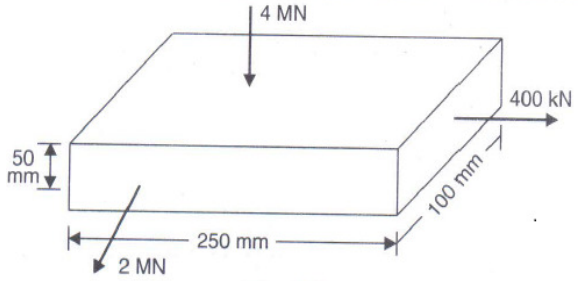
PART –A

1. a) Write the relationship between modulus of elasticity and modulus of rigidity.
   b) Explain Maximum Bending moment and Point of contra flexure.
   c) A rectangular beam 200mm deep and 300mm wide is simply supported over a span of 8m. What Uniform Distributed Load per meter the beam may carry, If the bending stress is not exceed 120 N/mm^2.
   d) Determine the slope and Deflection of a simply supported beam carrying uniformly distributed load by MOHR'S theorem.
   e) A cylindrical shell of thickness 1.5cm has to withstand maximum internal pressure of 1.5N/mm^2. If the ultimate stress in the material of the cylinder is 300N/mm^2, factor of safety 3.0 and joint efficiency 80%, determine the Diameter of the cylinder.
   f) Find the maximum shear stress induced in a solid circular shaft of diameter 15 cm when the shaft transmits 150kW power at 180 r.p.m. (3M+4M+4M+4M+4M+3M)

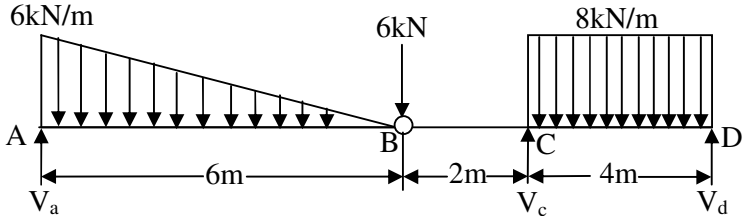
PART-B

2. a) A metallic bar 250mm×100mm×50mm is loaded as shown in fig. find the change in volume. Take $E = 2\times10^5$N/mm^2 and Poisson's ratio= 0.25. Also find the change that should be made in the 4MN load, in order that there should be no change in the volume of the bar.



   b) A bar of steel is length L and the diameter of the bar is varies uniformly from D_1at one end to D_2 at another end. Find the extension of the rod when is carries an axial pull *P*. (8M+8M)

3. a) Analyse the beam ABCD shown in figure. Draw the shear force and bending moment diagram, also calculate the maximum bending moment.



   b) A 20m long girder carrying a U.D.L of W kN/m is to be supported on two piers, 12m apart, in such a way that the maximum bending moment is as small as possible. Determine the distance of piers from the ends of the girder and the maximum bending moment. Draw the sheer force and bending moment diagrams. (8M+8M)

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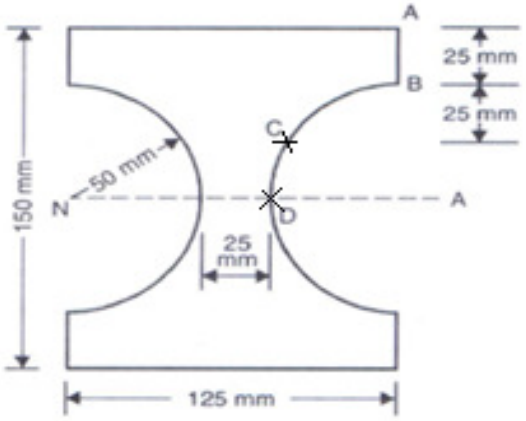
4. a) Figure shows a section, which is subjected to a sheer force of 100kN. Determine the shear stresses at A, B, C, and D. Sketch the shear stress distribution also.



b) A circular beams where one is solid of diameter D and other is a hollow of outer diameter D_0 and inner diameter D_i are f the same length, same material and of same weight. Find the ratio of section modulus of these circular beams (10M+6M)

5. a) Define Macaulay's method? And find out Deflection of a simply supported beam with an Eccentric point load.
   b) A horizontal beam of uniform section is pinned at its ends which are the same level and is loaded at the left hand pin with an anti clockwise moment M and right hand pin with a clockwise moment 2M both in the same vertical plane. The length between the pins is L. Find the angles of the slope at each end and the deflection of the midpoint of the span in terms of M, L, E and I. (10M+6M)

6. a) A cylindrical tank 1.8m in diameter and 2.4m long is 12.5mm thick. The ends which are flat and rigid are joined by 9 tie bars of 38mm diameter, and equally spaced. If the tie bar are initially stressed to 45 N/mm^2 and the tank filled with the water determine how much extra water will be pumped in during a pressure test to1.4 N/mm^2 and find the new stress in the tie bar. Neglect any constraint at the junction between the shell and the ends. Take for the tank material and the tie rods $E = 2.06\times10^5$ N/mm^2 and the bulk modulus of water $K = 2060$ N/mm^2.
   b) Determine change in dimensions of a thin spherical shell due to an internal pressure. (10M+6M)

7. a) Two shafts of same material and same lengths are subjected to same torque, if the first shaft is a solid circular section and the second shaft is hallow circular section whose internal diameter is 2/3 of the outside diameter. And the maximum shear stress developed in each shaft is the same, compare the weights of the shafts.
   b) A simply supported beam of length 4m is subjected to a uniformly distributed load of 30 kN/m over the whole span and deflects 15mm at the center. Determine the Crippling loads when this beam is used as a column with the following conditions.
   (i) One end fixed and other end hinged (ii) both the ends pin jointed. (8M+8M)

Code No: RT21044 **R13** SET - 1

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
SIGNALS AND SYSTEMS
(Com. to ECE, EIE, ECC)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Write any two properties of Fourier series. (4M)
   b) What is aliasing? How can it be reduced? (3M)
   c) Explain about Linearity of a system. (3M)
   d) The auto-correlation of a continuous time signal is $R_x(\tau) = 10e^{-2\tau}$. Find its energy spectral density. (4M)
   e) Explain the concept of region of convergence (ROC) for Laplace transforms. (4M)
   f) Explain the time reversal property for Z - transform. (4M)

PART -B

2. a) Define orthogonal signal space and bring out clearly its application in representing a signal. (8M)
   b) Show that whether $x(t) = A\, e^{-\alpha(t)}\, u(t)$, $\alpha > 0$ is an energy signal or not. (8M)

3. a) Find the energy spectral density of the signal x(t) = 10 Sinc 10t. Also find its total energy. (8M)
   b) Signal x(t) has Fourier Transform $x(f) = [\, j2\pi f \,] / [3+(j / 10)]$. What is total net area under the signal x(t). (8M)

4. a) Explain about LTI system by taking an example. (8M)
   b) Discuss about the Causality and physical reliability of a system. (8M)

5. a) For the signal $g(t) = 2a/(t^2+a^2)$,determine the essential Band width B Hz of g(t) such that the energy contained in the spectral components of g(t) of frequencies below B Hz is 99% of signal energy Eg. (8M)
   b) Explain the method of detection of periodic signals in the presence of noise by correlation. (8M)

6. a) Explain the Linearity and time shifting properties of Laplace transform. (8M)
   b) Find the Laplace transform of t u (t). List any 2 properties of ROC for Laplace transforms. (8M)

7. a) Solve $X(Z) = Z^2 (1 - 1/2\ Z^{-1}) (1 + Z^{-1}) (1 - Z^{-1})$ (8M)
   b) Explain the properties of ROC for Z Transforms. (8M)

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Code No: RT21044 **R13** SET - 2

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
SIGNALS AND SYSTEMS
(Com. to ECE, EIE, ECC)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1.	a)	Differentiate between Fourier series and Fourier transform.	(4M)
	b)	Find the Fourier transform of the signal x(t) = 20 sinc (20t).	(4M)
	c)	The transfer function of a continuous time system is H(s) = 5/ s+5. Test if the system is stable?	(4M)
	d)	Write any 2 Properties of Convolution.	(4M)
	e)	Explain the relation between L.T, and F.T. of a signal.	(3M)
	f)	Explain the time shifting property for Z - transform.	(3M)

PART -B

2.	a)	Obtain the condition under which two signals f1(t) & f2 (t) are said to be orthogonal to each other. Hence, prove that Sin (nw_0t) and Cos (mw_0t) are orthogonal to each other for all integer values of m,n.	(8M)
	b)	Explain any 3 properties of Fourier Series.	(8M)
3.	a)	Find the Fourier transforms of an even function $x_e(t)$ and odd function $x_o(t)$ of x(t).	(8M)
	b)	Differentiate between energy and power signals.	(8M)
4.	a)	Explain the difference between the following systems. i) Linear and non-linear systems. ii) Time variant and time invariant systems.	(8M)
	b)	Find the DTFT of the discrete signal x(n)=nu(n).	(8M)
5.	a)	Explain the method of detection of periodic signals in the presence of noise by correlation.	(8M)
	b)	Explain the relation between auto correlation function and energy/power spectral density function.	(8M)
6.	a)	Explain the Scaling and Frequency shifting properties of Laplace transform.	(8M)
	b)	Find the inverse Laplace transform of F(s) = (s + 4) / (s+3) (s+2) ; -3 < Re(s) < -2.	(8M)
7.	a)	Explain the concept of ROC in Z- transforms and list any 2 properties of the same.	(8M)
	b)	Find the inverse of Z transform of X (Z) = Z / ($3Z^2$- 4Z+1).	(8M)

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Code No: RT21044 **R13** SET - 3

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
SIGNALS AND SYSTEMS
(Com. to ECE, EIE, ECC)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1.	a)	Test if the two signals $x_1(t) = A \cos 100t$, $x_2(t) = 2A \cos 200t$ are orthogonal in the interval $0< t< T$ where T is time period of $x_1(t)$.	(4M)
	b)	What is Hilbert transform?	(3M)
	c)	$Y(t) = ax^2(t) + b$. Test for linearity and time variance.	(4M)
	d)	Write the Parseval's identity for the discrete Fourier series.	(4M)
	e)	Explain any 2 properties of Laplace transform.	(4M)
	f)	Explain the linearity property for Z - transform.	(3M)

PART –B

2.	a)	Prove that the complex exponential functions are orthogonal functions.	(8M)
	b)	State the properties of Fourier series.	(8M)
3.	a)	Explain the importance of Sampling theorem. What is aliasing and how is it avoided.	(8M)
	b)	An AM signal is given by $f(t) = 15 \text{ Sin } (2\pi\ 10^6\ t) + [\ 5 \text{ Cos } 2\pi\ 10^3\ t + 3 \text{ Sin} 2\pi\ 10^2 t]\ \text{Sin } 2\pi\ 10^6\ t$. Find the Fourier Transform and draw its spectrum.	(8M)
4.	a)	Find the impulse response of series RC limit. Explain the difference between causal and non-causal systems.	(8M)
	b)	Write notes on Distortion less transmission through a system.	(8M)
5.	a)	What is Hilbert Transform and give its importance. Also state Parseval's theorem.	(8M)
	b)	Explain Cross correlation and Auto correlation of functions. Discuss the properties of correlation function.	(8M)
6.	a)	Explain the Time convolution and Scaling properties of Laplace transform.	(8M)
	b)	Find the inverse Laplace transform of $x(s) = 2s / (s+1)^2 (s+2)$; $Re(s) < -2$. Given that the ROC lies to the left of s = -2.	(8M)
7.	a)	Derive the relation between Z transform and Fourier transform.	(8M)
	b)	Find the inverse Z-transform of $X(Z) = Z / [Z (Z-1) (Z-2)]$ for $\lvert Z \rvert > 2$.	(8M)

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Code No: RT21044 **R13** SET - 4

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
SIGNALS AND SYSTEMS
(Com. to ECE, EIE, ECC)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1.	a)	Prove that Sin n ω_0 t & Cos m ω_0 t are orthogonal to each other.	(4M)
	b)	State the time differentiation property of Fourier transform.	(3M)
	c)	Test if the system described by the transfer relationship y(t) = t x(t) is linear.	(4M)
	d)	Explain the relation between convolution and correlation.	(4M)
	e)	L.T [f(2t)] = ____	(3M)
	f)	Distinguish between Laplace, Fourier and Z transforms.	(4M)

PART -B

2.	a)	State and explain the Dirichlets Conditions.	(8M)
	b)	Differentiate clearly between the even, odd and half wave symmetry waveforms with respect to their Fourier co-efficients (use appropriate waveform) in their Fourier series representation.	(8M)
3.	a)	Determine the Fourier transform of a two sided exponential pulse $x(t) = e^{-|t|}$.	(8M)
	b)	State and prove the following properties of Fourier transform. i) Duality ii) Time-shifting	(8M)
4.	a)	Find the impulse response of series RL circuit. What is an LTI system? Explain its properties	(8M)
	b)	Consider a causal LTI system with frequency response H (jw) = 1 / (3+jw). For a particular input x(t) this system is observed to produce the Output = e^{-3t} u (t) – e^{-4t} u (t). Find x(t).	(8M)
5.	a)	State and explain Parseval's theorem.	(8M)
	b)	Discuss the properties of correlation function.	(8M)
6.	a)	Discuss any 3 properties of Laplace transform.	(8M)
	b)	Find the inverse Laplace transform of x(s) = 5(s+5)/ s(s+3) (s+7); Re(s) > -3	(8M)
7.	a)	Prove the differentiation property of Z-transform. Explain the concept of ROC in Z transform.	(8M)
	b)	Using Z-transforms find $x_1(n) \otimes x_2(n)$ if $x_1(n) = u(n)$ and $x_2(n) = (1/2)^n u(n)$.	(8M)

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Code No: RT21053 **R13** SET - 1

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
DIGITAL LOGIC DESIGN
(Com. to CSE, IT)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Convert the following numbers with the given radix to decimal. (4M)
   i) $(4433)_5$ ii) $(1199)_{12}$
   b) State and prove De Morgan's theorem. (4M)
   c) Define encoder? List out the applications of it? (3M)
   d) Explain the operation of a SR flip-flop? (3M)
   e) Discuss about a serial-in, serial-out shift registers? (4M)
   f) What are the advantages of PLDs over fixed function ICs? (4M)

PART –B

2. a) Perform the subtraction using 1's complement and 2's complement methods. (8M)
   i) 11010 – 10000 ii) 11010 – 1101 iii) 100 - 110000
   b) How are negative numbers represented? Represent signed numbers from +7 to -8 using different ways of representation. (8M)

3. a) Reduce using mapping the following expression and implement the real minimal expression in Universal logic. F= ∑m (0, 2, 4, 6, 7, 8, 10, 12, 13, 15) (8M)
   b) State and prove consensus theorem? Solve the given expression using consensus theorem. (i) $\overline{AB} + AC + \overline{BC} + \overline{BC} + AB$ (ii) $(A + B)(\overline{A} + C)(B + C)(\overline{A} + D)(B + D)$ (8M)

4. a) Perform the realization of half adder and full adder using decoders and logic gates. (8M)
   b) Design a 4 bit combinational logic to subtract one bit from the other. Draw the logic diagram using NAND and NOR Gates. (8M)

5. a) Draw the circuit diagram of a positive edge triggered JK flip flop and explain its operation with the help of a truth table? (8M)
   b) Convert a D flip flop into SR flip flop and JK flip flop? (8M)

6. a) Design a 4-bit universal shift register using D flip flops and multiplexers? (8M)
   b) Explain the operation of 4-bit ring counter with circuit diagram, state transition diagram and state table. Draw the corresponding timing diagrams? (8M)

7. a) Discuss how PROM, EPROM and EEPROM technologies differ from each other. (8M)
   b) Implement the following multiple output functions using PROM (8M)
   F_1= ∑m (0, 1, 4, 7, 12, 14, 15) F_3= ∑m (2, 3, 7, 8, 10)
   F_2= ∑m (1, 3, 6, 9, 12) F_4= ∑m (1, 3, 5)

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Code No: RT21053 **R13** SET - 2

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
DIGITAL LOGIC DESIGN
(Com. to CSE, IT)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1.	a)	Why is hexadecimal code widely used in digital systems? List out the digits used to represent the hexadecimal codes?	(4M)
	b)	What is two-level logic? What is its advantage?	(4M)
	c)	Why a multiplexer is called a data selector? Draw the 2x1 MUX.	(4M)
	d)	What are the various methods used for triggering flip-flops? Explain with examples.	(3M)
	e)	Explain the basic types of shift registers?	(3M)
	f)	Draw the basic architecture of a PAL?	(4M)

PART –B

2.	a)	Subtract the following decimal numbers by the 9's and 10's complement methods. 274 - 86 ii) 93 - 615 iii) 574.6 - 297.7 iv) 376.3 - 765.6	(8M)
	b)	What is a Gray code? Obtain a 3-bit and 4-bit gray code from a 2-bit gray code by reflection.	(8M)
3.	a)	Without reducing, implement the following expressions in AOI logic and then convert them into NAND logic and NOR logic A + BC + (A + B'C) + D ii) A + B'C + (B + C)' + B'C'	(8M)
	b)	Reduce the following expression to the simplest possible POS and SOP forms. F= ∑m (6,8,13,18,19,25,27,29,31) + d (2,3,11,15,17,24,28)	(8M)
4.	a)	Implement the following multiple output combinational logic circuit using a 4 line to 16 line decoder: F_1= ∑m (0, 1, 4, 7, 12, 14, 15) F_3= ∑m (2, 3, 7, 8, 10) F_2= ∑m (1, 3, 6, 9, 12) F_4= ∑m (1, 3, 5)	(8M)
	b)	Discuss a few applications of multiplexers and distinguish between a multiplexer and a decoder.	(8M)
5.	a)	Draw the schematic circuit of an edge-triggered JK flip flop with active low preset and active low clear using NAND gates and explain its operation?	(8M)
	b)	Define the following terms with relation to flip flop: i) Set-up time ii) Hold time iii) Propagation delay time iv) Preset v) Clear	(8M)
6.	a)	Design a type-D counter that goes through states 0, 2, 4, 6, 0…….. The undesired states must always go to a 0 on the next clock pulse.	(8M)
	b)	With suitable logic diagram explain a 4-bit bidirectional shift register?	(8M)
7.	a)	What is a PLD? Compare the three combinational PLDs?	(8M)
	b)	Design an Excess-3 to BCD code converter using a PLA?	(8M)

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Code No: RT21053 **R13** SET - 3

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
DIGITAL LOGIC DESIGN
(Com. to CSE, IT)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) What are the three methods of obtaining the 2's complement of a given binary number? (4M)
   b) How can a NOR gate be used as an inverter, AND gate and OR gate? (4M)
   c) Distinguish between a half-adder and a full-adder? (3M)
   d) Draw the circuit of J – K master slave flip-flop with active high clear and active low preset. (3M)
   e) Draw the state diagram of modulo-4 up/down counter. (4M)
   f) What is a PLD? What is the principal advantage of a PLD? (4M)

PART -B

2. a) How are binary codes classified? Briefly explain each code with suitable examples? (8M)
   b) Convert the following numbers into Gray code numbers (8M)
   i) $(96)_{10}$ ii) $(45)_{16}$ iii) $(235)_{8}$ iv) $(85)_{12}$

3. a) Simplify the following using K- map and implement the same using NAND gates. (8M)
   $Y(A, B, C) = \sum (0, 2, 4, 5, 6, 7)$
   b) Simplify the following Boolean expression. (8M)
   $T(x, y, z) = (x + y) \{[x' (y' + z')]'\} + x' y' + x' z'$
   $X(A, B, C, D) = A^1B^1C^1+(A+B+C^1)^1+A^1B^1C^1D$

4. a) Draw the logic diagram of a 2 to 4 line decoder using NOR gates including an enable input. (8M)
   b) Give circuit implementation of 4 Bit Ripple adder and Ripple Adder/Subtractor using ones and twos complement method. (8M)

5. a) Draw the schematic circuit of a D flip flop with negative edge triggering using NAND gates. Give its truth table and explain its operation? (8M)
   b) Give the transition table for SR, JK, D and T flip flops. Convert an SR flip flop into D flip flop. (8M)

6. a) Write the design steps of synchronous counters with suitable examples? (8M)
   b) What is a register? Discuss the applications of shift registers? (8M)

7. a) Design an arithmetic circuit that adds 2 binary digits. The circuit should have 2 outputs, one for the sum and the other for the carry. Implement the same in a PAL. (8M)
   b) Show how the PLA circuit can be programmed to implement the binary to gray conversion. (8M)

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Code No: RT21053 **R13** SET - 4

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
DIGITAL LOGIC DESIGN
(Com. to CSE, IT)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Express the Decimal Digits 0-9 in 2421 and 84-2-1. (4M)
   b) What do you mean by K-map? Name it advantages and disadvantages. (4M)
   c) Realize a single bit comparator? (3M)
   d) Draw and explain active low S-R latch. (3M)
   e) Draw the state diagram of synchronous mod-10 up-down counter. (4M)
   f) What are the advantages and disadvantages of using a PROM as a PLD? (4M)

PART -B

2. a) Convert the following to Decimal and then to octal (8M)
   (i) $(125F)_{16}$ (ii) $(10111111)_2$ (iii) $(392)_{10}$
   b) How do you convert a gray number to binary? Generate a 4-bit gray code directly using the mirror image property? (8M)

3. a) Simplify the following using K- map and implement the same using NAND gates. (8M)
   Y (A, B, C) = ∑ (0, 2, 4, 5, 6, 7)
   b) Represent and draw the following Boolean function using minimum number of basic gates. i) (AB + AB') (AB)' (8M)
   ii) [(ABD(C + D + E)) + (A +DBC)'] (ABC + (CAD)')

4. a) Realize the function f(A,B,C,D) = ∑ (1,2,5,8,10,14)+d (6,7,15) using (8M)
   i) 8:1 MUX ii) 4:1 MUX
   b) Design and draw the logic circuit diagram for full adder/subtractor. Let us consider a control variable w and the designed circuit that functions as a full adder when w=0, as a full subtractor when w= 1. (8M)

5. a) Design a JK flip flop using AND gates and NOR gates. Explain the operation of the JK flip flop with the help of characteristic table and characteristic equation. Explain the Race around condition and also explain how to eliminate it. (8M)
   b) Draw the circuit diagram of clocked D-flip-flop with NAND gates and explain its operation using truth table. Give its timing diagram. (8M)

6. a) Explain the operation of 5-stage twisted ring counter with circuit diagram, state transition diagram and state table. (8M)
   b) With suitable logic diagrams explain about Buffer register and Controlled buffer register? (8M)

7. a) Design a PAL for the following logical functions. (8M)
   Y1=AB+A'CB', Y2=AB'C+AB+AC', Y3=AB+BC+CA
   b) Design a combinational circuit using ROM. The circuit accepts a 3 bit no and generates an O/p binary number equal to square of input number. (8M)

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Code No: R21025 **R10** SET - 1

II B. Tech I Semester Supplementary Examinations, Oct/Nov - 2016

ELECTRICAL MACHINES - I

(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) Draw and explain schematic diagram of flow of energy in the conversion of electrical energy into mechanical term. (8M)
   b) For a singly-excited magnetic system derive the expression for mechanical force and mechanical work done. Make suitable assumptions. (7M)

2. a) Derive the expression of emf generated in case of generator from the first principles. (8M)
   b) Explain about different excitation methods of DC Generators with diagrams. (7M)

3. a) Briefly discuss about the armature reaction and its effects on the operation of D.C. Machines. How the armature reaction is minimized. (8M)
   b) Explain different methods for improving the commutation. (7M)

4. a) Explain the following characteristics of shunt wound dc generators. (8M)
      i) Magnetization characteristics, ii) External and internal characteristics.
   b) What are the causes of failure to build – up voltage and explain the remedy for DC Shunt Generator. (7M)

5. a) Write the conditions for parallel operation of DC series generators. (8M)
   b) Two shunt generators operating in parallel deliver a total current of 250 A. One of the generators is rated 50 KW and the other 100 KW. The voltage rating of both machines is 500 V and have a regulation of 6 percent(smaller one) and 4 percent. Assuming linear characteristics, determine i) the current delivered by each machine ii) terminal voltage. (7M)

6. a) Explain the applications of DC shunt and series motors with the help of their characteristics and equations. (8M)
   b) A 6-pole DC motor has a wave connected armature with 87 slots, each slot containing 6 conductors. The flux per pole is 20 m.wb and the armature has a resistance of 0.13 ohm when the motor is connected to 240V supply and the armature draws a current of 80A driving a load of 16KW. Calculate
      i) Speed, ii) Armature Torque and iii) shaft Torque. (7M)

7. a) Explain Armature voltage and field flux speed control methods for DC shunt motors. (8M)
   b) Explain necessity of starter and briefly describe 3 point starter with neat diagam. (7M)

8. a) With neat diagram explain the Hopkinson's test conducted on two DC machines. Give all calculations assuming equal constant losses. (8M)
   b) A brake test on a DC shunt motor gave the following results: Tensions 4.5 kg and 0.5 kg., radius of pulley = 12 cm, speed = 1200 RPM, V = 200 V, I_L = 3.7 Amp. Find the output torque, output power, hose power, and efficiency. (7M)

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Code No: R21032 **R10** SET - 1

II B. Tech I Semester Supplementary Examinations, Oct/Nov - 2016
THERMODYNAMICS
(Com. to ME, AE, AME, MM)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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Note: Steam Tables are allowed

1. a) Explain quasi-static process. Explore its importance in Engineering. (6M)
   b) An electric generator coupled to a windmill produces an average electrical power output of 5 kW. The power is used to charge a storage battery. Heat transfer from the battery to the surroundings occurs at a constant rate of 0.6 kW. Determine the total amount of energy stored in the battery, in kJ, in 8 hr of operation. (9M)

2. a) One kilogram of water at 373 K is converted to steam at 373 K at 101 kPa. Determine the change in the internal energy during the process. Take Density of water ρ_{water} = 1000 kg/m^3 at 373 K, Density of steam, ρ_{steam} = 0.6 kg/m^3 at 373 K, Latent Heat, h_{fg}= 2250 kJ/kg (6M)
   b) A gas flows steadily through a rotary compressor. The gas enters the compressor at a temperature of 16^{o}C, a pressure of 100 kPa, and an enthalpy of 391.2 kJ/kg. The gas leaves the compressor at a temperature of 245^{o}C, a pressure of 0.6 MPa, and an enthalpy of 534.5 kJ/kg. There is no heat transfer to or from the gas as it flows through the compressor. (i) Evaluate the external work done per unit mass of gas assuming the gas velocities at entry and exit to be negligible.
   (ii) Evaluate the external work done per unit mass of gas when the gas velocity at entry is 80m/s and that at exit is 160m/s. (9M)

3. a) Establish the inequality of Clausius. (6M)
   b) Two reversible heat engines A and B are arranged in series, A rejecting heat directly to B. engine A receives 200kJ at a temperature of 421^{0}C from a hot source, while engine B is in communication with a cold sink at a temperature of 4.4^{0}C. if the work output of A is twice that of B, find (9M)
      (i) the intermediate temperature between A and B,
      (ii) the efficiency of each engine, and
      (iii) the heat rejected to the cold sink.

4. a) A sample of steam from an engine exhaust at 1.25 bar flows steadily through an electric calorimeter and comes out at 1 bar/130^{o}C. The calorimeter is fitted with two numbers of 1 kW electric heaters. The flow rate of the steam is measured to be 3.6 kg in 5 min. Determine the quality of the steam exhausted by the engine. (7M)
   b) A rigid tank (capacity 1 m^3) holds dry saturated steam at 0.2 MPa. However, due to poor insulation, there is some heat loss to the surroundings whereupon the steam pressure drops to 0.1 MPa after sometime. Determine the (8M)
   (i) Final condition of the steam, (ii) Amount of heat transferred
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5. a) Express the van der Waals constant in terms of critical properties. (6M)

   b) A 1.5 kg mass of a certain gas is filled in a cylinder enclosed by a weightless, frictionless piston. The cylinder-piston assembly is perfectly insulated. The gas occupies 0.06 m^3 at 5600 kPa and expands isentropically until the gas temperature drops to 513 K. For this gas (9M)
   $C_p = a + kT$ and $c_v = b + kT$
   Where a, b, k are constants and T is absolute temperature.
   If a = 0.946, b = 0.662, and k = 10^{-4}, Determine the work done in the expansion.

6. a) Why is there no temperature change when an ideal gas is throttled? Why do the specific heats of an ideal gas depend only on the atomic structure of the gas? (6M)

   b) Two tanks are connected by a valve. One tank contains 2 kg of CO_2 gas at 77°C and 0.2 bar. The other tank holds 8 kg of the same gas at 27°C and 1.2 bar. The valve is opened and the gases are allowed to mix while receiving energy by heat transfer from the surroundings. The final equilibrium temperature is 42°C. Determine the final equilibrium pressure and the heat transfer for the process. (9M)

7. a) Describe the Otto cycle using $P-v$ and $T-s$ diagrams. Mark the various processes. (6M)

   b) A theoretical diesel engine operates at suction conditions of 100 kPa/300 K. At the end of the compression stroke, the pressure rises to 1.5 MPa. The maximum temperature limit of the cycle is 1800 K. Determine (9M)
   (i) Cut-off ratio (r_c),
   (ii) Net work output of the cycle,
   (iii) Thermal efficiency of the cycle,
   (iv)The work ratio (r_w),
   (v) The mean effective pressure. Take for air R = 0.287 kJ kg^{-1} K^{-1}; c_p= 1.005 kJ kg^{-1} K^{-1}; c_v = 0.718 kJ kg^{-1} K^{-1}; γ = 1.4

8. a) What is the reversible cycle that represents the simple steam power plant? Draw the flow, $p-v$, $T-s$ and $h-s$ diagrams of this cycle. (6M)

   b) An ideal Gas Turbines plant operates between the temperature limits of 278 and 1112 K. Determine the (9M)
   (i) Pressure ratio at which the cycle efficiency will equalize with that of the Carnot cycle.
   (ii) Pressure ratio at which the maximum work will be available; and
   (iii) Efficiency under the maximum work conditions.

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Code No: R21044 **R10** SET - 1

II B. Tech I Semester Supplementary Examinations, Oct/Nov - 2016
SIGNALS AND SYSTEMS
(Com. to ECE, EIE, ECC, BME)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. Determine whether each of the system with impulse response is casual, stable (15M)
   $i) h(n) = 3^n u(-n)$ $ii) h(n) = cos(n\pi/2)$
   $iii) h(n) = cosx(n)$ $iv) h(n) = 4^n u(n-2)$

2. Obtain the condition under which two signals $f_1(t)$ & $f_2(t)$ are said to be orthogonal to each other. Hence, prove that $Sin\, nw_0 t$ and $Cos\, mw_0 t$ are orthogonal to each other for all integer values of *m, n.* (15M)

3. a) Find the trigonometric Fourier series of $x(t) = t^2$ over the interval *(-1, 1)* (8M)
   b) Explain the trigonometric Fourier series with necessary mathematical expressions (7M)

4. a) Using Fourier transform, Find the convolution of the signals (8M)
   $x_1(t) = e^{-t}u(t)$ *and* $x_2(t) = e^{-3t}u(t)$
   b) What is Hilbert transform? How does it different from other transforms? (7M)

5. a) Discuss the effect of under sampling a signal with example and neat diagrams. (8M)
   b) Explain how a signal is extracted from a noisy environment by using filtering technique (7M)

6. a) If $y(t) = x(t) * h(t)$ then show that $x(t-t1) * h(t-t2) = y(t-t1-t2)$ (7M)
   b) Find the cross correlation of the functions $Sin\, \omega t$ *and* $Cos\, \omega t$. (8M)

7. a) Determine the inverse Laplace transform of the following (8M)
   $i) \frac{2}{s(s+1)(s+2)}$ $ii) \frac{1}{(s+1)(s+5)}$
   b) Discuss various properties of ROC's for Laplace transform. (7M)

8. a) for the given signal $x(n) = -b^n u(-n-2) + 0.8^n u(n)$ (7M)
   Determine the parameter values for which Z-Transform will exist
   b) Find the Z-Transform and Plot the ROC for (8M)
   $x(n) = -b^n u(-n-2) + 0.8^n u(n)$

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Code No: R21054 **R10** SET - 1

II B. Tech I Semester Supplementary Examinations, Oct/Nov - 2016
DIGITAL LOGIC DESIGN
(Com. to CSE, IT)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Convert the following numbers (7M)
   i) $(6753)_8$ to base 10
   ii) $(00111101.0101)_2$ to base 8 and base 4
   iii) $(95.75)_{10}$ to base 2.
   b) Encoding the decimal numbers 0 to 9 by means of the following weighted binary codes. i) A) 8 4 2 1 B) 2 4 2 1 C) 6 4 2 -3 (8M)
   ii) Determine which of the above codes are self complementing and why?

2. a) Obtain the complement of the following Boolean expression. (10M)
   i) B'C'D+(B+C+D)+B'C'D'E iii) AB+(AC)'+(AB+C)
   ii) A'B'C+A'BC'+AB'C+ABC' iv) AB+(AC)'+AB'C
   b) Implement the following Boolean function with NOR-NOR logic (5M)
   Y = AC + BC + AB + D

3. a) What do you mean by K-map? Draw the K-maps up to 4 variables and list its advantage and disadvantage. (8M)
   b) Reduce the following function using K-map technique. (7M)
   f(A,B,C,D) = Σ m(0,1,4,8,9,10)

4. a) Implement the following Boolean expression with half adder (7M)
   F = ABC' + (A'+B')C
   b) Explain the working of carry look-ahead generator. (8M)

5. a) Draw the circuit for 3 to 8 decoder and explain. (7M)
   b) Design 2x4 decoder using NAND gates. (8M)

6. Implement the following function using a PROM. (15M)
   i) F(w,x,y,z) = Σ (1,9,12,15)
   ii) G(w,x,y,z) = Σ (0,1,2,3,4,5,7,8,10,11,12,13,14,15)

7. a) Realize an SR latch circuit using (8M)
   i) NOR gates and ii) NAND gates. Give truth table
   b) Convert a D flip-flop into JK flip-flops. (7M)

8. a) Design a modulo 10 counter JK flip-flops. (8M)
   b) Draw and explain 3-bit asynchronous up counter using flip-flops and explain with output (7M)

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Code No: W0221 **R07** SET - 1

II B. Tech I Semester Supplementary Examinations, Oct/Nov - 2016
ELECTRICAL MACHINES - I
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 80

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Show that the reaction of coupling magnetic field on the electrical or mechanical system is essential for the electromechanical energy conversion process.
   b) What are the advantages of analyzing the energy conversion devices by field-energy concept?

2. a) Explain the action of commutator in a DC generator.
   b) Draw the developed winding diagram of progressive lap winding for 4 – poles, 24 slots with one coil per slot, single layer showing there the position of poles, direction of motion, direction of induced e.m.f and position of the brushes.

3. a) Explain the process of commutation in a DC machine and discuss the methods to improve it.
   b) A 5 kW, 400 V, 4-pole dc generator has 1200 lap wound conductors. The brush leads of 5 angular degrees (mech.) from the geometric neutral axis. Calculate the cross and demagnetizing turns per pole. Neglect the shunt field current.

4. a) Explain the process of buildup of induced voltage in a DC generator.
   b) The magnetization curve of a DC shunt generator running at 1000 rpm is as follows:

Field current (A)	0.25	0.5	1.0	1.5	2.0	2.5	3.0
EMF (V)	36	72	138	188	225	250	270

   Find
   (i) The value of field resistance to give 240 V on no load
   (ii) The speed at which the generator just fail to build up.

5. a) Two DC generators are operating in parallel have linear characteristics. One machine has a terminal voltage of 270 V on no load and 220 V at a load current of 30 A. The other machine has a voltage of 280 V on no load and 220 V at a load current of 40 A. Calculate the output current of each machine and the bus voltage when
   (i) the total load current is 50 A and (ii) load resistance is 10 ohms.
   b) Two shunt generators connected in parallel discuss in detail how they share load?

6. a) Draw the different characteristics of the series motor? Explain the importance of speed-torque characteristics?
   b) A 4-pole dc series motor has 944 lap connected armature conductors. At a certain load the flux per pole is 30 mWb and the total mechanical power developed is 3 kW. Calculate the line current taken by the motor and the speed at which it will run with an applied voltage of 220 V. The total motor resistance is 1 ohm.
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7. a) A 220V, 30A, 900 rpm DC shunt motor has armature circuit resistance of 0.2 ohms. If load torque is reduced to 60% of its full-load value and a resistance of 2 ohms is inserted in series with armature circuit, find the motor speed. Armature reaction weakens the field flux by 4% at full load?
   b) Explain with a neat diagram the operation of a 4-point starter.

8. a) Explain the Hopkinson's test for determination of efficiency of shunt machines.
   b) A retardation test on a DC motor gave the following results: With the field unexcited, the speed fell from 1530 to 1470 in 43 second; with field normally, the same drop in speed occurred in 26 seconds; with an average load of 1.2 kW supplied by the armature, the same speed drop occurred in 20 seconds. Determine the moment of inertia of the rotating parts at 1500 rpm and the core loss for normal excitation at this speed.

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Code No: X0523 **R07** SET - 1

II B. Tech I Semester Supplementary Examinations, Oct/Nov - 2016
ADVANCED DATA STRUCTURES
(Com. to CSE, ECC)

Time: 3 hours Max. Marks: 80

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Demonstrate the call by value method of passing arguments to a function with an example. (8M)
   b) Give an example to explain about access control in C++ (8M)

2. a) Why Operator overloading is used in C++ programming? What things to be remembered while using Operator overloading in C++ language? (10M)
   b) Write a C++ program to demonstrate the overloading of ++ operator. (6M)

3. Write a C++ program for delimiter matching algorithm that reads a character and stores it on a stack if it is an opening delimiter and compares with delimiter popped off if it is a closing delimiter. If they match processing continues otherwise processing discontinues. The program ends if the stack is empty.
   Show the processing that occurs when the above algorithm is applied to the statement: s = t [5] + u / (v * (w + y)) ; (16M)

4. a) Outline an algorithm to delete a key from a table when the linear hashing method is used for inserting keys. (8M)
   b) How collision resolution is resolved using separate chaining? (8M)

5. Illustrate the three methods in the merge phase of external sorting in detail. (16M)

6. a) Create a binary search tree using the following data entered as a sequential set: 14, 23, 7, 10, 33, 56, 80, 66, 70. (10M)
   b) What is meant by prefix traversal? Explain with example. (6M)

7. Start with an empty Red Black tree and insert the following keys in the given order: 15, 14, 13, 12, 11, 10, 9,8, 7, 6, 5, 4, 3, 2, 1. Draw the figures depicting your tree immediately after each insertion and following the rebalancing rotation or color change(if any). (16M)

8. Describe the Brute Force algorithm for Pattern matching. Explain with an example. (16M)

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