Code No: RT31013 **R13** SET - 1

III B. Tech I Semester Regular Examinations, November - 2015
DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES
(Civil Engineering)

Time: 3 hours Max. Marks: 70

Answer any ONE Question from Part – A and any THREE Questions from Part – B
Use of IS: 456-2000 and design charts from SP-16 is allowed.
For all designs adopt Limit State Method

*****

PART –A

1 A rectangular reinforced concrete beam is simply supported on two masonry walls 230 mm thick and 6 m apart (centre to centre). The beam is carrying an imposed load of 15 kN/m. Design the beam with all necessary checks. Use M25 concrete and Fe 415 steel. Sketch the details of reinforcement. [28M]

(OR)

2 Design a reinforced concrete slab for a room of clear dimensions 4 m x 5 m. The slab is supported on walls of width 300 mm. The slab is carrying a live load of 4 kN/m^2 and floor finish 1 kN/m^2. Use M20 concrete and Fe 415 steel. The corners of slab are held down. Sketch the layout of the reinforcement. [28M]

PART -B

3 a) What are different methods of design in R.C.C? [7M]
b) Draw stress-strain relationship for concrete and explain it briefly. [7M]

4 A simply supported R.C.C. beam 250 mm wide and 450 mm deep (effective) is reinforced with 4 numbers of 18 mm diameter bars. Design the shear reinforcement if M20 grade of concrete and Fe 415 steel is used and beam is subjected to a shear force of 150 kN at service state. [14M]

5 Design a short R.C.C. column to carry an axial load of 1600 kN. It is 4 m long, effectively held in position and restrained against rotation at both ends. Use M20 concrete and Fe 415 steel. [14M]

6 Design a square footing of uniform thickness for an axially loaded column of 450 mm x 450 mm size. The safe bearing capacity of soil is 190 kN/m^2. Load on column is 850 kN. Use M20 concrete and Fe 415 steel. [14M]

7 Design a flight (waist slab) between landing to landing of a tread-riser type of staircase, with 10 risers, each 150 mm, and with tread of 270 mm. The upper and lower landings are 1200 mm wide each supported on 230 mm thick masonry walls at the edges, parallel to the risers. The risers are liable to be overcrowding. The materials to be used for construction are M20 grade concrete and HYSD bars of grade Fe 415. [14M]

-000-

Code No: RT31013 **R13** SET - 2

III B. Tech I Semester Regular Examinations, November - 2015
DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES
(Civil Engineering)

Time: 3 hours Max. Marks: 70

Answer any ONE Question from Part – A and any THREE Questions from Part – B
Use of IS: 456-2000 and design charts from SP-16 is allowed.
For all designs adopt Limit State Method

*****

PART –A

1 Design a reinforced concrete beam of span 7 m carrying a load of 20 kN/m throughout its length. The beam is simply supported on brick masonry walls with 230 mm width. Use M30 grade concrete and Fe500 steel bars. Keep the depth as 1.5 times the width. Sketch the details of reinforcement. [28M]

(OR)

2 A reinforced concrete slab of size 6m x 4m whose adjacent short edges are discontinuous and monolithic construction with the supports. The slab has to carry a live load of 5 kN/m^2 and a floor finish of 1.5 kN/m^2 and the floor partition is 1 kN/m^2. Use M20 concrete and Fe415 steel. Sketch the details of reinforcement also. [28M]

PART -B

3 Draw stress block diagram and evaluate the following expressions for limit state design:
a) Neutral Axis depth [5M]
b) Lever arm [4M]
c) Moment of resistance. [5M]

4 A simply supported R.C.C. beam 230 mm wide and 450 mm over all depth is reinforced with 4 numbers of 16 mm diameter bars. Design the shear reinforcement if the shear force at service state is 180 kN. Use M20 grade of concrete and Fe 415 grade steel. [14M]

5 Design a circular column of 4 m height is effectively held in position at one end and pinned at other end. The diameter of the column is 400 mm. Calculate the reinforcement if it is required to carry a factored axial load of 1600 kN. Use M30 mix and Fe 500 grade steel. [14M]

6 Design an isolated rectangular footing for an axial load of 1500 kN transmitted by the column. The cross section of the column is 230 mm x 450 mm. The SBC of soil is 180 kN/m^2. Adopt M20 grade concrete and Fe 415 grade steel. [14M]

7 Design a stair case slab for a three storied residential building. The dimensions of stair case room are 3.6 m x 4.5 m. The height of each storey is 3.6 m. Adopt M 20 grade concrete and Fe 415 grade steel. [14M]

-000-

Code No: RT31013 **R13** SET - 3

III B. Tech I Semester Regular Examinations, November - 2015
DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES
(Civil Engineering)

Time: 3 hours Max. Marks: 70

Answer any ONE Question from Part – A and any THREE Questions from Part – B
Use of IS: 456-2000 and design charts from SP-16 is allowed.
For all designs adopt Limit State Method

*****

PART –A

1 A reinforced concrete beam is simply supported over a clear span of span 6 m. The beam carries a superimposed load of 10 kN/m. Design the beam if the width of the beam is 300 mm. Use M20 grade concrete and Fe 415 steel. The beam is resting on 400 mm thick walls. Sketch the details of reinforcement. [28M]

(OR)

2 Design an R.C.C. slab of size 5 m x 6 m, simply supported on all four edges with corners held down. The slab is carrying a load of 4 kN/m^2 including floor finish etc. Use M 20 concrete and Fe 415 steel. Sketch the details of reinforcement also. [28M]

PART -B

3 a) Write short notes on balanced, under reinforced and over reinforced sections with sketches (working stress method). [7M]

b) A doubly reinforced beam 300 mm x 680 mm effective is reinforced on tension and compression side with 4 numbers of 25 mm diameter bars. Compression steel is placed 40 mm from top of the beam. If the beam carries a bending moment of 215 x 10^6N-mm, find the stresses induced in steel and concrete. Take m = 13.33 [7M]

4 A simply supported R.C.C. beam 200 mm x 400 mm (effective) is reinforced with 4 bars of 22 mm diameter on tension side. The beam is carrying a load of 10 kN/m over a clear span of 8 m. Design the shear reinforcement. Use M 20 concrete and Fe 415 steel bars. [14M]

5 An R.C.C. short column of size 400 mm x 500 mm is carrying a factored load of 3000 kN. Design the column assuming e_{min} < 0.05 D. Use M25 concrete and Fe 415 steel. [14M]

6 Design a rectangular footing of uniform thickness for an axially loaded column of size 300 mm x 600 mm. Load on the column is 1150 kN. Safe bearing capacity of the soil is 200 kN/m^2. Use M20 concrete and Fe 415 steel. [14M]

7 Design the waist slab type stair case consisting of a straight flight of stairs resting on two stringer beams along the two sides. Assume the span of the slab as 2 m with risers of 160 mm and treads of 270 mm. Live load= 3 kN/m^2. Adopt M20 grade concrete and Fe 415 grade steel. [14M]

-000-

Code No: RT31013 **R13** SET - 4

III B. Tech I Semester Regular Examinations, November - 2015
DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES
(Civil Engineering)

Time: 3 hours Max. Marks: 70

Answer any ONE Question from Part – A and any THREE Questions from Part – B
Use of IS: 456-2000 and design charts from SP-16 is allowed.
For all designs adopt Limit State Method

*****

PART –A

1 A simply supported R.C.C. beam over an effective span of 8 m carrying an imposed load of 30 kN/m. Design the beam using M20 grade concrete and Fe 415 steel. Sketch the details of reinforcement. [28M]

(OR)

2 The panel of slab is 4.5 m x 5 m. One short edge and one long edge of the slab is discontinuous and other short edge and long edges are continuous. The slab is restrained with edge beam. Super imposed load is 3.5 kN/m^2 and floor finishes being 1.0 kN/m^2. Design the slab. Use M20 grade concrete and Fe 415 steel. Sketch the details of reinforcement also. [28M]

PART -B

3 a) Find the moment of resistance of a beam section 250 mm x 500 mm deep is reinforced with 2- 16 mm bars in tension at an effective cover of 40 mm. Use M20 concrete and Fe 500 grade of steel. [7M]

b) What would be the increase in the moment of resistance if it is reinforced with 2-16 mm bars of Fe 500 grade in compression at an effective cover of 40 mm. Whether the neutral axis would shift upwards or downwards, and by what amount? [7M]

4 A simply supported beam with clear span 6 m, width 400 mm and effective depth 560 mm carries a limit state load of 175 kN/m inclusive of self weight, dead load and live load. It is reinforced with 4 bars of 28 mm diameter tension steel which continue right into the support. Take f_{ck} = 20 N/mm^2, f_y= 250 N/mm^2, Design shear reinforcement. [14M]

5 Design a R.C.C. column to carry an axial load of 2000N. The size of the column is restricted to 600 mm square. The effective height of column is 9 m. Use M20 concrete and σ_{sc} = 190 N/mm^2. [14M]

6 Design the footing for a reinforced concrete column 225 x 450 mm carrying an axial load of 1075 kN. The bearing capacity of the soil is 100 kN/m^2. Use M20 concrete and Fe500 grade steel as reinforcement. [14M]

7 Design a single flight stair case slab to cover a horizontal span of 4.5 m if the total vertical rise is 3.6 m. There are total 18 steps to rise. The tread is 250 mm. Take live load as 3000 N/m^2. Use M25 concrete and Fe 415 steel. [14M]

****

Code No: RT31023 **R13** SET - 1

III B. Tech I Semester Regular Examinations, November - 2015

POWER SYSTEMS-II

(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

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

*****

PART –A

1	a)	Give the advantages of bundled conductors.	[3M]
	b)	Define voltage regulation and efficiency of transmission lines.	[3M]
	c)	What do you mean by surge impedance and surge impedance loading of transmission line?	[4M]
	d)	What is reflection & refraction coefficient of current and voltage wave of transmission line when receiving end is open circuited.	[4M]
	e)	What is skin effect? On what factors does it depend?	[4M]
	f)	Define String efficiency of suspension insulator string. List the methods to improve it?	[4M]

PART –B

2	a)	Derive the expression for inductance of a three phase double circuit line.	[8M]
	b)	Three conductors of three phase line are arranged at corners of triangle of sides 2m, 3.2m and 4m. The diameter of the conductor is 2.5cm. Calculate the inductance and capacitance of a three phase three wire system.	[8M]
3	a)	Show how regulation and transmission efficiency are determined for medium lines using end condenser method and illustrate your answer with suitable vector diagram.	[6M]
	b)	A three phase transmission line is 135 km long. The series impedance is Z=0.04 + j 0.95 ohm per phase per km, and shunt admittance is Y=j 5.1×10^{-6} mho per phase per km. The sending end voltage is 132 kV and the sending end current is 154 A at 0.9 power factor lagging. Determine the voltage, current and power at the receiving end and the voltage regulation using medium line-T model.	[10M]
4	a)	Derive expressions for ABCD constants for lossless long transmission line. Assume distributed parameters for the line.	[8M]
	b)	A three - phase overhead transmission line has series impedance per phase of $250\angle80^0$ ohms and a total shunt admittance of $0.0019\angle90^0$ siemen per phase. The line delivers a load of 100MW at 0.8 p.f lagging and 200kV between the lines. Calculate the sending-end voltage and current by the rigorous method.	[8M]

5 a) Derive the travelling wave equations in a lossless transmission line. [6M]

b) The ends of two long transmission lines, A and C are connected by a cable B, 1km long. The surge impedances of A, B, C are 400, 50 and 500 ohms respectively. A rectangular voltage wave of 25 kV magnitude and of infinite length is initiated in A and travels to C, determine the first and second voltages impressed on C. [10M]

6 a) Explain in brief about shunt compensation in power systems. [8M]

b) Explain the principle of operation and working of synchronous capacitors in power system for improvement of power factor. [8M]

7 a) What is sag template? Explain the construction of pin type insulator. [8M]

b) Derive the expression for string efficiency of a string of 3- insulators. [8M]

*****

Code No: RT31023 **R13** SET - 2

III B. Tech I Semester Regular Examinations, November - 2015

POWER SYSTEMS-II

(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

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

*****

PART –A

1	a)	Give the list of various types of conductors.	[3M]
	b)	What are the differences between nominal-T and nominal-π methods?	[3M]
	c)	What are ABCD constants of long transmission line?	[4M]
	d)	What are types of power system transients?	[4M]
	e)	What are the factors affecting corona?	[4M]
	f)	What are stringing chart and sag template?	[4M]

PART –B

2	a)	What are bundled conductors? Discuss the advantages of bundled conductors, when used for overhead lines.	[6M]
	b)	A 3-phase, 50 Hz, 66 kV overhead transmission line has its conductors arranged at the corners of an equilateral triangle of 3m sides and the diameter of each conductor is 1.5 cm. Determine the inductance and capacitance per phase, if the length of line is 100 km. And also calculate the charging current.	[10M]
3	a)	Define A, B, C and D constants of a transmission line? What are their values in short lines?	[6M]
	b)	A 3-phase, 3km long line delivers 3000 kW at a power factor of 0.8 lagging to a load. If the voltage at the supply end is 11 kV, determine the voltage at the load end, percentage regulation, sending end power factor and the efficiency of transmission. The resistance and reactance per km of each conductor are 0.4 ohm and 0.3 ohm respectively.	[10M]
4	a)	Derive the expressions for voltage and current distribution over a long line. Explain the significance of characteristic impedance loading in connection with the long lines. Deduce the above voltage and current relations in the hyperbolic form and obtain the element values of an equivalent to represent the long lines.	[8M]
	b)	A 220 kV, 3-phase transmission line has impedance per phase of (60 + j 200) ohm and an admittance of (0 + j 0.0015) mho. Determine i) Sending end voltage and ii) Sending end current when receiving end current is 200 amps at 0.95 p.f lagging.	[8M]

Code No: RT31023 **R13** SET - 2

5 a) When the transmission line is terminated by the capacitive load, how do you find out the expressions of reflected voltage and current wave? [8M]

b) Step wave of 110 kV travels through a line having a surge impedance of 350Ω. The line is terminated by an inductance of 5000μH. Find the voltage across the inductance and reflected voltage wave. [8M]

6 a) What are skin and proximity effects on transmission lines? [6M]

b) Find the critical disruptive voltage and the critical voltages for local and general corona on a 3- phase overhead transmission line, consisting of 3-stranded copper conductors spaced 2.5 m apart at the corners of an equilateral triangle. Air temperature and pressure are 21^0C and 73.6 cm of Hg respectively. Take conductor diameter 10.4 mm, irregularity factor 0.85, local and general surface factors 0.7 and 0.8 respectively. [10M]

7 a) Explain the various methods used for improving string efficiency. [10M]

b) An overhead line has a span of 250 m. Find the weight of conductor if the ultimate strength is 5758kg, sag is 1.5 m and factor of safety is 2. [6M]

***

Code No: RT31023 **R13** SET - 3

III B. Tech I Semester Regular Examinations, November - 2015
POWER SYSTEMS-II
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

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

*****

PART –A

1	a)	Define GMD and GMR for transmission lines.	[3M]
	b)	Give the classification of overhead transmission lines.	[3M]
	c)	Define wave length & velocity of propagation of waves.	[4M]
	d)	What are the factors that cause a travelling wave?	[4M]
	e)	What is meant by Ferranti effect?	[4M]
	f)	Write down the expression for sag when supports are at equal and unequal levels.	[4M]

PART –B

2	a)	Briefly discuss the various types of conductor material used for over head transmission lines.	[8M]
	b)	What is the method of images? How can it be used to take into account the presence ground in calculating the capacitance of a single phase line?	[8M]
3		Find the ABCD parameters of a 3-phase, 80km, 50Hz transmission line with series impedance of (0.15 + j 0.28) ohm per km and a shunt admittance of $j5x10^{-4}$ mho per km for the both Π and T networks.	[16M]
4	a)	Explain characteristic impedance and surge impedance loading of long lines.	[6M]
	b)	A three-phase, 50 Hz, 150 km long transmission line has three conductors each of 0.7 cm radius spaced at the corners of triangle of sides 2 m, 3.5m and 4.5m. The resistance of each conductor is 0.4 ohms per km and the line delivers 50 MVA at 132 kV and at a lagging p.f. of 0.85. Determine ABCD constants as long line (both real and complex angle methods).	[10M]
5	a)	Explain the variation of current and voltage on an overhead line when one end of the line is short circuited and at the other end a source of constant voltage V is switched in.	[8M]
	b)	A 500 kV, 2 μsec, duration rectangular surge passes through a line having surge impedance of 350 Ω and approaches a station at which the concentrated earth capacitance is 3×10^3 pF. Calculate the maximum value of surge transmitted to the second line.	[8M]

6 a) Explain the phenomenon of corona. How can the corona loss be minimized in transmission lines? [8M]

b) A certain 3-phase equilaterally spaced transmission line has a total corona loss of 55 kW at 110 kV and a loss of 110 kW at 120 kV. What is the disruptive critical voltage between lines? What is the corona loss at 125 kV? [8M]

7 An overhead line has the following data: span length 185m, difference in levels of supports 5m, conductor diameter 1.82cm, weight per unit length of conductor 2.5kg/m, wind pressure 49kg/m^2 of projected area. Maximum tensile stress of the conductor 4250kg/cm^2. Factor of safety 5. Calculate the allowable sag in meters at the lower support. [16M]

*****

Code No: RT31023 **R13** SET - 4

III B. Tech I Semester Regular Examinations, November - 2015

POWER SYSTEMS-II

(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

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

*****

PART –A

1	a)	What is the effect of ground on capacitance?	[3M]
	b)	What are ABCD constants for short transmission lines?	[3M]
	c)	What do you mean by incident, reflected and reflected waves?	[4M]
	d)	What are reflection and refraction coefficients of current and voltage wave of transmission line when receiving end is short circuited?	[4M]
	e)	What are the advantages of corona?	[4M]
	f)	Write down the expression for working stress and vertical sag.	[4M]

PART –B

2	a)	Derive the expression of capacitance for 2 wire and 3 wire systems.	[8M]
	b)	Calculate the capacitance of a conductor per phase of a three-phase 400 km long line, with the conductors spaced at the corners of an equilateral triangle of side 4 m and the diameter of each conductor being 2.5cm.	[8M]
3	a)	Explain the effect of power factor on regulation and efficiency.	[8M]
	b)	A single-phase, 11 kV line with a length of 15 km is to transmit 500 kVA. The inductive reactance of the line is 0.6 Ω per km and the resistance is 0.25Ω per km. Calculate the efficiency and regulation for a p.f of 0.75 lag.	[8M]
4	a)	With reference to long transmission line, give physical interpretation of the terms of characteristic impedance and propagation constant? What is meant by surge impedance?	[8M]
	b)	Determine ABCD constant for 3-phase, 50 Hz transmission line 200 km long having the following distributed parameters. L= $1.20\text{x}10^{-3}$ H/km, C= $8\text{x}10^{-9}$ F/km, R = 0.15 Ω/km, G=0.	[8M]

5 a) When the transmission line is terminated through a resistance, how do you find out the expressions of reflection and refraction coefficient? [8M]

b) An overhead transmission line with surge impedance 400 ohms is 300 km long. One end of this line is short circuited and at the other end a source of 11 KV is suddenly switched in. Calculate the current at the source end 0.005 sec after the voltage is applied. [8M]

6 a) What is corona? Explain the theory of corona formation in detail. [6M]

b) What is Ferranti effect? Prove with mathematical expression the actual phenomenon that occurs in Ferranti effect. [6M]

c) What is skin effect? [4M]

7 a) What is guard ring which is being used in the suspension string type insulator? Deduce the relation for determining the capacitance formed by the ring. [8M]

b) A three phase over head line is being supported by three discs suspension insulators, the potential across the first and second insulators are 12 and 18 kV respectively. Calculate (i) the line voltage, (ii) the ratio of capacitance between pin and earth to self-capacitance of each unit, (iii) the string efficiency. [8M]

*****

Code No: RT31033 **R13** SET - 1

III B. Tech I Semester Regular Examinations November - 2015
DESIGN OF MACHINE MEMBERS – I
(Mechanical Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**
(Data books may be allowed)
*****

PART –A

1	a)	Enumerate the various phases of design.	[3M]
	b)	Explain preferred numbers and their significance.	[4M]
	c)	Describe the causes of stress concentration.	[4M]
	d)	Explain modified Goodman's line.	[4M]
	e)	Draw a sketch of triple riveted double cover butt joint with zig-zag type of riveting.	[3M]
	f)	Discuss the stresses in Helical Springs of circular wire.	[4M]

PART -B

2	a)	Explain the manufacturing considerations in design.	[4M]
	b)	State and explain various theories of failure under static loading.	[8M]
	c)	Find the diameter of shaft required to transmit 60 kW at 150 rpm if the maximum torque is likely to exceed the mean torque by 25% for a maximum permissible torsional shear stress of 60 N/mm^2. Also find the angle of twist for a length of 2.5 meters. Take G = 80 GPa.	[4M]
3	a)	Explain the types of fluctuating stresses.	[4M]
	b)	A hot rolled steel shaft is subjected to a torsional moment that varies from +350 Nm to -115 Nm and an applied bending moment at a critical section varies from 445 Nm to 225 Nm. The shaft is of uniform cross section. Determine the required shaft diameter. The material has an ultimate strength of 550 MPa and yield strength of 410 MPa. Take the endurance limit as half the ultimate strength, factor of safety of 2, size factor of 0.85 and a surface finish factor of 0.62. (Using Goodman's Line).	[12M]
4	a)	What is the difference between caulking and fullering? Explain with the help of neat sketches.	[4M]
	b)	Design a triple riveted longitudinal double strap butt joint with unequal straps for a boiler. The inside diameter of the drum is 1.3 meters. The joint is to be designed for a steam pressure of 2.4 N/mm^2. The working stresses to be used are σ_t=77N/mm^2, τ=62 N/mm^2; σc=120 N/mm^2. Assume the efficiency of the joint as 81 %.	[12M]
5	a)	Explain different types of keys.	[4M]
	b)	Design a cotter joint to connect two mild steel rods for a pull of 30 kN. The maximum permissible stresses are 55N/mm^2 in tension, 40N/mm^2 in shear and 70 N/mm^2 in crushing. Draw a neat sketch of the joint.	[12M]

6 a) Compare weight, strength and stiffness of two shafts of same material, subjected to same torque. One being solid other being hollow with inner diameter to outer diameter ratio 0.5. [4M]

b) Two shafts are connected by means of a flange coupling to transmit torque of 25 Nm. The two flanges of the coupling are fastened by four bolts of the same material at a radius of 30mm. Find the size of the bolts if the allowable shear stress for the bolt material is 30MPa. [12M]

7 a) Describe the construction of semi-elliptical leaf spring. [4M]

b) A helical compression spring made of oil tempered carbon steel is subjected to a load which varies from 400N to 1000N. The spring index is 6 and the design factor of safety is 1.25. If the yield stress in shear is 770MPa and endurance stress in shear is 350MPa. Find i) Size of spring wire, ii) Diameters of the spring, iii) Number of turns of the spring, iv) free length of spring. The compression of the spring at the maximum load is 30mm. The modulus of rigidity for the spring material may be taken as $80kN/mm^2$. [12M]

-000-

Code No: RT31033 **R13** SET - 2

III B. Tech I Semester Regular Examinations November - 2015
DESIGN OF MACHINE MEMBERS – I
(Mechanical Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**
(Data books may be allowed)
*****

PART –A

1	a)	List the mechanical properties of materials.	[3M]
	b)	Describe the methods to determine stress concentration factors.	[4M]
	c)	Explain the endurance limit modifying factors.	[4M]
	d)	Explain the design procedure for eccentric loaded welded joints.	[4M]
	e)	What is the purpose of shaft coupling?	[3M]
	f)	Explain the stresses in helical springs of circular wire.	[4M]

PART -B

2	a)	Find the diameter of shaft required to transmit 60 kW at 150 rpm if the maximum torque is likely to exceed the mean torque by 25% for a maximum permissible torsional shear stress of 60 N/mm^2. Also find the angle of twist for a length of 2.5 meters. Take G = 80 GPa.	[6M]
	b)	A bolt is subjected to a direct tensile load of 20 kN and a shear load of 15 kN. Suggest the suitable size of bolt according to various theories of elastic failure, if the yield stress in simple tension is 360 MPa. A factor of safety of 3.5 should be used. Take Poisson's ratio as 0.25.	[10M]
3	a)	Explain the causes of stress concentration.	[4M]
	b)	A circular cross section cantilever beam having length 130 mm. subjected to a cyclic transverse load of varying form -150 N to 350 N, FOS is 2, theoretical stress concentration factor is 1.4, notch sensitivity factor is 0.9, ultimate strength is 540 MPa, yield strength is 320 MPa. Size correction factor is 0.85. Endurance limit is 275 MPa, surface correction factor is 0.9 and notch sensitivity factor is 0.9. Determine the diameter of the beam by (i) Goodman method and (ii) Soderberg method.	[12M]
4	a)	Explain the bolts of uniform strength.	[4M]
	b)	A steam engine of effective diameter 300 mm is subjected to a steam pressure of 1.5 N/mm^2. The cylinder head is connected by 8 bolts having yield point 330 N/mm^2 and endurance limit at 240 N/mm^2. The bolts are tightened with an initial preload of 1.5 times the steam load. Assume a factor of safety 2. Find the size of bolt required the stiffness factor for copper gasket may be taken as 0.5.	[12M]

5 a) Explain stresses acting on keys. [4M]

b) Design a cotter joint to connect two mild steel rods for a pull of 30 kN. The maximum permissible stresses are 55N/mm^2 in tension, 40N/mm^2 in shear and 70 N/mm^2 in crushing. Draw a neat sketch of the joint. [12M]

6 Design and a cast iron coupling for a mild steel shaft transmitting 90kW at 250 rpm. The allowable shear stress in the shaft is 40MPa and the angle of twist is not to exceed 1^0 in a length of 20 diameters. The allowable shear stress in the coupling bolts is 30MPa. [16M]

7 A mechanism used in printing machinery consists of a tension spring assembled with a preload of 30N. The wire diameter of spring is 2mm with a spring index of 6. The spring has 18 active coils. The spring wire is hard drawn and oil tempered having the shear stress 680MPa and modulus of rigidity 80kN/mm^2. Determine the initial torsional shear stress in the wire, spring rate and the force to cause the body of the spring to its yield strength. [16M]

-000-

Code No: RT31033 **R13** SET - 3

III B. Tech I Semester Regular Examinations November - 2015
DESIGN OF MACHINE MEMBERS – I
(Mechanical Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**
(Data books may be allowed)
*****

PART –A

1	a)	Define fits and their significance.	[3M]
	b)	Explain how the factor of safety is adopted in designing machine elements varies with the nature and type of load imposed on them.	[4M]
	c)	Describe fatigue stress concentration factor.	[4M]
	d)	Explain endurance strength and fatigue strength.	[4M]
	e)	Explain the function of key and a cotter.	[3M]
	f)	Explain the construction of leaf spring.	[4M]

PART -B

2	a)	Discuss various theories of failure.	[8M]
	b)	Find the diameter of shaft required to transmit 60 kW at 150 rpm if the maximum torque is likely to exceed the mean torque by 25% for a maximum permissible torsional shear stress of 60 N/mm^2. Also find the angle of twist for a length of 2.5 meters. Take G = 80 GPa.	[8M]
3	a)	Explain the factors that affect the fatigue strength.	[6M]
	b)	A machine member is made of plain carbon steel of ultimate strength 650 N/mm^2 and endurance limit of 300 N/mm^2. The member is subjected to a fluctuating torsional moment which varies from -200 Nm to 400 Nm. Design the member using (i) modified Goodman's equation and (ii) Soderberg equation.	[10M]
4	a)	Explain with sketches the different types of failures and efficiencies of the riveted joints.	[6M]
	b)	Two MS tie bars for a bridge structure are to be joined by means of a butt joint with double straps. The thickness of the tie bar is 12 mm and carries a load of 400 kN. Design the joint completely taking allowable stresses as 100 MPa in tension, 70 MPa in shear and 150 MPa in compression.	[10M]
5	a)	Discuss the advantages and disadvantages of riveted, bolted and welded joints.	[6M]
	b)	Design a cotter joint of socket and spigot type which is subjected to a pull and push of 50 kN. All the parts of the joint are made of the same material with the permissible stress as 70 MPa in tension, 100 MPa in compression and 40 MPa in shear.	[10M]

6 Design a rigid type of flange coupling to connect two shafts. The input shaft transmits 37.5kW power at 180 rpm to the output shaft through the coupling. The service factor for the application is 1.5. The design torque is 1.5times of rated torque. Select suitable materials for various parts of the coupling, design the coupling and specify the dimensions of the components. [16M]

7 A locomotive semi-elliptical laminated spring has an overall length 1m and sustains a load of 70kN at its centre. The spring has 3 full length leaves and 15 graduated leaves with central band of 100mm width. All the leaves are to be stressed to 400 MPa when fully loaded. The ratio of the total spring depth to that of width is 2. E= 210kN/mm^2. Determine i) the thickness and width of the leaves, ii) The initial gap that should be provided between the full length and graduated leaves before the band load is applied and iii) The load exerted on the band after the spring is assembled. [16M]

-000-

Code No: RT31033 **R13** SET - 4

III B. Tech I Semester Regular Examinations November - 2015
DESIGN OF MACHINE MEMBERS – I
(Mechanical Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**
(Data books may be allowed)
*****

PART –A

1	a)	Enumerate the most commonly used Engineering materials.	[3M]
	b)	What is the significance of preferred numbers?	[4M]
	c)	Describe the stress concentration factor and its significance.	[4M]
	d)	Differentiate the terms bolt, screw and stud.	[3M]
	e)	List advantages of bolted joints over welded joints.	[4M]
	f)	What is nipping in a leaf spring? Discuss its role.	[4M]

PART -B

2	a)	A shaft is required to transmit 1 MW power at 240 rpm. The shaft must not twist more than 1^o on a length of 15 diameters. If the modulus of rigidity for material of the shaft is 80 GPa, find the diameter of the shaft and shear stress induced.	[6M]
	b)	A bolt is subjected to a direct tensile load of 20 kN and a shear load of 15 kN. Suggest the suitable size of bolt according to various theories of elastic feature, if the yield stress in simple tension is 360 MPa. A factor of safety of 3.5 should be used. Take Poisson's ratio as 0.25.	[10M]
3	a)	Explain the factors that affect the fatigue strength.	[6M]
	b)	A machine member is made of plain carbon steel of ultimate strength 650 N/mm^2 and endurance limit of 300 N/mm^2. If the member is subjected to a fluctuating torsional moment which varies from -200 N-m to 400 N-m. Design the member using (i) modified Goodman's equation and (ii) Soderberg equation.	[10M]
4	a)	Explain briefly design procedure for circumference lap joint for a boiler.	[6M]
	b)	Design a triple riveted longitudinal butt joint with unequal cover plates for a boiler seam. The diameter of the boiler is 2 m and the internal pressure is 2 MPa. The working stresses are 70 MPa in tension, 50 MPa in shear and 120 MPa in compression and the required efficiency of the joint is 80%.	[10M]
5		Two tie rods are to be connected by means of a sleeve and two steel cotters. The rods are subjected to a tensile load of 40kN. Design the joint using the permissible stress in tension as 60MPa, in shear as 50MPa and in crushing as 120MPa. Draw a neat sketch and show all the dimensions.	[16M]

6 Design a bushed pin type flexible coupling for connecting a motor shaft to a pump shaft for the following service conditions. Power to be transmitted = 40 kW, speed of the motor shaft = 1000 rpm. The material properties are : i) The allowable shear and crushing stress for shaft and key material is 40 MPa and 80 MPa respectively, ii) allowable shear stress for cast iron is 15 MPa, iii) Allowable bearing pressure for rubber brush is 0.8 N/mm^2 and iv) the material of the pin is same as that of shaft and key. Draw neat sketch of the coupling. [16M]

7 Design a close coiled helical compression spring for a service load ranging from 2250N to 2750N. The axial deflection of the spring for the load range is 6mm.assume a spring index of 5.the permissible shear stress intensity is 420MPa and modulus of rigidity is 84kN/mm^2. Neglect the effect of stress concentration. Draw a fully dimensioned sketch of the spring showing details of the finish of the end coils. [16M]

-000-

Code No: **R31013/R10**

III B.Tech I Semester Supplementary Examinations, November - 2015

CONCRETE TECHNOLOGY

(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

*****

1	a)	Explain briefly the setting time tests of cement.	[8]
	b)	Write the advantages of high volume fly ash concrete.	[7]
2	a)	Mention the different tests to be conducted on aggregates and explain in brief impact and crushing tests.	[10]
	b)	Write a short note on uniform, gap and continuous grading of aggregates.	[6]
3	a)	Define workability and write the factors affecting workability.	[12]
	b)	Explain various steps in manufacture of concrete.	[4]
4	a)	Explain gel-space ratio.	[4]
	b)	Explain briefly the maturity concept of concrete.	[8]
	c)	Define shrinkage of concrete.	[4]
5	a)	Write about split tensile strength and flexural strength of concrete.	[8]
	b)	What are the advantages of NDT over destructive tests?	[8]
6	a)	Define creep and explain how creep is measured and also the factors influencing creep.	[12]
	b)	Write about the thermal properties of concrete.	[4]
7		Design a concrete mix of M30 grade. Take standard deviation of 5MPa. The specific gravities of coarse aggregate and fine aggregate are 2.77 and 2.63 respectively. The bulk density of coarse aggregate is 1620kg/cu.m and fineness modulus of fine aggregate is 2.73. Design the concrete mix using IS code method. Assume any missing data suitably.	[16]
8	a)	Write about self consolidated concrete.	[8]
	b)	Write about fibre reinforced concrete and the factors affecting the properties of FRC	[8]

*****

Code No: **R31023/R10**

III B.Tech I Semester Supplementary Examinations, November - 2015

POWER SYSTEMS- II

(Electrical and Electronics Engineering)

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

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

1 a) Find the expression for the flux linkages due to i) a single current carrying conductor, ii) current carrying conductors in parallel. [8]

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

2 a) Show how regulation and transmission efficiency are determined for medium lines using end condenser method and illustrate your answer with suitable vector diagram [8]

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

3 a) Explain the surge impedance loading of transmission line [7]

b) The three phase transmission lines have the generalized constants: [8]

$A_1 = D_1 = 0.98\angle 2^o$, $B_1 = 28\angle 69^o$ ohm, $C_1 = 0.0002\angle 88^o$ mho

$A_2 = D_2 = 0.95\angle 3^o$, $B_2 = 40\angle 85^o ohm$, $C_2 = 0.0004\angle 90^O$ mho

They are connected in series and delivers a load current of 200 A at 0.95 p.f. at 110kV. Determine the sending end voltage and current.

4 a) Draw equivalent circuit for finding the transmitted voltage and current surges on a line. Derive expressions for the transmitted voltage and currents. [9]

b) A 200 kV, 3 μs, rectangular surge travels on a line of surge impedance of 400 ohms. The line is terminated in a capacitance of 3000 pf. Find an expression for voltage across the capacitance. [6]

5 a) What is Ferranti effect? Prove with mathematical expression the actual phenomenon that occurs in Ferranti effect. [8]

b) A 3-phase, 220 kV, 50 Hz, over line consists of 2.5cm diameter conductors spaced 3 meters apart in equilateral triangle formation. Determine the corona loss per km of the line at 20^0C and atmospheric pressure 75 cm of mercury. Take irregularity factor as 0.8. [7]

6 a) Explain the use of grading rings and arcing horns on suspension insulators. [7]

b) A string of four suspension insulators is to be graded to obtain uniform distribution of voltage across the string. If the capacitance to ground of each unit is 10% of the capacitance of the top unit, determine the capacitance of the remaining three units. [8]

7 a) Derive the expression for sag and tension when the supports are at unequal heights. [8]

b) Determine the sag of an overhead line for the following data: span length 160 meter, conductor diameter 0.95 cm, weight per unit length of the conductor 0.65 kg/meter. Ultimate stress = 4250 kg/cm^2, wind pressure = 40kg/cm^2 of projected area and Factor of safety = 5. [7]

8 a) Why voltage control is required in power systems? Mention the different methods of voltage control employed in power system. [8]

b) A synchronous motor improves the p.f. of a load of 180 kW from 0.8 lagging to 0.9 lagging. Simultaneously the motor carries a load of 60 kW. Find i) the leading kVAr supplied by the motor, ii) the p.f. at which motor operates. [7]

-000-

Code No: R31033/R10

III B.Tech I Semester Supplementary Examinations, November - 2015

DYNAMICS OF MACHINERY

(Common to ME, AME)

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

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

1 a) Explain the effect of precession motion on the stability of moving vehicles such as motor car? [6]

b) The moment of inertia of a pair of locomotive driving wheels with the axle is 200kg m^2. The distance between the wheel centers is 1.6m and the diameter of the wheel treads is 1.8m. Due to defective ballasting, one wheel falls by 5mm and raises again in a total time of 0.12 second while the locomotive travels on a level track at 100 km/h. assuming that the displacement of the wheel takes place with simple harmonic motion, determine the gyroscopic couple produced and the reaction between the wheel and rail due to this couple. [9]

2 a) Explain the terms of friction couple, friction axis and film lubrication? [6]

b) A power screw driven by an electric motor moves a nut in horizontal plane when a force of 80 kN at a speed of 6mm/s is applied. This screw is of single thread of 8mm pitch and 48mm major diameter. Determine the power of the motor if the coefficient of the friction at the screw threads is 0.1. [9]

3 a) A car moving on a level road at a speed 60 kmph, has a wheel base 3 m, distance of C.G from ground level 600mm, and the distance of C.G from rear wheels is 1.2 m. Find the distance travelled by the car before coming to rest when brakes are applied, (i) to the front wheels only, (ii) to the rear wheels only and (iii) to all the four wheels. Take coefficient of friction between the tyres and the road as 0.6. [8]

b) What is self-energizing brake? Derive 'self-locking conditions' for a differential band brake when drum rotates in clockwise direction. [7]

4 A machine has to carry out punching operation at the rate of 10 holes per minute. It does 6 kN-m of work per mm^2 of the sheared area on cutting 25 mm diameter holes in 20mm thick plates. A flywheel is fitted to the machine shaft which is driven by a constant torque. The fluctuation of speed is between 180 and 200 rpm. The actual punching takes 1.5 seconds. The frictional losses are equivalent to 1/6 of the work done during punching. Find: a) Power required to drive the punching machine and b) Mass of the flywheel, if the radius of gyration of the wheel is 0.5m. [15]

5 a) What are the differences between Porter and Proell Governors? Why the speed range of Proell governor is less than that of a similar Porter type? [8]

b) The lengths of the upper and lower arms of a Porter governor are 200mm and 250mm respectively. Both the arms are pivoted on the axis of the rotation. The central load is 150N, the weight of each ball is 20N and the friction of the sleeve together with the resistance of the operating gear is equivalent to a force of 30N at the sleeve. If the limiting inclinations of the upper arms to the vertical are 30° and 40°, determine the range of speed of the governor. [7]

6 A single cylinder horizontal engine runs at 120 r.p.m. The length of stroke is 400 mm. The mass of the revolving parts assumed concentrated at the crank pin is 100 kg and mass of reciprocating parts is 150 kg. Determine the magnitude of the balancing mass required to be placed opposite to the crank at a radius of 150mm which is equivalent to all the revolving and 2/3rd of the reciprocating masses. If the crank turns 300 from the inner dead centre, find the magnitude of the unbalanced force due to the balancing mass. [15]

7 a) Prove that a maximum secondary unbalanced force is l/n times the maximum primary unbalanced force for ‘n’ cylinders reciprocating engine. [8]

b) For radial engines with an odd number of cylinders prove that the primary force may be balanced by attaching single mass of km where 'k' is number of cylinders and 'm' is mass of reciprocating parts. [7]

8 a) Explain about free Vibration of spring mass system? [6]

b) A shaft of 10cm diameter and 100cm long is fixed at one end and other end carries a flywheel of mass 80kg. Taking Young’s modulus for the shaft material as $2x10^6$ Ks/cm^2. Find the natural frequency or longitudinal and transverse vibrations. [9]

*****

Code No: **R31053/R10**

III B.Tech I Semester Supplementary Examinations, November - 2015

ADVANCED DATA STRUCTURES

(Common to CSE & IT)

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

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

1	a)	With an example explain open hashing and closed hashing methods.	[10]
	b)	Give a brief notes on hash tables.	[5]
2	a)	Write the difference between AVL trees and Binary trees.	[5]
	b)	Explain the procedure for insertion and deletion of nodes into a 2-3 tree.	[10]
3	a)	What is a priority queue? Explain how it is implemented using Heaps.	[8]
	b)	What are lazy binomial queues? Explain.	[7]
4		Define Graph. How to represent a graph? Explain various basic operations performed on a graph with sample code and example.	[15]
5		Write and explain the Dijkstra's algorithm with an example.	[15]
6		Write an algorithm for heap sort and also explain with an example how many passes are required to sort n elements.	[15]
7		What is a digital search tree? Explain multi way tree with its structure, representation and basic operations.	[15]
8	a)	Give the file structure and directory structure of UNIX.	[8]
	b)	How to manage fixed length and fixed field buffers? Explain briefly.	[7]

*****