Code No: RT21011 **R13** SET - 1

II B. Tech I Semester Regular Examinations, Jan - 2015
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Com. to CE, ME, CHEM, AME, MM, PE, PCE)

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 Kirchhoff's laws?
   b) What is the function of Commutator in the D.C machines?
   c) List out the speed control methods of a DC motor? Write one demerit of each method.
   d) What are the functions of a transformer?
   e) Define slip and torque of an induction motor?
   f) Draw the V-I characteristics of a PN diode?
   g) What is a feedback amplifier?
   h) Draw the standard symbol of PNP and NPN transistor?
   (2M+3M+3M+2M+3M+3M+3M+3M)

PART-B

2. a) State and prove Kirchhoff's laws using an example.
   b) If 'n' number of resistances connected in parallel, derive the expression for the equivalent resistance? (8M+8M)

3. a) Derive the expression for the e.m.f induced in a DC machine by defining all the terms clearly?
   b) Explain the operation of 3-point starter in a DC machine? (8M+8M)

4. a) Explain principle of operation of a 1 phase transformer?
   b) Derive the expression for the regulation of a 1 phase transformer and discuss whether its value should be low or high to get the better efficiency? (8M+8M)

5. a) Explain in detail about the constructional features and operation of an alternator?
   b) Draw and explain about the torque slip characteristics of an induction motor? (8M+8M)

6. a) Explain the operation of a half wave rectifier with the help of circuit diagram?
   b) Discuss about the characteristics of an OP-AMP? (8M+8M)

7. a) Explain about the principle of operation of PNP transistor? Discuss how it is operated as an amplifier?
   b) Explain basic concept of a feedback amplifier? (8M+8M)
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Code No: RT21011 **R13** SET - 2

II B. Tech I Semester Regular Examinations, Jan - 2015
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Com. to CE, ME, CHEM, AME, MM, PE, PCE)

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 Ohm's law and write its applications.
   b) What is the need of starter in a DC machine?
   c) Write statements of Kirchhoff's laws?
   d) Write the principle of operation of transformer?
   e) What is the difference between slip-ring and squirrel cage induction motors?
   f) Draw the frequency response of a CE amplifier?
   g) Write the differences between forward biased and reverse biased PN diode?
   h) Write the expression for synchronous speed of an induction motor in terms of poles and frequency? (2M+3M+2M+3M+3M+3M+3M+3M)

PART-B

2. a) Explain the star-delta and delta-star transformation for a resistive network?
   b) Two batteries A and B with the internal resistances RA and RB are connected in parallel to supply current of 155A to a load resistance RL. Given EA = 122V, RA = 0.15 ohms and RB = 0.1 ohms and IB = 60A. Calculate EB and power drawn by the load? (8M+8M)

3. a) Explain in detail about the classification of DC generators based on the type of excitation? Give the connection diagrams.
   b) A 4 pole 220V wave connected shunt motor gives 11.19 kW when running at 1000 r.p.m and drawing armature and field current of 50A and 1A respectively. It has 540 conductors. Its resistance is 0.1 ohms. The brush drop is 1V per brush. Calculate total torque, useful torque, flux per pole, rotational losses and efficiency? (8M+8M)

4. a) What are the losses that are occur in a transformer? Explain the methods to minimize losses.
   b) The full load copper and iron losses of a 15 kVA, 1-phase transformer are 322 W and 200 W respectively. Calculate the efficiency on full load and half load when the load p.f is 0.8 lagging in each case? (8M+8M)

5. a) Derive the relation between stator supply frequency and rotor induced e.m.f frequency.
   b) A 3-phase, 2-pole 50 Hz induction motor has a slip of 4% at no-load and 6% at full load. Find: i) Synchronous speed ii) Full-load speed iii) No-load speed iv) Frequency of rotor current at stand still v) Frequency of rotor current at full load. (8M+8M)

6. a) With a neat sketch explain operation of a PN junction diode? Draw its V-I characteristics
   b) Discuss about the advantages and disadvantages of a half wave rectifier. Draw the output wave forms? (8M+8M)

7. a) Explain in detail about the differences between PNP and NPN transistors?
   b) Draw and explain the input and output characteristics for transistor CE configuration? (8M+8M)
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Code No: RT21011 **R13** SET - 3

II B. Tech I Semester Regular Examinations, Jan - 2015
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Com. to CE, ME, CHEM, AME, MM, PE, PCE)

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 back e.m.f in a DC machine?
   b) State ohm's law? What is the limitation of ohm's law?
   c) What is the function of no volt coil in a three point starter?
   d) Draw the output waveforms of half wave and bridge rectifiers?
   e) Write the volt-ampere relationships of R, L and C elements?
   f) What are the advantages with feedback amplifier?
   g) Write the applications of DC series motor?
   h) What is the difference between inverting and non-inverting OP-AMP?
   (2M+3M+3M+2M+3M+3M+3M+3M)

PART-B

2. a) Two resistances when they are in series have an equivalent resistance of 9 ohms and when connected in parallel have an equivalent resistance of 2 ohms. Find the two resistances. ?
   b) Two coils A and B are kept in parallel planes, such that 70% of the flux produced by coil A links with coil B. Coil A has 10,000 turns and coil B has 12,000 turns. A current of 5A in coil A produces a flux of 0.04 mWb while a current of 4A in coil B produces a flux of 0.08 mWb. Calculate self inductance of each coil and the mutual inductance? (8M+8M)

3. a) Derive the torque equation of a DC motor?
   b) Explain the Swinburne's test to determine the efficiency of a DC machine. (8M+8M)

4. a) Derive the e.m.f equation of a single phase transformer?
   b) The no load current of a transformer is 10 A at a power factor of 0.25 lagging, when connected to 400V, 50 Hz supply. Calculate magnetizing component of no-load current, iron loss and maximum value of the flux in the core. Assume primary winding turns as 500? (8M+8M)

5. a) Explain the operation an induction motor. Discuss the applications of induction motor.
   b) Explain in detail about the working principle of a three phase alternator? (8M+8M)

6. a) Explain about the principle of operation of a full wave rectifier with the help of circuit diagram?
   b) Explain about the operation of an Op-AMP in the inverting and non inverting modes of operations? (8M+8M)

7. a) Explain about the operation of a transistor as amplifier with a neat of circuit diagram?
   b) Draw and explain the circuit diagram of a common emitter amplifier and draw its charcteristics? (8M+8M)
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Code No: RT21011 **R13** SET - 4

II B. Tech I Semester Regular Examinations, Jan - 2015
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Com. to CE, ME, CHEM, AME, MM, PE, PCE)

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 the need of star-delta and delta-star transformation?
   b) What are the applications of DC compound motors?
   c) What is meant by slip of an induction motor?
   d) Write the principle of operation of transformer?
   e) Define torque in a DC motor?
   f) Draw the slip-torque characteristics of induction motor?
   g) What are the advantages of Swinburne's test?
   h) What are the disadvantages of feedback amplifier? (3M+3M+3M+3M+3M+3M+2M+2M)

PART-B

2. a) A coil takes 4 amperes when connected to 24 A dc supply. If this coil is connected to 40 V, 50 Hz AC supply then same amount of power is consumed. Calculate inductance of the coil and phase angle between voltage and current.
   b) Three resistances 2 ohms, 4 ohms and 6 ohms are connected in series across 24V supply. Find the voltages across three resistors and current through each resistor. (8M+8M)

3. a) A 1500 kW, 550V, 10 pole generator runs at 150 r.p.m. There are 2500 lap connected conductors and the full load copper losses are 25KW. The air gap flux density has a uniform value of 0.9wb/m2. Calculate the no load terminal voltage and the area of the pole shoe?
   b) Draw the circuit diagram of DC series generator and write the relations between voltages and currents? Write its applications. (8M+8M)

4. a) What are the various losses in a transformer? Derive a condition for maximum efficiency of the transformer.
   b) A 20 kVA transformer has its maximum efficiency of 0.98 at 15 kVA at p.f is equal to one. The iron loss is 350 W. Calculate the efficiency at full load0.8 p.f lagging and unity power factor? (8M+8M)

5. a) Explain the synchronous impedance method for determine regulation of an alternator?
   b) Sketch and explain the typical torque slip characteristics of an induction motor? (8M+8M)

6. a) Explain in detail about any two applications of an OP-AMP?
   b) Discuss about the differences between half wave rectifier and full wave rectifier by using the output waveforms? (8M+8M)

7. a) Explain the differences between the NPN and PNP transistor.
   b) Derive the output voltage and current expressions of a CE amplifier? (8M+8M)
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Code No: RT21014 **R13** SET - 1

II B. Tech I Semester Regular Examinations, Jan - 2015
BUILDING MATERIALS AND CONSTRUCTION
(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 detailed classification of stones based on origin?
   b) Explain different alternative materials used to timber?
   c) What is meant by hydration of cement?
   d) List out different terms used in arches?
   e) Write any four characteristics of good flooring tile?
   f) Give any four reasons for dampness in a building?
   g) State the importance of formwork in concrete construction?
   h) Classify aggregates based on shape? (3M+2M+3M+3M+3M+3M+3M+2M)

PART-B

2. a) Define 'Dressing of stones'? Also explain how the dressing of stones will be carried out? Give some neat pictures of dressed stone?
   b) List out different steps involved in the manufacturing of bricks? Explain in detail the burning of bricks stage? (8M+8M)

3. a) What is meant by bond in brick work? Explain in detail the salient features in the construction of Flemish bond with a neat plan sketch of any odd course?
   b) Explain different advantages of cavity walls?
   c) Explain different defects in timber? (8M+4M+4M)

4. a) Explain in detail different stages involved in the manufacturing of lime?
   b) Classify different type of cements? Explain any four types of cement with applications? (8M+8M)

5. a) Classify different type of floors? Explain the construction process of any four type floors with neat sketches?
   b) Explain in detail the differences between lean to roof, coupled roof and trussed roof with neat sketches? (8M+8M)

6. a) Explain in detail different constituents of paint? Also classify different type of paints?
   b) Classify different type of plasters? Explain in detail the preparation of each plaster? (8M+8M)

7. a) Explain the phenomenon 'bulking of sand'? Also explain the process of determining this parameter?
   b) Mention the conditions of aggregates as per moisture in the pores? (8M+8M)
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Code No: RT21014 **R13** SET - 2

II B. Tech I Semester Regular Examinations, Jan - 2015
BUILDING MATERIALS AND CONSTRUCTION
(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 detailed classification of tiles?
   b) What are the different precautions taken in blasting process?
   c) What is chemical composition of cement?
   d) List out various type of stairs?
   e) What is the advantage of providing lintel?
   f) State the difference between plastering and pointing?
   g) What are the advantages of steel formwork over conventional timber form work?
   h) Define Fineness modulus of aggregates? (3M+3M+3M+3M+2M+3M+3M+2M)

PART-B

2. a) Give the detailed classification of stones?
   b) Explain the composition of good brick earth? Mention in detail the functions ingredients of brick earth including harmful ingredients? (8M+8M)

3. a) Classify different type of stone masonry work? Explain in detail salient features of each masonry work with neat sketch?
   b) What are the different materials can be used as alternative materials to wood? Explain the advantages of those materials? (8M+8M)

4. a) Explain in detail the classification of Lime? Also explain the different ingredients in Lime stone with their function?
   b) List out different tests conducted on cement? Explain in detail any four testing methods? (8M+8M)

5. a) State the differences between mosaic and terrazzo floors with neat sketches
   b) Explain the detailed construction process of Madras Terrace and Prefabricated roofs with neat sketches? (8M+8M)

6. a) Classify different type of paints? Explain in detail each type.
   b) List out different damp proofing materials? Also explain the uses of all the materials? (8M+8M)

7. a) What is the importance of specific gravity aggregate? Mention the testing process to determine this parameter?
   b) Classify the aggregates based on the shape and surface texture? Also explain how these factors affect the performance of concrete? (8M+8M)

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Code No: RT21014 **R13** SET - 3

II B. Tech I Semester Regular Examinations, Jan - 2015
BUILDING MATERIALS AND CONSTRUCTION
(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) What is meant by quarrying of stone?
b) Classy different type of bricks?
c) Define 'seasoning of timber'?
d) Sketch a neat picture of rubble masonry work?
e) List out different type of plasters?
f) What is the use of Damp Proof Course?
g) State the difference between formwork and scaffolding?
h) Differentiate between absolute specific gravity and apparent specific gravity?
(3M+2M+3M+3M+3M+3M+2M+3M)

PART-B

2. a) Discuss various characteristics of a good building stone?
b) What are the different steps involved in manufacturing of tiles? Explain the process in detail. (8M+8M)

3. a) What is meant by English bond? Explain the salient points in the construction of this bond with a neat plan sketch of even course?
b) Explain in detail about different type of woods used in the buildings? (8M+8M)

4. a) What is meant by 'slaking of lime'? Explain different precautions taken while doing this process?
b) Explain different tests conducted on concrete? Explain in detail the tests conducted on fresh concrete? (8M+8M)

5. a) Explain the detailed construction process of Concrete and Terrazo floors with neat sketches?
b) Explain in detail the construction process of king post and queen post trusses with neat sketches? (8M+8M)

6. a) Define 'Varnish'? Explain in detail different ingredients in varnish?
b) Explain the process of painting a new wooden surface? (8M+8M)

7. a) Explain the differences between coarse and fine aggregate?
b) Also explain clearly the difference between porosity and moisture content of aggregate?
c) Define 'Fineness modulus of aggregates? Explain the detailed test process to calculate the fineness modulus of fine aggregate? (3M+6M+7M)
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Code No: RT21014 **R13** SET - 4

II B. Tech I Semester Regular Examinations, Jan - 2015
BUILDING MATERIALS AND CONSTRUCTION
(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 'Tempering' process of bricks?
b) What is ASCU treatment?
c) Draw the macro structure of wood and label all parts?
d) List out various ingredients in lime?
e) Differentiate between Initial setting time and Final setting time of cement?
f) Classify different type of paints?
g) Mention various components of scaffolding?
h) Define 'soundness of aggregate'? (3M+3M+3M+3M+2M+2M+3M+3M)

PART-B

2. a) What is meant by 'Quarrying of stones'? Explain the detailed methods of quarrying of stone?
b) Explain the characteristics of a good tile? Also explain in detail classification of different type of tiles based on the use? (8M+8M)

3. a) Explain in detail the difference between partition and cavity walls? Explain with one example?
b) What is the requirement of seasoning of timber? Explain in detail different seasoning methods with neat sketches? (8M+8M)

4. a) Explain the chemical composition of cement? Mention the function of each ingredient?
b) Classify different tests conducted on concrete? Explain in detail the testing process done on hardened concrete? (8M+8M)

5. a) Define staircase? Explain all the technical parts in a staircase with a neat sketch? Also classify different type of staircases?
b) Explain the differences between Pitched, flat and lean to roofs with neat sketches? (8M+8M)

6. a) What is meant by 'Distempering'? Explain in detail the process of distempering?
b) Define 'Plastering'? Explain the process of plastering a new wall surface with lime and cement? (8M+8M)

7. a) What is the importance of bulk density of aggregates in the concrete preparation? Mention the detailed test process to determine this factor?
b) Give the detailed classification of aggregate based on geological origin, source, size, shape and texture?
c) Explain the meaning of strength of aggregates? (8M+5M+3M)

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Code No: RT21016 **R13** SET - 1

II B. Tech I Semester Regular Examinations, Dec - 2014
FLUID MECHANICS
(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) How does the viscosity of air vary with temperature?
   b) Differentiate between stream function and velocity potential.
   c) List the surface and body forces in fluid flow.
   d) Define boundary layer with a neat sketch.
   e) List Minor losses and explain briefly.
   f) Draw a neat sketch of pitot tube and explain its working. (4M+4M+4M+4M+3M+3M)

PART B

2. a) List all fluid properties and derive Newton's law of viscosity.
   b) Find the height through which water rises by capillary action in a glass tube of 2mm bore if the surface tension at the prevailing temperature is 0.075 N/m. (8M+8M)

3. a) Define stream function and velocity potential. What are their uses
   b) Determine whether the following velocity components satisfy the continuity equation.
   i) u = cx, v = -cy ii) u = -cx/y , v = c log xy (8M+8M)

4. a) What are the surface and body forces? State the Bernoulli's equation and discuss the significance of different terms.
   b) A pipe line tapers from 1.5m in diameter at higher end to 1.0 m diameter at lower end in 400 m length at a slope of 1 in 100. The pressure at the higher end is 75 KPa. If the discharge is 60 m^3/minute, find the pressure at lower end. Neglect losses. (6M+10M)

5. a) Explain the development of boundary layer formation over a flat plate.
   b) Define drag and lift. Explain how boundary layer separates from the boundary (8M+8M)

6. a) What are hydraulic grade line and total energy line? How do you draw the same
   b) Two reservoirs with a difference in water surface elevations of 10m are connected by a pipe line ABC which consists of two pipes of AB and BC joined in series. Pipe AB is 10cm in diameter, 20m long and has a value of f =0.02. Pipe BC is of 16cm diameter, 25m long and has f=0.018. The junctions with the reservoirs and between the pipes are abrupt. Calculate the discharge considering all minor losses. (6M+10M)

7. a) A pipe carries a flow of an oil of Relative Density = 0.85. A pitot-static tube is inserted into the pipe to measure the velocity at a point M. If a differential mercury-oil gauge connected to the pitot-static tube indicates a reading of 4cm, calculate the velocity at M. Assume the coefficient of the pitot tube as 0.99.
   b) Compare the working of a venturimeter with orifice meter (10M+6M)
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II B. Tech I Semester Regular Examinations, Dec - 2014
FLUID MECHANICS
(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) What are the applications of surface tension?
b) What is a flow net? What are its uses?
c) Explain any one application of momentum equation.
d) What is Magnus Effect?
e) Explain how Reynold's experiment is conducted.
f) Draw a neat sketch of venturimeter and explain its parts. (4M+4M+4M+4M+3M+3M)

PART-B

2. a) Derive the equation for capillarity depression when a small glass tube is inserted in mercury.
b) A piston of 7.95 cm diameter and 30 cm long works in a cylinder of 8.0 cm diameter. The annular space of the pistion is filled with an oil of viscosity 2 poise. If an axial load of 10N is applied to the piston, calculate the speed of movement of the piston. (6M+10M)

3. a) What is a centre of pressure? Derive the equation for the centre of pressure for a submerged plane surface in a fluid.
b) A circular plate of diameter 0.75m is immersed in a liquid of relative density 0.80 with its plane making an angle of 30 degrees with the horizontal. The centre of the plate is at a depth of 1.50 m below the free surface. Calculate the total force on one side of the plate and the location of centre of pressure. (6M+10M)

4. a) State the Bernoulli's equation and discuss its significance.
b) A Water pipe changes in diameter from 400mm at section A to 800mm at section B which is 7 m above. The pressures at A and B are 100 KPa and 75 KPa respectively. The discharge is 400 litres/sec. Find the direction of flow. (8M+8M)

5. a) What do you understand by Boundary Layer? Explain the development of Boundary layer over a flat plate.
b) Define drag and lift. Explain how Boundary layer separation takes place (8M+8M)

6. a) Explain the Reynold's experiment to classify the flows.
b) Derive Hazen Poiscille equation for laminar flow in circular pipe line (8M+8M)

7. a) A venturimeter is used for measuring the flow of petrol in a pipe line inclined at 35 degrees to horizontal. The specific gravity of the petrol is 0.81 and throat area ratio is 4. If the difference in mercury levels in the gauges is 50mm, calculate the flow if the pipe diameter is 0.3m. Take coefficient of discharge as 0.975.
b) Explain the working of all the discharging measuring devices with required equations. (10M+6M)
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Code No: RT21016 **R13** SET - 3

II B. Tech I Semester Regular Examinations, Dec - 2014
FLUID MECHANICS
(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) Derive the equation for capillary rise in a small tube dipped in a liquid
b) Explain the concept of stream tube in fluid mechanics.
c) Discuss any one application of Bernoulli's equation.
d) Explain Boundary layer separation with a neat sketch.
e) Explain TEL and HGL.
f) What are notches? Explain any one notch with a neat sketch. (4M+4M+4M+4M+3M+3M)

PART-B

2. a) What is the significance of viscosity and surface tension in fluid flow phenomenon? Explain in detail with required equations.
b) What are the modes of measuring pressure? How can you convert the pressure in KPa into the liquid columns and vice-versa? (8M+8M)

3. a) Derive the equation for centre of force for a circular plane area immersed in a fluid
b) Find the absolute pressure at a depth of 5m below the surface of a liquid of relative density 0.85. The barometer reading on the surface is 750 mm of mercury. (8M+8M)

4. a) What are energy correction and momentum correction factors?
b) A pipe line 300 m long has a slope of 1 in 100 and tapers from 1.2m diameter at the high end to 0.6m at the low end. The discharge through the pipe is 5.4 m^3/minute. If the pressure at the high end is 70 KPa, find the pressure at the low end. Neglect losses. (6M+10M)

5. a) What are the characteristics of boundary layer formation over a flat plate?
b) Define drag and lift. Discuss the boundary layer separation. (8M+8M)

6. a) What do you mean by pipe in series and pipes in parallel?
b) A reservoir discharges water into the atmosphere through a compound horizontal pipe line ABC. The compound pipe consists of two pipes as noted below. A is junction point with the reservoir.
AB : Diameter = 10cm , length =25m, f = 0.02
BC : Diameter = 12cm , length = 35m, f= 0.02
The water level in the tank is 10m above the centre line of the pipe. Calculate the discharge considering all the minor losses. (6M+10M)

7. a) A pipe carries a flow of an oil of Relative Density = 0.85. A pitot-static tube is inserted into the pipe to measure the velocity at a point M. If a differential mercury-oil gauge connected to the pitot-static tube indicates a reading of 4cm, calculate the velocity at M. Assume the coefficient of the pitot tube as 0.99.
b) Explain the working of orifice meter with neat sketches. (10M+6M)
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Code No: RT21016 **R13** SET - 4

II B. Tech I Semester Regular Examinations, Dec - 2014
FLUID MECHANICS
(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) What is pascal's law? Explain with an example.
b) What is centre of pressure? Where does it lie in relation to centre of gravity?
c) How do you find force acting on a pipe bend?
d) Discuss Navier Stokes equation
e) What is the significance of Reynold's experiment?
f) Explain the working of Cippoletti notch. (4M+4M+4M+4M+3M+3M)

PART-B

2. a) List all the fluid properties and explain why water rises in a small glass tube when inserted in water.
b) The space between two parallel plates kept 3mm apart is filled with an oil of dynamic viscosity 0.2 Pa.s. What is the shear stress on the lower fixed plate, if the upper one is moved with a velocity of 1.50m/sec? (6M+10M)

3. a) What are different types of flows? Explain in detail
b) Derive the equation of continuity in three dimension form. (8M+8M)

4. a) Derive the Bernoulli's equation from Euler's equation. State the assumptions made.
b) Define and derive equation for energy correction factor. (8M+8M)

5. a) What is a boundary layer? Differentiate between a laminar and turbulent boundary layer.
b) Explain how a boundary layer separates from boundary. What are the conditions under which separation takes place ? (8M+8M)

6. a) List out the minor losses in closed conduit flow and discuss their significance
b) A 6 cm diameter pipe has a discharge of 450 l/min. At a section the pipe has a sudden expansion to a size of 9 cm diameter. If the pressure just upstream of the expansion is 20 KN/ m^2, calculate the pressure just after the expansion. Assume the pipe to be horizontal. (6M+10M)

7. a) What are the different flow measuring devices? Explain any one of them neatly and clearly.
b) Gasoline of specific of gravity 0.82 flows at a rate of 215 litres per second, upwards in an inclined venturimeter fitted to a 300mm diameter pipe. The venturimeter is inclined at 60 degrees to the vertical and its 150mm diameter throat is 1.2m from the entrance along its length. The pressure gauges inserted at entrance and throat show pressures of 0.141 N/mm^2 and 0.077 N/mm^2 respectively. Calculate the coefficient of discharge. (6M+10M)

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Code No: RT21012 **R13** SET - 1

II B. Tech I Semester Regular Examinations, Jan - 2015
PROBABILITY AND STATISTICS
(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) Define Gamma distribution and show that mean of Gamma distribution is $\mu = \alpha\beta$

b) The actual amount of Instant Coffee that a filling machine puts into 4-ounce jars may be looked upon as a random variable having a normal distribution with $\sigma = 0.04$ ounce. If only 2% of the jars are to contain less than 4 ounces, what should be the mean fill of these jars?

c) A sample of size 10 was taken from a population standard deviation of sample is 0.3. Find the maximum error with 99% confidence.

d) Samples of students were drawn from two universities and their weights (in Kg) and Standard deviation is calculated. Make a large sample test to find the significance of the difference between the means.

	Mean	S.D	Size of sample
University A	55	10	400
University B	57	15	100

e) In the accompanying table x is the tensile force applied to a steel specimen in thousands of pounds and y is the resulting elongation in thousands of inch.

x	1	2	3	4	5	6
y	14	33	40	63	76	85

Fit the equation of the least squares line and use it to predict the elongation when the tensile force is 3.5 of thousands pounds.

f) The past records of a factory using quality control methods show that on the average 4 articles produced are defective out of a batch of 100. What is the maximum number of defective articles likely to be encountered in the batch of 400, when the production process is in state of control? (3M+3M+4M+4M+4M+4M)

PART-B

2. a) A Random variable X has the following probability distribution.

X	1	2	3	4	5	6	7	8
P(X)	K	2K	3K	4K	5K	6K	7K	8K

Find the value of (i) K (ii) $P(X \leq 2)$ (iii) $P(2 \leq X \leq 5)$

b) Find the least squares regression equation of X_1 on X_2 and X_3 from the following data

X_1	3	5	6	8	12	14
X_2	16	10	7	4	3	2
X_3	90	72	54	42	30	12

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3. a) A marksman has a probability of 0.9 of hitting a target on a single shot. If the marksman has 40 shots, what is the probability that he hits the target i) at least 35 times ii) between 34 and 36 times iii) 37 times.
   b) It is known that the mean diameters of rivets produced by two firms A and B are practically the same, but the standard deviations may differ. For 22 rivets produced by Firm A, the S.D is 2.9 mm, while for 16 rivets manufactured by firm B, the S.D is 3.8mm. Compute the statistic you would use to test whether the products of firm A have the same variability as those of firm B and test its significance.

4. a) The mean of certain normal population is equal to the standard error of the mean of the samples of 64 from that distribution. Find the probability that the mean of the sample size 36 will be negative.
   b) A random sample of 8 envelops is taken from the letter box of a post office and their weights in grams are found to be 10, 10.5, 11.25, 11.5, 11, 11.7, 11, 11.5. Find 95% confidence limits for the mean weight of the envelops received at that post office.

5. a) Three different machines are used for a production. On the basis of the outputs, test whether the machines are equally effective.

OUTPUTS		
Machine-1	Machine-2	Machine-3
10	9	20
5	7	16
11	5	10
10	6	4

   b) Obtain the moment generating function of the random variable X having probability density function $f(x) = \begin{cases} x, & 0 \le x < 1 \\ 2 - x, & 1 \le x < 2 \\ 0, & elsewhere. \end{cases}$

6. a) Ten recruits were subjected to a selection test to ascertain their suitability for a certain course of training. At the end of training they were given a proficiency test. The marks secured by recruits in the selection test (X) and in the proficiency test(Y) are given below. Test the correlation.

x	1	15	12	17	13	16	24	14	22	20
y	30	42	45	46	33	34	40	35	39	38

   b) The marks obtained in Mathematics by 1000 students is normally distributed with mean 78% and standard deviation 11%. Determine
   i) How many students got marks above 90% ii) What was the highest mark obtained by the lowest 10 % of the students iii) Within what limits did the middle of 90% of the students lie.

7. a) What is control chart? How is it designed?
   b) The following data gives readings of 10 samples of size 6 each in the production of a certain component

Sample	1	2	3	4	5	6	7	8	9	10
Mean $\bar{X}$	383	508	505	582	557	337	514	614	707	753
Range R	95	128	100	91	68	65	148	28	37	80

   Draw Control Charts for $\bar{X}$ (for n = 6, A_2 = 0.483). What is your conclusion?

Code No: RT21012 **R13** SET - 2

II B. Tech I Semester Regular Examinations, Jan - 2015
PROBABILITY AND STATISTICS
(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) Define Weibull distribution and show that mean of weibull distribution is $\mu = \alpha^{-1/\beta}\ \Gamma(1 + 1/\beta)$.

b) The marks obtained in Statistics in a certain examination are found to be normally distributed. If 15% of the candidates ≥ 60 marks, $40\% \leq 30$ marks. Find the mean and standard deviation of marks.

c) The scores of 10 students in test are 65, 70, 86, 74, 90, 94, 57, 65, 76, 83. If the mean score of students in general is 69 with standard deviation 9.3, find the value of t.

d) A research investigator was interested in studying whether there is a significant difference in the salaries of MBA graduates in two metropolitan cities. A random sample size of 100 from Mumbai yields an average income of Rs. 20,205/-. Another random sample of 60 from Chennai result in an average income of Rs. 20,250/-. Assume the variances of both the populations are given as σ_1^2= Rs. 40,000/- and σ_2^2 = Rs. 32,000/- respectively.

e) The following table shows how many weeks a sample of six persons have worked at an automobile inspection and the number of cars each one inspected between noon and 2 p.m. on a given day

No. of weeks employed x	2	7	9	1	5	12
No. of cars inspected y	13	21	23	14	15	21

Fit the straight line by least squares method. Estimate how many cars someone who has been working at the inspection station for 8 weeks can be expected to inspect during the year 2 hours period.

f) If the average fraction defective of large sample of products is 0.1537. Calculate control limits. (Given that sub-group size is 2,000) (3M+3M+4M+4M+4M+4M)

PART-B

2. a) The probability density function of a variate X is

X	0	1	2	3	4	5	6
P(X)	K	3k	5k	7k	9k	11k	13k

i) Find $P(X < 4)$, $P(X \geq 5)$, $P(3 < X \leq 6)$
ii) What will be the minimum value of k so that $P(X \leq 2) > 0.3$?

b) Calculate correlation coefficient for the heights of fathers and sons

X	65	66	67	67	68	69	70	72
Y	67	68	65	68	72	72	69	71
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3. a) A certain drug is effective in 72% of cases. Given 2000 people are treated with the drug, what is the probability that it will be effective for (i) at least 1400 patients (ii) less than 1390 patients (iii) 1420 patients.
   b) The measurements of the output of two units have given the following results. Assuming that both samples have been obtained from the normal population at 10% significant level, test whether the two populations have the same variance.

Unit-A	14.1	10.1	14.7	13.7	14.0
Unit-B	14.0	14.5	13.7	12.7	14.1

4. a) Determine the expected number of random samples having their means
   i) Between 22.39 and 22.41
   ii) Greater than 22.42
   iii) Less than 22.37
   b) In a study of an automobile insurance a random sample of 50 body repair costs had a mean of Rs. 472.36 and the S.D of Rs. 62.35. If $\bar{x}$ is used as a point estimate to the true average repair cost, with what confidence we can assert that the maximum error doesn't exceed Rs. 10?

5. a) The Samples of each size 5 are drawn from three un correlated normal populations with equal variances. Test the hypothesis that the population means are equal at 5% level.

Sample-1	10	12	9	16	14
Sample-2	9	7	12	11	11
Sample-3	14	11	15	15	16

   b) Find moment generating function of the random variable X having the probability density function $f(x) = \begin{cases} 1/3, & -1 < x < 2 \\ 0, & elsewhere \end{cases}$

6. a) Fit a parabola $y = a + bx + cx^2$ to the following data

x	1	2	3	4	5	6	7	8	9
y	2	6	7	8	10	11	11	10	9

   b) The mean and standard deviation of the marks obtained by 1000 students in an examination are respectively 34.5 and 16.5. Assuming the normality of the distribution, find the approximate number of students expected to obtain marks between 30 and 60.

7. a) Discuss the base principle underlying Control Charts
   b) The following data show the values of a sample mean $\bar{x}$ and range (R) for 10 samples for size 6 each. Calculate the values for central line and the control limits for Mean-Chart and Range-Chart. Draw the control charts and comment on the state of control.

Sample	1	2	3	4	5	6	7	8	9	10
Mean $\bar{X}$	43	49	37	44	45	37	51	46	43	47
Range R	5	6	5	7	7	4	8	6	4	6

Code No: RT21012 **R13** SET - 3

II B. Tech I Semester Regular Examinations, Jan - 2015
PROBABILITY AND STATISTICS
(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) Define Weibull distribution and use Weibull distribution to calculate the following: Suppose that the life time of certain kind of emergency backup battery(in hours) in a random variable X having the Weibull distribution with $\alpha = 0.1$ and $\beta = 0.5$. Find the probability that such a battery will last more than 300 hours.

b) If X has Binomial distribution with probability distribution $b(x; n, p) = \binom{n}{p} p^x (1-p)^{n-x}$ for $x = 0,1,2,\ldots,n$. Show that moment generating function of the binomial distribution is $M(t) = (1 - p + pe^t)^n$ for all t.

c) Find the value of t for the following variate values for eight samples -4, -2, -2, 0 2, 2, 3, 3, taking mean of universe as 0.

d) In a sample of 1000 citizens of India, 540 are wheat and the rest are rice eaters. Can we assume that both rice and wheat are equally popular in India at 1% Level of significance?

e) The following data pertaining to the number of jobs per day and the central processing unit time required.

No. of Jobs	1	2	3	4	5
CPU time	2	5	4	9	10

Fit a straight line and estimate the mean CPU time at x= 3.5.

f) In a glass factory, the task of quality control was done with the help of mean ($\bar{X}$) and standard deviation (σ) charts. 18 samples of 10 items each were chosen and then values $\sum X$ and $\sum S$ were found to be 59.8 and 8.28 respectively. Determine the 3 $\sigma -$ limits for standard deviation chart. You may use the following control factors for your calculations.

n	A_1	B_3	B_4
10	1.03	0.28	1.72

(3M+3M+4M+4M+4M+4M)

PART-B

2. a) A Random variable X has density function $f(x) = \begin{cases} 1/4, & -2 < x < 2 \\ 0, & elsewhere \end{cases}$

Obtain (i) P(X < 1) (ii) P (|X | > 1) (iii) P (2X+3 > 5)

b) Find the correlation of the following data

X	10	12	18	24	23	27
Y	13	18	12	25	30	10

3. a) In a normal distribution 31% of the items are under 45 and 8% are over 64. Find the mean and variance of distribution.

b) The following figures show the distribution of digits in numbers chosen at random from a telephone directory

Digits	0	1	2	3	4	5	6	7	8	9
Frequency	1026	1107	997	966	1075	933	1107	972	964	853

Test whether the digits may be taken to occur equally frequently in the directory.
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4. a) The guaranteed average life of a certain type of electric bulbs is 1500 hrs with a S.D of 120 hrs. It is decided to sample the output so as to ensure that 95% of bulbs do not fall short of the guaranteed average by more than 2%. What will be the minimum sample size?
   b) A random sample of 400 items is found to have mean 82 and SD of 18. Find maximum error of estimation at 95% confidence interval.

5. a) The following table gives the number of refrigerators sold by 4 salesmen of Kelvinator (India) Ltd., in three months May, June, July.

Month	A	B	C	D
May	50	40	48	39
June	46	48	50	45
July	39	44	40	39

   Using ANOVA, test the hypothesis that mean sales is the same for three months.
   b) Find the probability that out of 1000 patients, between 80 and 95 inclusive will survive a heart- operation, given that the chances of survival is 0.9.

6. a) Find the curve $Y = a e^{bx}$ for the following data

X	1	2	3	4	5	6
Y	1.6	4.5	13.8	40.2	125	300

   b) Suppose the weights of 800 male students are normally distributed with mean $\mu = 140$ pounds and standard deviation 10 pounds. Find the number of students whose weight are (i) between 138 and 148 pounds (ii) more than 152 pounds.

7. a) The following data refer to the number of defectives in 10 samples of 100 items each. Construct appropriate control limits.

Sample No.	1	2	3	4	5	6	7	8	9	10
No. of defectives	4	8	11	3	11	7	7	16	12	6

   b) Sample of 100 tubes are drawn randomly form the output of a process that produces several thousand units daily. Sample items are inspected for quality and defective tubes are rejected. The results of 15 samples are shown below

Sample No.	No. of defective tubes	Sample No.	No. of defective tubes
1	8	9	10
2	10	10	13
3	13	11	18
4	9	12	15
5	8	13	12
6	10	14	14
7	14	15	9
8	6		

   On the basis of information given above prepare a control chart for fraction defective. What conclusion do you draw from the control chart?

Code No: RT21012 **R13** SET - 4

II B. Tech I Semester Regular Examinations, Jan - 2015
PROBABILITY AND STATISTICS
(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) Suppose that the life time of certain kind of emergency backup battery(in hours) in a random variable X having the Weibull distribution with $\alpha = 0.1$ and $\beta = 0.5$.. Find the mean life time of these batteries.

b) If X has Poison distribution with probability distribution $P(x) = \frac{\lambda^x}{x!} e^{-\lambda}$ for $x = 0,1,2,\ldots,\infty$. Show that the moment generating function of the Poison distribution is $M(t) = e^{\lambda(e^t - 1)}$ for all t.

c) 400 articles from a factory are examined and 3% are found to be defective. Construct 95% confidence interval

d) A random sample from a company's very extensive files show that the orders for a certain kind of machinery were filed respectively in 10, 12, 19, 14, 15, 18, 11 and 13 days. Use the level of significance α = 0.01 to test the claim that on the average, such orders are filed in 10.5 days. Assume normality.

e) The following show the improvement (gain in reading Speed) of eight students in a speed reading program and the number of weeks they have been in the program.

No. of weeks	3	5	2	8	6	9	3	4
Speed gain	86	118	49	193	164	232	73	109

Fit a straight line by method of least squares

f) Measurements on average ($\bar{X}$) and ranges (R) from 20 samples each of size 5 gave the following results: $\bar{\bar{X}} = 99.6$, $\bar{R} = 7.0$. Determine the values of the control limits for drawing mean chart, (given that for n = 5, mean range = 2.32 × population S.D)

(3M+3M+4M+4M+4M+4M)

PART-B

2. a) A random variable X has the density function:

$$f(x) = \begin{cases} K\dfrac{1}{1+x^2}, & -\infty < x < \infty \\ 0, & otherwise \end{cases}$$

Determine K and the distribution function.

b) Find the rank correlation coefficient for the following data

X	68	64	75	50	64	80	75	40	55	64
Y	62	58	68	45	81	60	68	48	50	70

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3. a) The mean and variance of binomial distribution are 4 and 3 respectively. Find P(X ≥1)
   b) 200 digits were chosen at random from a set of tables. The frequencies of the digits are shown below:

Digits	0	1	2	3	4	5	6	7	8	9
Frequency	18	19	23	21	16	25	22	20	21	15

   Use the chi square test to assess the correctness of the hypothesis that the digits were distributed in equal number in the table which these were chosen.

4. a) A random sample of size 100 is taken from infinite population having the mean μ = 76 and the variance σ^2 = 256. What is the probability that $\bar{x}$ will be between 75 and 78.
   b) Measurements of the weight of a random sample of 200 ball bearing made by a certain machine during one week showed a mean of 0.824 and a standard deviation of 0.042. Find maximum error at 95% confidence interval?

5. a) An urban community ward take to show that the incidence of breast cancer is higher than in a nearby rural area. If it is found that 20 of 200 adult women in urban community have breast cancer and 10 of 150 women in rural community have the breast cancer. Can we conclude at 00.1 level, that breast cancer is more prevalent in urban community?
   b) The marks obtained in Statistics in a certain examination found to be normally distributed. If 15% of the students ≥ 60 marks, 40 % < 30 marks, find the mean and standard deviation.

6. a) Fit $y = a.b^x$ by the method of least squares to the following data

X	0	1	2	3	4	5	6	7
Y	10	21	35	59	92	200	400	610

   b) In a sample of 1000 cases, the mean of certain test is 14 and standard deviation is 2.5. Assuming the distribution to be normal, find
   i) How many students score between 12 and 15?
   ii) How many score above 18?
   iii) How many score below 18?

7. a) The following are the figures of defectives in 22 lots each containing 2000 rubber belts:
   425, 430, 216, 341, 225, 322, 280, 306, 337, 305, 356
   402, 216, 264, 126, 409, 193, 326, 280, 389, 451, 420
   Draw control chart for fraction defectives and comment on the state of control of process
   b) Construct a control chart for C, that is, the number of defectives, from the following data pertaining to the number of imperfections in 20 pieces of cloth of sample length in a certain make of polyester and infer whether the process is in a state control: 2, 3, 5, 8, 12, 2, 3, 4, 6, 5, 6, 5, 6, 10, 4, 6, 5, 7, 4, 9, 7, 3.

Code No: RT21013 **R13** SET - 1

II B. Tech I Semester Regular Examinations, Jan - 2015
STRENGTH OF MATERIALS - I
(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 Strain Energy and deduce the expression due to gradual loading.
   b) Show that the ratio of maximum shear stress to average shear stress is 1.5 in case of a rectangular section (bxd).
   c) Derive an expression for circumferential stress for a thin spherical shell of internal diameter d, wall thickness t, is subjected to an internal pressure p.
   d) Deduce the relation between shear force and bending moment
   e) Explain moment area theorems.
   f) Write the assumptions made in the theory of simple bending. (4M+4M+4M+4M+4M+2M)

PART-B

2. a) Deduce the relation between the Modulus of Elasticity and Modulus of Rigidity from fundamentals.
   b) The Modulus of rigidity for a material is 0.51×10^5 N/mm^2. A 10 mm diameter rod of the material was subjected to an axial pull of 10 kN and the change in diameter was observed to be 3×10^{-3} mm. Calculate Poisson's ratio and the modulus of elasticity. (6M+10M)

3. a) Deduce the relation between Shear force and intensity of loading.
   b) An overhanging beam is shown in Figure 1. Draw the S.F and B.M diagrams. (4M+12M)

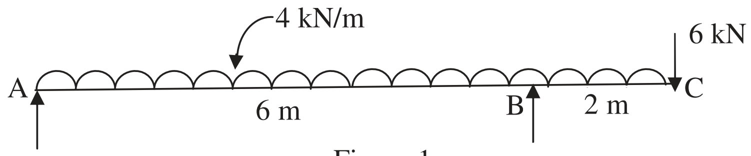

Figure 1

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4. a) Derive the bending equation from fundamentals M/I= f/y = E/R
   b) A 120 mm x 50 mm I- section is subjected to a shearing force of 10 kN. Calculate the shear stress at the neutral axis and at the top of the web. Given I = $220x10^4$ mm^4, Area = $9.4x10^2$ mm^2, web thickness = 3.5 mm and flange thickness = 5.5 mm (8M+8M)

5. a) Obtain the expression for shearing stress at a section of a loaded beam?
   b) A T – section beam with 100 mm x 15 mm flange and 150 mm x 15 mm web is subjected to a shear force of 12 kN at a section. Draw the variation of shear stress across the depth of the beam and obtain the value of maximum shear stress of the section. (6M+10M)

6. A simply supported beam of span 5 m, carrying a point load of 5 kN at a distance of 3 m from the left end. Find (i) slope at the left support, (ii) deflection under the load and (iii) maximum deflection. Take E= $2x10^5$ N/mm^2 and I = $1x10^8$ mm^4. Use double integration method. (16M)

7. A compound cylinder is made by shrinking a cylinder of external diameter 200 mm and an internal diameter 160 mm over another cylinder of external diameter 160 mm and internal diameter 120 mm. The radial pressure at the junction after shrinking is 8 N/mm^2. Find the final stress set up across the section, when the compound cylinder is subjected to an internal fluid pressure of 60 N/mm^2. (16M)

Code No: RT21013 **R13** SET - 2

II B. Tech I Semester Regular Examinations, Jan - 2015
STRENGTH OF MATERIALS - I
(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) Define (i) Poisson's ratio and (ii) Volumetric strain
   b) A cantilever beam of span 2 m is loaded with a point load of 30 kN at its free end. Find the deflection at the fee end, if EI = $8x10^{12}$ N-mm^4.
   c) Show that the ratio of maximum shear stress to average shear stress is 4/3 in case of a circular section of diameter d.
   d) Deduce the circumferential stress equation for a thin cylindrical shell subjected to an internal pressure of intensity 'p' with a thickness 't' and diameter 'd'.
   e) Deduce the section modulus for a hollow circular section of internal diameter, d and external diameter, D.
   f) Deduce the relation between Shear force and intensity of loading

(3M+4M+4M+4M+4M+3M)

PART-B

2. a) Deduce the expression for Strain Energy due to gradual and sudden applied loads.
   b) A load of 100 N falls through a height of 20 mm on to a collar rigidly attached to the lower end of a vertical bar 1.5 m long and of 1.5 cm^2 cross-sectional area. The upper end of the vertical bar is fixed. Determine: i) Maximum instantaneous stress induced in the bar, and ii) Maximum instantaneous elongation. Take E=$2x10^5$ N/mm^2 (6M+10M)

3. A horizontal beam, 30 m long, carries a uniformly distributed load of 10 kN/m over the whole length and concentrated load of 30 kN at the right end. If the beam is simply supported at the left end, find the position of the second support so that the bending moment on the beam should be as small as possible. Draw the diagrams of shearing force and bending moment and insert the principal values. (16M)

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4. a) Write and explain the assumptions made in the theory of simple bending.
   b) Find the section modulus for a hollow circular section of internal diameter d and external diameter D.
   c) Prove that the ratio of depth to width of the strongest beams that can be cut from a circular log of diameter, d is 1.414. (4M+4M+8M)

5. a) Find the ratio of maximum shear stress to average shear stress is 1.5 in case of a rectangular section.
   b) A beam is simply supported and carries a U.D.L of 40 kN/m run over the whole span. The section of the beam is rectangular having depth as 300 mm. If the maximum stress in the material of the beam is 120 N/mm^2 and moment of inertia of the section is 7x10^8 mm^4. Find the span of the beam. (6M+10M)

6. a) Write and Explain moment area theorems.
   b) Find the slope and deflection of simply supported beam of span L, carrying i) a point load P at the centre, ii) a U.D.L of w kN/m over the entire span using the moment area method. (4M+12M)

7. A steel cylinder (thick) of 300 mm external diameter is to be shrunk to another steel cylinder of 150 mm internal diameter. After shrinking the diameter at the junction is 250 mm and radial pressure at the common junction is 28 N/mm^2. Find the original difference in radii at the junction. Take E = 2x10^5 N/mm^2. (16M)

Code No: RT21013 **R13** SET - 3

II B. Tech I Semester Regular Examinations, Jan - 2015
STRENGTH OF MATERIALS - I
(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) Deduce the total extension of a uniformly tapering rod of diameters d and D over a length of L, when the rod is subjected to an axial load P.
   b) Deduce the section modulus for a hollow rectangular section of internal dimensions (bxh) and external dimension (BxH).
   c) Find ratio of maximum shear stress to average shear stress, in case of a rectangular section.
   d) A simply supported beam of span 2 m is loaded with a point load of 20 kN at its mid point. Find the maximum slope of the beam, if EI = 500×10^9 N-mm^4.
   e) Deduce the longitudinal stress for a thin cylindrical shell subjected to an internal pressure of intensity 'p' with a thickness 't' and diameter 'd'.
   f) Deduce the relation between shear force and bending moment

(3M+4M+4M+4M+4M+3M)

PART-B

2. a) Deduce the Strain Energy expression for impact loading, in terms of Length, L and height of fall h.
   b) A steel rod of 3 cm diameter and 5 m long is connected to two grips and the rod is maintained at a temperature of 90^0 C. Determine the stress and pull exerted when the temperature falls to 30^oC, if (i) the ends do not yield and (ii) the ends yield by 0.13 cm. Take E = 2.1×10^5 N/mm^2 and $\alpha = 12 \times 10^{-6} / {}^o$C. (6M+10M)

3. a) Deduce the relation between S.F and intensity of loading.
   b) A simply supported beam of span 9 m loaded with a varying load of intensity zero at the left hand side and 3 kN/m at the right side. Draw the S.F and B.M diagrams. (4M+12M)
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4. a) Derive the bending equation from fundamentals M/I= f/y = E/R
   b) A timber beam of rectangular section is to support a load of 20 k N uniformly distributed over a span of 3.6 m when beam is simply supported. If the depth of section is to be twice the breadth, and the stress in the timber is not to exceed 7 N/mm^2, find the dimensions of the cross-section. (6M+10M)

5. a) Show that the ratio of maximum shear stress to average shear stress is 4/3 in case of a circular section of diameter d.
   b) The cross section of joist is a tee section 150 mm x 100 mm x 13 mm with 150 mm side horizontal. Find the maximum intensity of shear stress and sketch the distribution of stress across the section, if it has to resist a shear force of 50 kN. (6M+10M)

6. a) State and prove the moment area theorems.
   b) A simply supported beam of span L, carrying a point load P at 0.4L from left support. Determine, the (i) mid-span deflection (ii) deflection under the load, and (iii) slopes at the supports. Use the method of integration. Assume constant flexural rigidity for the beam. (6M+10M)

7. A compound cylinder is made by shrinking a cylindrical of external diameter 300 mm and internal diameter of 250 mm over an another cylindrical of external diameter 250 mm and internal diameter 200 mm. The radial pressure at the junction after shrinking is 8 N/mm^2. Find the final stresses set up across the section, when the compound cylinder is subjected to an internal fluid pressure of 84.5 N/mm^2. (16M)

Code No: RT21013 R13 SET - 4

II B. Tech I Semester Regular Examinations, Jan - 2015
STRENGTH OF MATERIALS - I
(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) Deduce the expression for Strain Energy due to suddenly applied loads.

b) Draw the B.M diagram of a cantilever beam of span L, subjected to a couple M at the free end.

c) Find the section modulus for a hollow circular section of external diameter, D and internal diameter, d, if internal diameter is 60% of external diameter.

d) Obtain the expression for shearing stress at a section of a loaded beam?

e) State and prove the moment area theorems.

f) Deduce the longitudinal stress for a thin spherical shell subjected to an internal pressure of intensity ‘p’, with a thickness ‘t’ and diameter ‘d’. (3M+3M+4M+4M+4M+4M)

PART-B

2. a) Deduce the relation between Modulus of Elasticity and Modulus of Rigidity from fundamentals.

b) A rectangular plate made of steel is 4 m long and 20 mm thick and is subjected to an axial tensile load of 40 kN. The width of the plate varies from 30 mm at one end to 80 mm at the other end. Find the elongation, if $E = 2x10^5$ N/mm^2. (6M+10M)

3. Draw the S.F and B.M diagrams of the beam shown in figure 1. (16M)

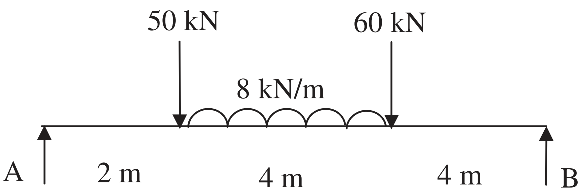

Figure 1
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4. a) Write and Explain moment area theorems.
   b) Find the slope and deflection of simply supported beam of span L, carrying i) a point load P at the centre, ii) a U.D.L of w kN/m over the entire span, using the moment area method. (6M+10M)

5. a) Show that the ratio of maximum shear stress to average shear stress is 3/2 in case of a rectangular section of width, b and depth, d
   b) A 120 mm x 50 mm I- section is subjected to a shearing force of 10 kN. Calculate the shear stress at the neutral axis and at the top of the web. Given I = $220x10^4$ mm^4, Area = $9.4x10^2$ mm^2, web thickness = 3.5 mm and flange thickness = 7.5 mm (6M+10M)

6. A beam AB, span 8 m, simply supported at the ends is subjected to a point load at C, which is 6m from left support. Using area moment method, compute i) deflection at C, ii) slope at A, iii) slope at B, and iv) slope at C. Take E= $2x10^5$ N/mm^2 and I = $6x10^8$ mm^4. (16M)

7. Derive the Lames equations from the fundamentals in a thick cylindrical shell for the given radii (r_1 and r_2) and internal fluid pressure, p. (16M)

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

II B. Tech I Semester Regular Examinations, Jan - 2015
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) Write the classifications of surveying?
   b) Distinguish between closed traverse and open traverse.
   c) Define contouring. What do you understand by contour interval and on what factors it depends?
   d) Define the terms
      i) face left and face right observations.
      ii) swinging and transiting the telescope.
   e) Define and differentiate between simple, compound and reverse curve.
   f) Derive the expression for trapezoidal formula for volume. (5M+3M+4M+4M+3M+3M)

PART-B

2. a) Explain method of intersection in Plane table surveying
   b) What is error of closure? How is it balanced graphically? (8M+8M)

Line	F.B	B.B
AB	66^0- 20’	246^0- 20’
BC	139^0- 30’	318^0- 50’
CD	189^0- 40’	11^0- 20’
DA	300^0- 30’	119^0- 30’

3. a) At what stations do you suspect local attraction? Find the correct bearings of lines and also compute the included angles.
   b) Write about GPS and GIS. (12M+4M)
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4. a) The following staff readings were taken with a level which was shifted after 4th,7th and 10th readings:1.235,200.5,1.875,0.96,0.38 ,1.64,2.84,1.75,1.93,2.15,2.37 and 2.46.Assuming the R.L of starting point as 100.00m, enter the readings in the form of a level book page and determine the rise and fall at all points.

   b) Explain about any instrument in EDM (12M+4M)

5. a) Explain how you would measure with a theodolite, the horizontal angle by method of repetition. ?

   b)Write about W.C.B and Q.B. (10M+6M)

6. a) Two horizontal distances of 30m and 70m were accurately measured, and the intercepts on the staff between the outer stadia wires were 0.526 and 0.826 respectively. Calculate the tachometric constants.

   b) Describe the method of setting out a simple circular curve with help of a chain and tape only. (4M+12M)

7. The following offsets were taken from a chain line to a hedge:

Distance in m	0	20	40	60	80	120	160	200	240	270
Offsets in m	24.2	20.0	12	8	10	14	16	20	22	26

Calculate the area enclosed between the chain line, the hedge and the end offsets by

(i) Simpson's rule (ii) Trapezoidal rule (16M)

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

II B. Tech I Semester Regular Examinations, Jan - 2015
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) Describe in brief the principles of surveying.
b) Write about base line, tie line and check line.
c) Describe under what conditions Tachometric surveying is advantageous.
d) Explain the temporary adjustment of leveling instruments.
e) Define and differentiate between simple, compound and reverse curve.
f) What are the different methods of determination of volume in earth work?
(3M+3M+4M+4M+4M+4M)

PART-B

2. a) Explain the method of radiation in Plane table surveying and where is it useful?
b) What are the different methods of contouring? Explain. (8M+8M)

3. Following bearings were observed with a Compass for a closed traverse:

Line	F.B	B.B
AB	16^0-45’	198^0-00’
BC	224^0-30’	47^0- 30’
CD	207^0-15’	25^0- 45’
DE	67^0- 45’	247^0 – 30’
EA	155^0-15’	332^0-45’

i) Correct the bearings for local attraction, if any
ii) Calculate the angles iii) If the declination is 3^0-30’ west, calculate the true bearings.
(16M)

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

5. a) Explain, how you would measure the vertical angle with a theodolite.
b) Write about Total station, GPS and GIS. (10M+6M)

6. a) Define the terms
i) True and magnetic bearing ii) Back bearings iii) Magnetic declination
b) Describe the method of setting out a simple circular curve with the help of a chain and tape only. (6M+10M)

7. A series of offsets were taken from a chain line to a curved boundary line at intervals of10m in the following order 0, 3.65,4.80,4.75,5.65,4.60,5.95,6.85 m
Compute the area between the chain line, the curved boundary and the end offsets by (i)Simpson’s rule (ii) Trapezoidal rule (ii) Average ordinate rule (16M)

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

II B. Tech I Semester Regular Examinations, Jan - 2015
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) What is the error due to incorrect chain?
b) Define Meridians, Azimuths and Bearings.
c) Sketch the characteristic feature of contour lines for the following
i) Pond ii) Hill iii) Ridge iv) Valley v) Vertical cliff
d) What are the temporary adjustments of Transit Theodolite.
e) Write about Total station.
f) Write the formulae of Trapezoidal rule and Simpson's rule. (3M+3M+5M+4M+4M+3M)

PART-B

2. a) What is Simpson's rule in the computation of areas of figures? Derive an expression for it.
b) Discuss the advantages and disadvantages of plane table surveying over other methods. (8M+8M)

3. The following staff readings were taken with a level which was shifted after 2nd ,4th and 8th readings: 0.875,1.235,2.310,1.385,2.930 ,3.125,4.125,0.120,1.875,2.030 and 3.765
The first reading was taken with the staff held upon a benchmark of elevation 142.145.Enter the readings in the level book form apply the usual checks. Find also the difference in level between the first and last points. (16M)

4. Explain, with the help of neat sketch, the graduations of a prismatic compass and a surveyor's compass. (16M)

5. a) Write about the different methods of contouring.
b) Define the terms
i) True and magnetic bearing ii) Back bearings
iii) Magnetic declination iv) Local attraction (8M+8M)

6. a) Explain how you would measure, the vertical angle with a theodolite.
b) Explain about instruments in EDM. (8M+8M)

7. Determine the difference in elevation between the instrument station and the object when base of the object inaccessible and instrument stations in the same vertical plane as the elevated object. (16M)
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Code No: RT21015 **R13** SET - 4

II B. Tech I Semester Regular Examinations, Jan - 2015
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)What are the accessories of the plane table.?
   b) Convert the following whole circle bearings to reduced bearing.
   i) 85^0- 30' ii) 140^0- 20' iii) 255^0-10' iv) 336^0- 40'
   c) Write the classification of leveling.
   d) What is line of collimation and Transiting?
   e) Write about different types of curves.
   f) Write the formulae of Trapezoidal rule and Simpson's rule. (5M+4M+4M+3M+3M+3M)

PART-B

2. a) What is Trapezoidal rule in the computation of areas of figures? Derive an expression for it.
   b) Explain the method of intersection in Plane table surveying and where is it useful? (8M+8M)

3. The following staff readings were taken with a level which was shifted after 3rd ,8^{th} and 10^{th} readings: 1.875,2.235,3.310,1.385,0.930 ,2.125,1.125,4.120,1.875,2.030 and 2.765
   The first reading was taken with the staff held upon a benchmark of elevation 122.125. Enter the readings in the level book form apply the usual checks. Find also the difference in level between the first and last points. (16M)

4. a) Differentiate clearly between Prismatic compass and Surveyor's compass.
   b) Two horizontal distances of 50m and 80m were accurately measured, and the intercepts on the staff between the outer stadia wires were 0.657 and 0.857 respectively. Calculate the tachometric constants. (12M+4M)

5. a) Define contour. What are the characteristics of contour?
   b) Distinguish between closed traverse and open traverse. (8M+8M)

6. Determine the difference in elevation between the instrument station and the object when base of the object inaccessible and instrument stations in the different vertical plane as the elevated object. (16M)

7. Write about the following
   a) Declination
   b) GPS and GIS
   c) Steps in setting out simple circular curves by Rankine's method. (2M+6M+8M)
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