Code No: R21012 **R10** SET - 1

II B. Tech I Semester Regular Examinations, March – 2014
CONSTRUCTION MATERIALS AND MANAGEMENT
(Civil Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. Discuss the geological classification of rocks. (15M)

2. a) Explain about Flemish bond with neat sketches.
   b) What is seasoning of timbers and why is it done? (7M+8M)

3. a) Explain the process of manufacturing fat lime?
   b) Enumerate the laboratory tests for cement and describe any two of them. (8M+7M)

4. a)Write about i) types of arches ii) varnishes
   b) Discuss the reasons for the causes of defects in painting work. (8M+7M)

5. Write short notes on:
   i) Effect of moisture on aggregates
   ii) Properties of good coarse aggregate
   iii) Fineness modulus
   iv) Alkali-aggregate reaction (3M+4M+4M+4M)

6. Write about functions and applications of Geosynthetics. (15M)

7. a) Write about mile stone charts and bar charts?
   b) Define an 'event' and an 'activity'. Differentiate clearly between the two. (7M+8M)

8. What do you understand by frequency distribution? How do you determine i) most likely time, ii) variance and iii) standard deviation from the frequency distribution? (15M)
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Code No: R21012 **R10** SET - 2

II B. Tech I Semester Regular Examinations, March – 2014
CONSTRUCTION MATERIALS AND MANAGEMENT
(Civil Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Describe the process of blasting.
   b) What are the precautions to be taken in the process of blasting? (10M+5M)

2. a) Write about Rubble & Ashlar masonry with neat sketches.
   b) Write about fiber reinforced plastics. (8M+7M)

3. a) Explain the classification of limes.
   b) Explain the soundness test (8M+7M)

4. a) Write about different trussed roofs.
   b) What are the differences between paints, varnishes and distemper? (8M+7M)

5. What is alkali-aggregate reaction? What are the factors which affect this reaction and how can this reaction be controlled? (15M)

6. Write about tests on geogrids and geotextiles. (15M)

7. Describe various phases of project management. (15M)

8. What is meant by probability distribution curve? Differentiate clearly between normal probability distribution curve and beta distribution. (15M)
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Code No: R21012 **R10** SET - 3

II B. Tech I Semester Regular Examinations, March – 2014
CONSTRUCTION MATERIALS AND MANAGEMENT
(Civil Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Compare clamp-burning with kiln-burning.
   b) What are the tests to which a stone should be subjected before it is selected for building purposes? (8M+7M)

2. a) Write about different types of masonry.
   b) Explain what is meant by felling of trees. (8M+7M)

3. Write in detail about different types of cement. (15M)

4. a) Write about different types of Floors.
   b) What is distempering? How is it done? (8M+7M)

5. Discuss the characteristics of good aggregates. (15M)

6. Write about Resource leveling and Resource allocation. (15M)

7. Explain in brief the difference between PERT and CPM networks. Explain the circumstances under which one is preferred over the other. (15M)

8. Differentiate clearly between most likely time estimate (t_L), mean time(t_m) and expected time (t_E). (15M)
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Code No: R21012 **R10** SET - 4

II B. Tech I Semester Regular Examinations, March – 2014
CONSTRUCTION MATERIALS AND MANAGEMENT
(Civil Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Describe the various types of tiles.
   b) Explain how the following tests for stones are carried out:
   i) Hardness test ii) Water absorption test (7M+8M)

2. a) Explain English bond with neat sketches.
   b) Mention the qualities of a good timber. (7M+8M)

3. Discuss at length the modern manufacturing process of ordinary cement. (15M)

4. a) Write about different types of stair cases.
   b) What are the different types of paints used for protecting steel structures in coastal regions? (7M+8M)

5. a) What are different types of aggregates for making mortar and concrete?
   b) What is fineness? How would you find the fineness modulus value of coarse and fine aggregates? (8M+7M)

6. Write about tests on geocomposites and geomembranes. (15M)

7. A project consists of 8 activities A, B, C, D, E, F, G and H with their times of completion as follows.

Activities	Duration (weeks)
A	2
B	4
C	2
D	4
E	6
F	4
G	5
H	4

   The precedence relationships are as follows:
   A and B can be performed in parallel.
   C and D cannot start until A is complete.
   E cannot start until half the work of activity C is complete.
   F can start only after activity D is complete
   G succeeds C
   H is the last activity, which should succeed E
   a) Draw the bar chart
   b) What is the total time of completion of the project? (15M)

8. Differentiate between PERT network and CPM network. Illustrate your answer by drawing the two types of networks for a project. (15M)
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Code No: R21013 **R10** SET - 1

II B. Tech I Semester Regular Examinations, March – 2014
ELECTRICAL AND ELECTRONICS ENGINEERING
(Com. to CE, ME, CHEM, PE, AME, MM)

Time: 3 hours Max. Marks: 75

All Questions carry **Equal** Marks
Note: Answer any FIVE Questions, not exceeding Three Question from any one part

PART-A

1. a) State and explain Kirchhoff's laws with suitable examples.
   b) Three resistances of 5 ohms, 10 ohms and 15 ohms are connected in parallel. If the current in 10 ohms resistance is 3 A, What is the current in other resistors and total current? Also determine the voltage applied to the circuit. (7M+8M)

2. a) Explain the basic principle of operation of a DC generator. What are the various types of generators? How they are classified? Draw their circuit diagrams.
   b) A 6-pole, lap wound armature has 840 conductors and flux per pole of 0.018 Wb. Calculate the emf generated when the machine is running at 600 rpm. (8M+7M)

3. a) What are the various losses in a transformer? Derive a condition for maximum efficiency of the transformer.
   b) A 11000/400 V distribution transformer takes a no load primary current of 1 A at a power factor of 0.24 lagging. Find: i) Core loss current ii) magnetizing current iii) Iron loss (7M+8M)

4. a) Describe the principle of operation of a 3- phase induction motor. Derive the relation between stator supply frequency and rotor induced E.M.F. frequency.
   b) How voltage regulation by synchronous impedance method is calculated? (10M+5M)

PART-B

5. a) Draw and explain the V-I characteristics of a PN junction diode?
   b) Draw the circuit diagram of full wave rectifier and explain its working principle and derive the rms value of the output voltage? (7M+8M)

6. a) Explain how a transistor acts as an amplifier?
   b) Draw and explain V-I characteristics of the SCR? (7M+8M)

7. a) What is induction heating? Explain how it works?
   b) Discuss ultrasonic generation and its application (7M+8M)

8. a) Explain the principle of thermo couple?
   b) Explain the principle of strain gauge? (7M+8M)

Code No: R21013 **R10** SET - 2

II B. Tech I Semester Regular Examinations, March – 2014
ELECTRICAL AND ELECTRONICS ENGINEERING
(Com. to CE, ME, CHEM, PE, AME, MM)

Time: 3 hours Max. Marks: 75

All Questions carry **Equal** Marks
Note: Answer any FIVE Questions, not exceeding Three Question from any one part

PART-A

1. a) A coil takes 4 A 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) Derive the relationship between the star- delta transformations of a network? (7M+8M)

2. a) Derive the expression for the torque developed by a DC motor.
   b) A 200 V shunt motor develops 23 hp when taking 20.2 kW. The field resistance is 50 ohms and armature resistance 0.06 ohm. What is the efficiency and power input when the output is 10 hp? (7M+8M)

3. a) 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 (b) magnetizing component of no-load current, iron loss and maximum value of the flux in the core. Assume primary winding turns as 500.
   b) Derive the emf equation of the Single Phase Transformer. (8M+7M)

4. a) Discuss the principle of operation of Induction motor and draw the torque speed characteristics of a 3- phase induction motor.
   b) Define regulation in alternators and give the expression in synchronous impedance method (7M+8M)

PART-B

5. Draw the circuit for half wave rectifier and explain its operation? Derive the equation for rms value of the out voltage and average value of the output voltage. (15M)

6. a) Draw the circuit and explain the operation of single stage CE amplifier.
   b) Explain the necessary conditions for oscillators. (7M+8M)

7. a) What is Induction heating? Explain its application to industries.
   b) What is the principle of dielectric heating and its applications (8M+7M)

8. Write a short note on the following:
   a) Thermocouples
   b) CRO
   c) Digital multi meters (5M+5M+5M)

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Code No: R21013 **R10** SET - 3

II B. Tech I Semester Regular Examinations, March – 2014
ELECTRICAL AND ELECTRONICS ENGINEERING
(Com. to CE, ME, CHEM, PE, AME, MM)

Time: 3 hours Max. Marks: 75

All Questions carry **Equal** Marks
Note: Answer any FIVE Questions, not exceeding Three Question from any one part

PART-A

1. a) State and explain Kirchhoff's laws with relevant circuit diagram.
   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. (7M+8M)

2. a) Draw a neat sketch of 3 point starter used for a DC motor and explain the protective devices provided in it.
   b) A 100 kW, 500 V, 750 rpm, D.C shunt generator, connected to constant voltage bus bars, has field and armature resistances of 100Ω and 0.1Ω respectively, and delivers full load. If the prime mover fails, and the machine continues to run taking 50 A from the bus- bars, calculate its speed. Neglect brush drop and armature reaction effect. (7M+8M)

3. a) The primary and secondary windings of a 1- phase 500 kVA transformer have resistances of 0.42 Ω and 0.0019 Ω respectively. The primary and secondary voltages are 11000 V and 415 V respectively and the core loss is 2.9 kW. Assuming the power factor of the load to be 0.8 lagging, calculate the efficiency on full load.
   b) Explain the various losses in a transformer. (10M+5M)

4. Explain how the regulation determined by conducting Synchronous Impedance Method in the laboratory on a synchronous machine. (15M)

PART-B

5. a) Compare half wave and full wave rectifiers.
   b) What is the dynamic characteristic of a diode? How do you obtain it from the static characteristic? (7M+8M)

6. a) Compare the working of PNP and NPN transistors?
   b) Give the physical arrangement of a PNP transistor and discuss how it provides current amplification. (7M+8M)

7. Describe the features of dielectric heating and Induction heating. (15M)

8. a) Draw the schematic diagram of CRO and about each part in detail.
   b) What is a transducer and write its applications (10M+5M)

Code No: R21013 **R10** SET - 4

II B. Tech I Semester Regular Examinations, March – 2014
ELECTRICAL AND ELECTRONICS ENGINEERING
(Com. to CE, ME, CHEM, PE, AME, MM)

Time: 3 hours Max. Marks: 75

All Questions carry **Equal** Marks
Note: Answer any FIVE Questions, not exceeding Three Question from any one part

PART-A

1. a) A parallel combination of 4 ohm resistor and 8 ohm resistor is connected in series with a 4 ohm resistor. The circuit is connected across 24 Volts dc supply. Find the current through each resistor and voltage drop across each one.
   b) Explain how to determine the impedance of an inductive circuit? (7M+8M)

2. a) A 4- pole shunt generator with wave connected armature having shunt field and armature resistance of 50 and 0.1 ohm respectively, supplies 2.4 kW at 100 V. Calculate the total armature current, the current per armature path and the generated emf. Assume brush drop 1 volt per brush.
   b) Derive the emf equation of a DC generator? (8M+7M)

3. a) Explain the operation of a transformer and sketch phasor diagram on no- load.
   b) A 6600/220 V single phase, 50 Hz core type transformer has an effective cross section of 0.05 m^2 and maximum flux density is 1.2 Wb/m^2. Calculate the number of turns on the HV and LV sides. (7M+8M)

4. a) Describe the principle of operation of Induction motor and discuss the some of its applications.
   b) Obtain the expression for emf equation in alternators. (8M+7M)

PART-B

5. a) Discuss the working principle and applications of PN Junction Diode.
   b) Derive the equation for rms and average values of the output voltage wave form of a bridge rectifier. (7M+8M)

6. a) With the help of necessary graphs and sketches explain about SCR characteristics and its applications.
   b) Discuss the working of Feedback amplifier (10M+5M)

7. a) Discuss dielectric heating and explain its applications clearly?
   b) List out applications of ultrasonics. (10M+5M)

8. a) Discuss the working of CRO and explain its applications.
   b) Discuss the working of LVDT. (8M+7M)

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Code No: R21016 **R10** SET - 1

II B. Tech I Semester Regular Examinations, March – 2014
MATHEMATICS - III
(Com. to CE, CHEM, BT, PE)

Time: 3 hours Max. Marks: 75

Answer any FIVE Questions
All Questions carry Equal Marks
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1. a) Prove that $\int_0^1 x\, J_n(m_1 x)\, J_n(m_2 x)\, dx = 0,\ m_1 \neq m_2$.

   b) Using the generating functions of Legendre polynomials, prove that
   $(2n+1)x\, P_n = (n+1)\, p_{n+1}(x) + n\, P_{n-1}(x)$. (8M+7M)

2. a) State the necessary conditions for analyticity of a function $f(z)$.

   Show that the function $f(z) = u + iv$, where

   $$f(z) = \frac{x^3(1+i) - y^3(1-i)}{x^2 + y^2}, \quad z \neq 0;$$
   $$= 0, \qquad z = 0$$

   satisfy the Cauchy-Riemann conditions at z = 0. Is the function analytic at z = 0? Justify your answer.

   b) If $u(x,y) = (x-1)^3 + xy^2 + 3y^2$, determine $v(x,y)$ so that $u + iv$ is a regular function of $x + iy$.
   (8M+7M)

3. a) Find all the roots of $\tan z = 2$.

   b) If $\cos h\,(u + iv) = x + iy$, prove that $\frac{x^2}{\cosh^2 u} + \frac{y^2}{\sinh^2 u} = 1$ and $\frac{x^2}{\cos^2 v} - \frac{y^2}{\sin^2 v} = 1$.
   (8M+7M)

4. a) Evaluate $\int_0^{3+i} z^2 dz$ along i) the line $y = x/3$ ii) along the curve $x = 3y^2$, does the integration depend upon the path?

   b) Evaluate the integral $\int_C \frac{\sin^2 z}{\left(z - \frac{\pi}{6}\right)^3} dz$, where C is the circle $|z| = 1$. (8M+7M)
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5. a) Expand $f(z)=\frac{1}{(z-1)(z-2)}$ in the region $|z|<1$. Also name the series so obtained.

   b) Find the nature and location of the singularities of the function $f(z)=\frac{e^{2z}}{(z-1)^4}$ by finding its Laurent's series expansion. (8M+7M)

6. State Residue theorem. Evaluate the residues at the poles of the function $f(z)=\frac{1}{z^4+a^4}$. Hence evaluate the integral $\int_0^\infty \frac{dx}{x^4+a^4}$, $a>0$ using suitable contour. (15M)

7. a) State and prove Argument Principle.

   b) Use Rouche's theorem to show that the equation $f(z)=z^5+15z+1=0$ has one root in the disc |z|<3/2 and four roots in the annulus $\frac{3}{2}<|z|<2$. (8M+7M)

8. a) Find the mapping of x-axis under the transformation $w=\frac{i-z}{i+z}$ onto the w - plane.

   b) Define bilinear transformation. Find the bilinear transformation that maps the points $z_1=-i,\ z_2=0,\ z_3=i$ into the points $w_1=-1,\ w_2=i,\ w_3=2$, respectively. (8M+7M)

Code No: R21016 **R10** SET - 2

II B. Tech I Semester Regular Examinations, March – 2014
MATHEMATICS - III
(Com. to CE, CHEM, BT, PE)

Time: 3 hours Max. Marks: 75

Answer any FIVE Questions
All Questions carry Equal Marks
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1. a) Show that $\frac{d}{dx}(xJ_nJ_{n+1}) = x(J_n^2 - J_{n+1}^2)$

   b) Prove that $\int_{-1}^{+1}[P_n(x)]^2 dx = \frac{2}{2n+1}$. (8M+7M)

2. a) Define analyticity of a function. Show that the function defined by $f(z) = \sqrt{|xy|}$ is not analytic at the origin although the C-R equations are satisfied at that point.

   b) Prove that $u = x^2 - y^2$ and $v = \frac{y}{x^2 + y^2}$ are harmonic functions of x and y, but are not harmonic conjugates. (8M+7M)

3. a) Find the modulus and principle value of the argument of $\frac{(1+i\sqrt{3})^{13}}{(\sqrt{3}-i)^{11}}$.

   b) Separate the real and imaginary parts of the function $\sinh(x + iy)$. (8M+7M)

4. State and prove Cauchy's Integral Formula. Use it to evaluate the integral

   $\int_C \frac{e^{2z}}{(z-1)^2(z-3)} dz$ where C is the circle $|z| = 4$. (15M)
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5. a) Represent the function $f(z)=\dfrac{3z+4}{z(z-3)(z+2)}$ in Laurent series in the annular region between $|z|=2$ and $|z|=3$.

   b) Find the singularities of the function $f(z)=\dfrac{\cot \pi z}{(z-a)^2}$ indicating the character of each singularity. (8M+7M)

6. State Residues theorem. Prove by calculus of residues $\int_0^{\infty} \dfrac{\cos mx\, dx}{(a^2+x^2)}=\dfrac{\pi}{2a}e^{-ma}$. (15M)

7. a) If $a>e$, then prove with the help of Rouche's theorem that the equation $e^z=az^n$ has n roots inside the circle $|z|=1$.

   b) If $f(z)$ is analytic within and on a closed contour C except at a finite number of poles and is not zero on C, then $\dfrac{1}{2\pi i}\int_C \dfrac{f'(z)}{f(z)}=N-P$, where N is the number of zeros and P is the number of poles inside . (8M+7M)

8. a) Find the image of the semi-infinite strip $x>0,\ 0<y<1$, under the transformation $w=iz+1$.

   b) Define bilinear transformation. Find the bilinear transformation that maps the points $z_1=2,\ z_2=i, z_3=-2$ into the points $w_1=1,\quad w_2=i,\ w_3=-1$, respectively. (8M+7M)

Code No: R21016 **R10** SET - 3

II B. Tech I Semester Regular Examinations, March – 2014
MATHEMATICS - III
(Com. to CE, CHEM, BT, PE)

Time: 3 hours Max. Marks: 75

Answer any FIVE Questions
All Questions carry Equal Marks
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1. a) Prove Rodriguez' formula $P_n(x)=\frac{1}{2^n n!}\frac{d^n}{dx^n}(x^2-1)^n$. Hence derive Legendre polynomials of first three orders.

   b) Prove that $\frac{d}{dx}\left(x^n J_n(x)\right)=x^n J_{n-1}(x)$ (8M+7M)

2. a) Discuss the analyticity of the function $f(z)=z\,\bar{z}$

   b) If $u+v=\frac{2\sin 2x}{e^{2y}+e^{-2y}-2\cos 2x}$ and $f(z)=u+iv$ is an analytic function of z, then find $f(z)$ in terms of z. (8M+7M)

3. a) Separate the real and imaginary parts of $\tanh(x+iy)$.

   b) Find the general value of i^i. (8M+7M)

4. a) State and prove Cauchy theorem.

   b) Evaluate the integral $\int_C \frac{z-1}{(z+1)^2(z-2)}dz$, where C is $|z-i|=2$. (8M+7M)

5. a) Explain zeros and singularities of an analytic function. What type of singularities does the function $f(z)=(z-a)\sin\left(\frac{1}{z-a}\right)$ have?.

   b) Find the Laurant series expansion of $f(z)=\frac{7z-2}{z^s-z^2-2z}$ in the region given by $|z+1|<1$. Write down the principal part in the series. (8M+7M)
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6. a) Find the residue at the singular points of the function $f(z)=\dfrac{1-e^{2z}}{z^4}$.

   b) Using suitable contour, evaluate the real integral $\int_0^{\infty} \dfrac{\cos 3x}{(x^2+1)(x^2+4)}dx$ (8M+7M)

7. a) If $f(z)$ is analytic within and on a closed contour C except at a finite number of poles and is not zero on C, then $\dfrac{1}{2\pi i}\int_C \dfrac{f'(z)}{f(z)} = N - P$, where N is the number of zeros and P is the number of poles inside C.

   b) State Rouche's theorem. Using it prove that all the roots of $z^7 - 5z^3 + 12 = 0$ lie between the circles $|z| = 1$ *and* $|z| = 2$. (8M+7M)

8. a) For the conformal transformation $w = z^2$, show that the circle $|z-1| = 1$ transforms into the cardioids $R = 2(1+\cos\phi)$, where $w = Re^{i\phi}$ in the w plane.

   b) Find the bilinear transformation that maps the points $z_1 = 2,\ z_2 = i,\ z_3 = -2$ into the points $w_1 = 1,\ w_2 = i,\ w_3 = -1$, respectively. What are its critical points? (8M+7M)

Code No: R21016 **R10** SET - 4

II B. Tech I Semester Regular Examinations, March – 2014
MATHEMATICS - III
(Com. to CE, CHEM, BT, PE)

Time: 3 hours Max. Marks: 75

Answer any FIVE Questions
All Questions carry Equal Marks
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1. a) Using generating functions of Legendre's polynomials, prove that
$nP_n(x) = xP_n'(x) - P_{n-1}'(x)$
b) Prove that $\int_0^1 xJ_n(ax)J_n(\beta x)dx = 0.$ (8M+7M)

2. a) State the necessary condition for analyticity of function $f(z)$.
If $f(z) = \frac{x^2y^5(x+iy)}{x^4+y^{10}}, z \neq 0, f(0) = 0,$ then show that $f(z)$ is not analytic at origin although Cauchy-Riemann equations are satisfied there.
b) If $f(z) = u(r,\theta) + iv(r,\theta)$ be an analytic function and given that $v = \left(r - \frac{1}{r}\right)\sin\theta,$ then find $f(z)$ in terms of z. (8M+7M)

3. a) Prove that the real part of the principal value of $i^{\log(1+i)}$ is equal to $e^{-\pi^2/8}\cos\left(\frac{\pi}{4}\log 2\right).$
b) Find all the roots of $\sin z = 2.$ (8M+7M)

4. a) i) State Cauchy integral theorem.
ii) Find the value of the integral $\int_C (x+y)\,dx + x^2 ydy$ along $y = x^2$ having (0,0) and(3,9) as end points.
b) Evaluate $\int_C \frac{z}{z^2+1}dz$ over the circular path $C: |z+i| = 1.$ (8M+7M)
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5. a) Obtain the expression for $f(z)=\frac{1}{z^2-3z+2}$ which are valid in the region $1<|z|<2$. Also name the series thus obtained.

   b) Obtain the nature and location of singularities of the function $f(z)=\frac{z-\sin z}{z^2}$. (8M+7M)

6. a) Compute the residue of $f(z)=\frac{z^2-z+1}{z^4+10z^2+9}$ at $z=3i$.

   b) Use contour integration to evaluate the real integral $\int_0^\infty \frac{\sin mx}{1+x^2}dx$ (8M+7M)

7. a) State and prove the fundamental theorem of algebra.

   b) Prove that the polynomial $f(z)=z^5+z^3+2z+3$ has just one zero in the first quadrant of the complex plane. (8M+7M)

8. a) Find the image of $|z-2i|=2$ under the mapping $w=\frac{1}{z}$.

   b) What do you mean by bilinear transformation? Find the bilinear transformation that maps the points $z=1,i,-1$ into the points $w=1,0,-i$, respectively. Hence find the image of $|z|<1$. (8M+7M)

Code No: R21011 **R10** SET - 1

II B. Tech I Semester Regular Examinations, March – 2014
MECHANICS OF MATERIALS
(Civil Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Four forces of magnitude P, 2P, 5.196P and 4P are acting at a point O. The angles made by these forces with x-axis are 0^0, 60^0, 150^0 and 300^0 respectively. Find the magnitude and direction of the resultant force.
   b) Four forces of magnitude 10 kN, 20 kN, 30 kN and 40 kN are acting respectively along the four sides of a square ABCD as shown in Figure 1. Determine: i) the resultant force, line of action and its direction. ii) Determine the resultant moment about point A. (7M+8M)

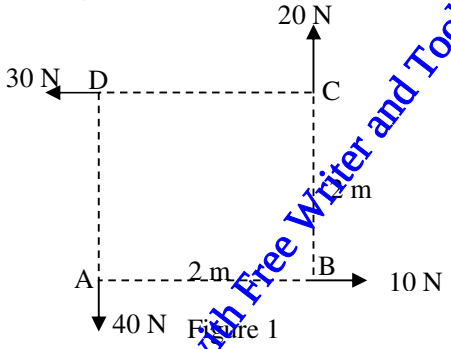

Figure 1

2. a) A ladder 5 m long and of 250 N weight is placed against a vertical wall in a position where its inclination to the vertical is 30^0. A man weighing 800 N climbs the ladder. At what position will he induce slipping? The coefficient of friction for both the contact surfaces of the ladder viz. with the wall and the floor is 0.2.
   b) Two locomotives on opposite banks of a canal pull a vessel moving parallel to the banks by means of two horizontal ropes. The tensions in the ropes are 2000 N and 2400 N while angle between them is 60^0. Find the resultant pull on the vessel and the angle between each of the ropes and the sides of the canal. (8M+7M)

3. a) Show that the maximum power can be transmitted at $\tau_{max} = 3\,\tau_c$
   b) A shaft rotating at 200 r.p.m drives another shaft at 300 r.p.m and transmits 6KW through a belt, the belt is 100mm wide and 10mm thick. The distance between the shafts is 4000mm the smaller pulley is 500mm in diameter. Calculate the stress in,
   (i) Open - belt and (ii) Crossed belt. Take μ = 0.3. Neglect centrifugal tension. (7M+8M)

4. a) Find out the mass moment inertia of a right circular cone of base radius, **R,** and mass, **M,** bout the axis of the cone.
   b) Find the moment of inertia about the horizontal centriodal axis of shaded portion for the Figure 2. (8M+7M)

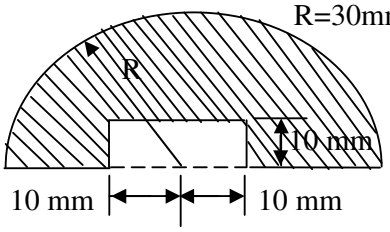

Figure 2
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5. a) Explain the terms:
   i) Modulus of elasticity *ii*) Modulus of rigidity and *iii*) Bulk modulus.
   b) Show that in a compound bar of length *L*, when temperature increases by *t*, the force *'P'* developed is given by

$$\frac{PL}{A_1E_1}+\frac{PL}{A_2E_2}=(a_1-a_2)tL$$

   Where A_1, A_2–Cross-sectional areas of bar 1 and bar 2 respectively
   E_1, E_2–Young's moduli of bar 1 and bar 2 respectively and α_1 and α_2 are coefficient of thermal expansion of bars 1 and 2 respectively. (6M+9M)

6. Draw BM and SF diagrams for the beam shown in Figure 3, indicating the values at all salient points. (15M)

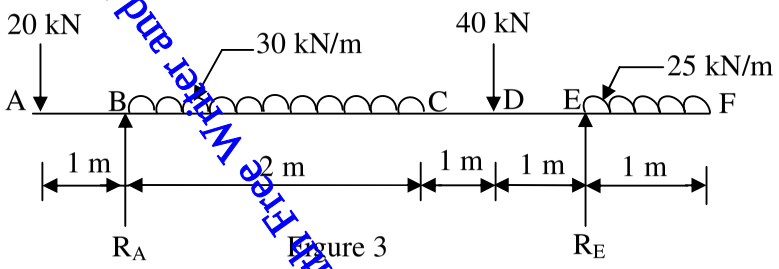

Figure 3

7. a) Compute the section modulus of rectangular section of dimensions ***b*** x ***d***.
   b) A simply supported beam of span 5.0 m has a cross-section 230 mm × 350 mm. If the permissible stress in the material of the beam is 10 N/mm^2, determine
   i) maximum uniformly distributed load it can carry
   ii) maximum concentrated load at a point 1 m from support it can carry.
   Neglect moment due to self weight. (6M+9M)

8. A beam has cross-section as shown in Figure 4. If the shear force acting on this is 150 kN, Draw the shear stress distribution diagram across the depth. (15M)

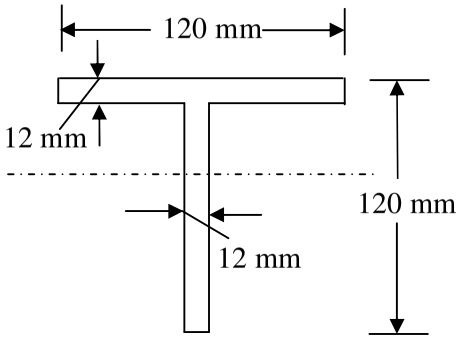

Figure 4

Code No: R21011 **R10** SET - 2

II B. Tech I Semester Regular Examinations, March – 2014
MECHANICS OF MATERIALS
(Civil Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. Find the resultant of the concurrent force system shown in Figure 1 which consists of the forces T = 500 N, P = 250 N and F = 800 N directed from D towards A, B and C respectively. (15M)

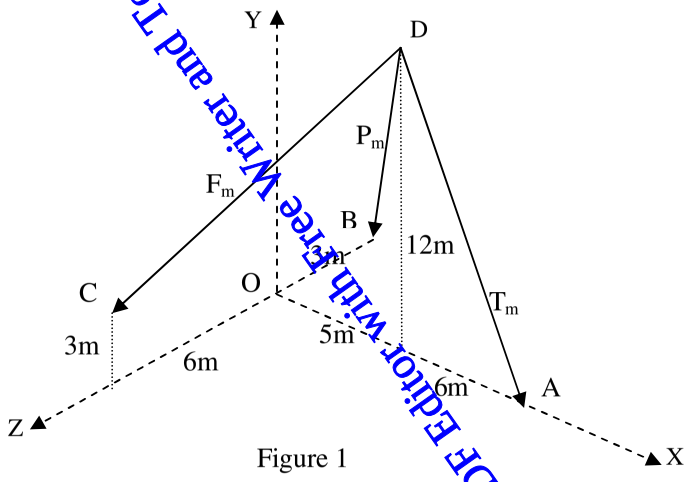

Figure 1

2. a) Explain the principles of operation of a screw-jack with a neat sketch.
   b) Outside diameter of a square threaded spindle of a screw Jack is 40mm. The screw pitch is 10mm. If the coefficient of friction between the screw and the nut is 0.15, neglecting friction between the nut and collar, determine
      i) Force required to be applied at the screw to raise a load of 2000N
      ii) The efficiency of screw jack
      iii) Force required to be applied at pitch radius to lower the same load of 2000N
      iv) Efficiency while lowering the load
      v) What should be the pitch for the maximum efficiency of the screw and what should be the value of the maximum efficiency. (6M+9M)

3. A leather belt is required to transmit 9kW from a pulley 1200 mm in diameter running at 200 r.p.m The angle embraced is 1650 and the coefficient of friction between leather belt and pulley is 0.3. If the safe working stress for the leather belt is 1.4N/mm^2 the weight of leather is 1000Kg/m^3 and the thickness of the belt is 10mm, determine the width of the belt taking the centrifugal tension in to account. (15M)
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4. a) Determine the volume generated by the shaded area as shown in Figure 2 about X –axis

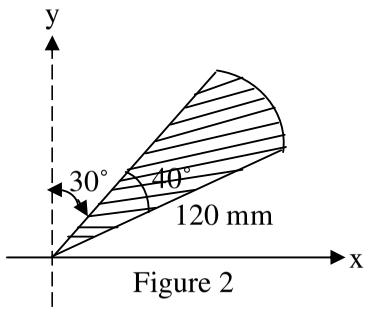

Figure 2

b) Show that the moment of inertia of a thin circular ring of mass 'M' and mean radius R with respect to its geometric axis is MR^2. (7M+8M)

5. a) If the Poisson's ratio of a material is 0.3 and its young's modulus is 2.1×10^5 N/mm^2. What is the value of shear modulus?

b) A steel rod of 20 mm diameter passes centrally through a tight copper tube of external diameter 40 mm. The tube is closed with the help of the rigid washers of negligible thickness and nuts threaded on the rod. The nuts are tightened till the compressive load on the tube is 50kN. Determine the stresses in the rod and the tube, when the temperature of the assembly falls by 50^0C. Take E_s = 200 GN/mm^2, E_c = 100 GN/mm^2, $\alpha_s = 12 \times 10^{-6}$ per ^{0}C, $\alpha_c = 18 \times 10^{-6}$ per ^{0}C. (6M+9M)

6. The simply supported beam AD is subjected to a uniform load over the segment BC together with a concentrated force applied at C as shown in Fig.3 Draw Shear force and bending moment diagram and indicate the values at salient points. (15M)

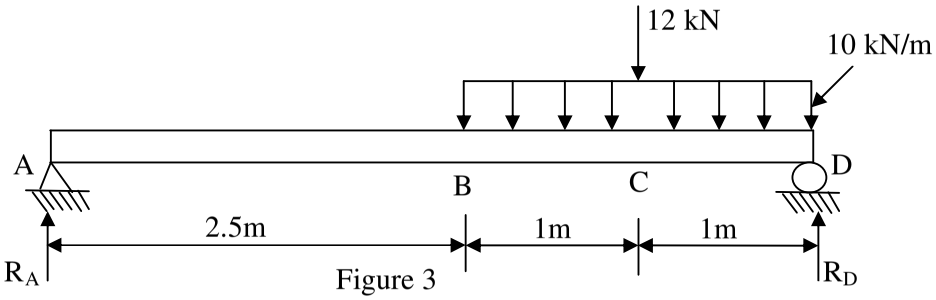

Figure 3

7. The cross-section of a cast iron beam is as shown in Figure 4. The top flange is in compression and bottom flange is in tension. Permissible stress in tension is 30 N/mm^2 and its value in compression is 90 N/mm^2. What is the maximum uniformly distributed load the beam can carry over a simply supported span of 5 m? (15M)

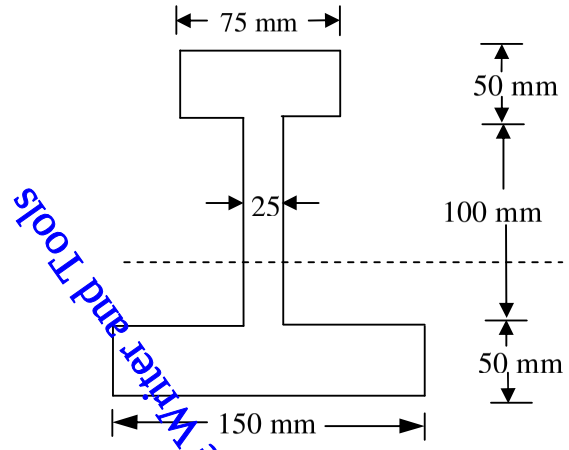

Figure 4

8. A ***I***-Section has flanges of size 200 × 12 mm and its overall depth is 360 mm. The thickness of the web is also 12 mm. It is used as a simply supported beam over a span of 4 m to carry a load of 60 kN/m over its entire span. Draw the variation of bending and shearing stresses across the depth. (15M)

Code No: R21011 **R10** SET - 3

II B. Tech I Semester Regular Examinations, March – 2014
MECHANICS OF MATERIALS
(Civil Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Three identical cylinders, each of weighing W, are staked as shown in Figure 1, on smooth inclined surfaces, each inclined at an angle, 'θ' with the horizontal. Determine the smallest angle 'θ' to prevent stack from collapsing.
   b) The boom of crane is shown in Figure 2, if the weight of the boom is negligible compared with the load W = 60 kN, find the compression in the boom and also limiting value of tension 'T' when the boom approaches the vertical position. (7M+8M)

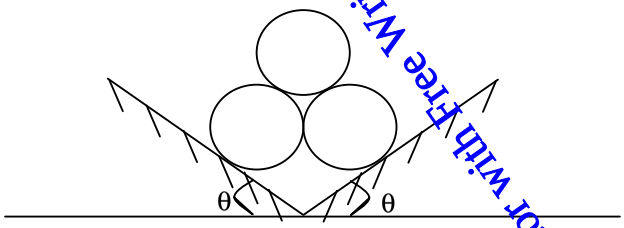

Figure 1

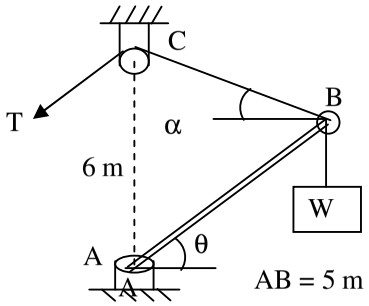

Figure 2

2. a) Find the least horizontal force 'P' to start motion of any part of the system of three blocks resting upon one another as shown in figure 3. The weights of the blocks are A =300N, B = 1000 N, C = 2000 N. Between A and B, μ = 0.3, between B and C, μ = 0.2 and between C and the ground μ = 0.1.
   b) Define the following terms
   i) Friction; ii) Angle of friction; iii) Cone of Friction
   c) What are the characteristic of friction? (6M+6M+3M)

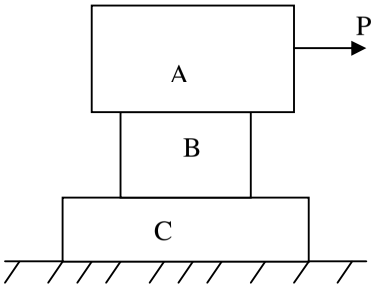

Figure 3
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3. a) Distinguish between quarter turn and compound belt drives.
   b) Determine the maximum power that can transmitted using a belt of 100 mm × 10 mm with an angle of lap of 1600 . The density of belt is 1000kg/m^3 and coefficient of friction may be taken as 0.25. The tension in the belt should not exceed 1.5N/mm^2. (6M+9M)

4. a) A thin plate of mass 'm' is cut in the shape of a parallelogram of thickness, 't' as shown in Figure 4. Determine the mass moment of inertia of the plate about the x-axis.
   b) Determine the centriod for a semicircular arc about its diameteral base. (7M+8M)

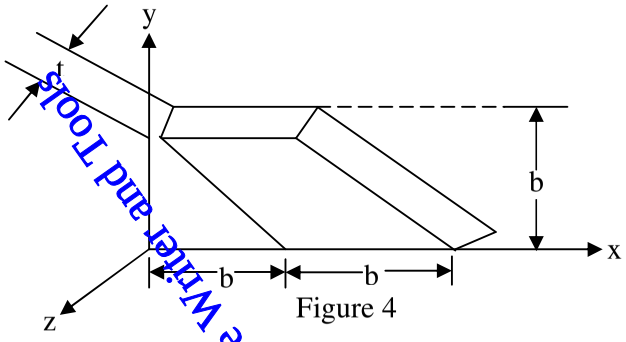


Figure 4

5. a) A bar of uniform thickness '***t***' tapers uniformly from a width ***b1*** at one end to ***b2*** at the other end in a length ***L.*** Find the expression for its extension under an axial pull *P*.
   b) Tension test was conducted on a specimen and the following readings were recorded.
   Diameter = 25 mm
   Gauge length of extensometer = 200 mm
   Least count of extensometer = 0.001 mm
   At a load of 30 kN, extensometer reading = 60
   At a load of 50 kN, extensometer reading = 100
   Yield load = 160 kN
   Maximum load = 205 kN
   Diameter neck = 17 mm
   Final extension over 125 mm original length = 150 mm
   Find Young's Modulus, yield stress, ultimate stress, percentage elongation and percentage reduction in area. (7M+8M)

6. The Beam AC is simply supported at A and C and subjected to the uniformly distributed load of 300 N/m plus the couple of magnitude 2700 N-m as shown in Figure 5 Write equations for shearing force and bending moment and make plots of these equations. (15M)

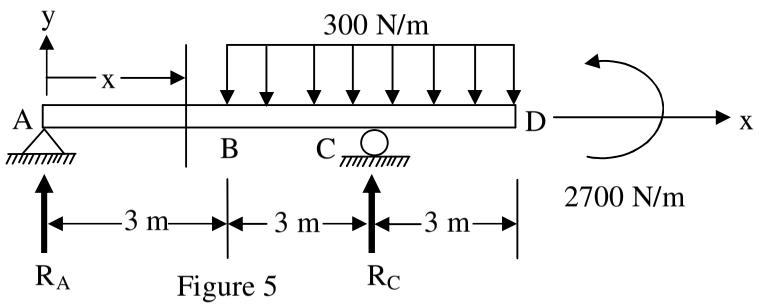


Figure 5

7. The cross-section of a cast iron beam is as shown in Figure 6. The top flange is in compression and bottom flange is in tension. Permissible stress in tension is 30 N/mm^2 and its value in compression is 90 N/mm^2. What is the maximum uniformly distributed load the beam can carry over a simply supported span of 5 m? (15M)

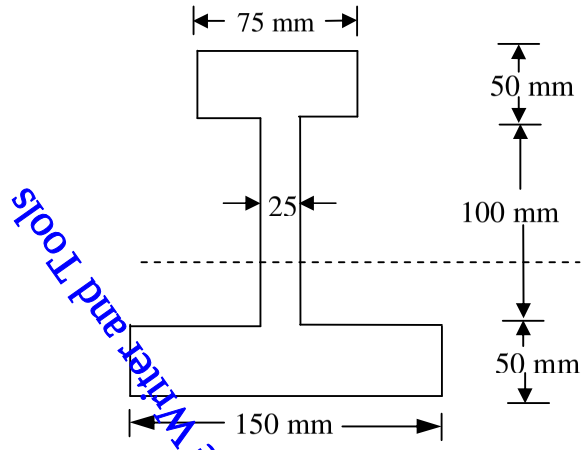
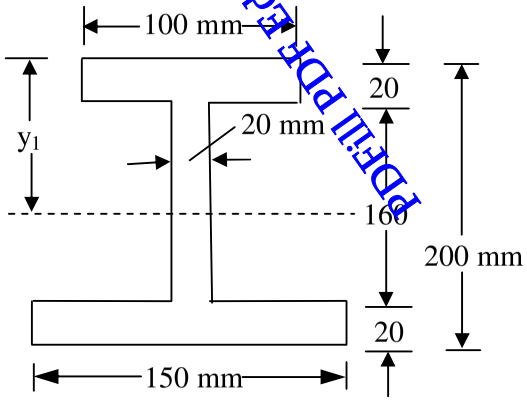


Figure 6

8. The unsymmetrical ***I***-section shown in Figure 7 Is the cross section of a beam, which is subjected to a hear force of 60 kN. Draw the shear stress variation diagram across the depth. (15M)



(a)

Figure 7

Code No: R21011 **R10** SET - 4

II B. Tech I Semester Regular Examinations, March – 2014
MECHANICS OF MATERIALS
(Civil Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) A tripod consists of three bars joined at D as shown in Fig.1. Find the component of force F along the direction T and the angle between F & T.
   b) Compute the horizontal component and its direction from X axis of resultant force of the force system T = 400 N, P = 200 N and F = 650 N directed from D towards A,B and C respectively acting as shown in Figure 1. (8M+7M)

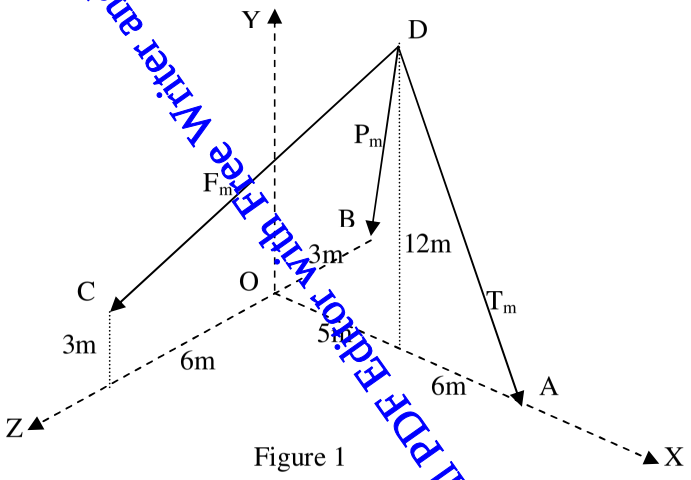

Figure 1

2. Two smooth ball bearings each of weight 'w' and radius 'r' are placed inside a cylindrical open at both ends. The assembly rests on a horizontal surface as shown in Figure 2. If the cylinder is of weight 'W' and radius R < 2r, find: a) the force exerted by either ball bearing on the cylinder, b) the smallest value of W that will prevent the cylinder from tipping over c) could the cylinder possibly tip if it were closed at the bottom? (15M)

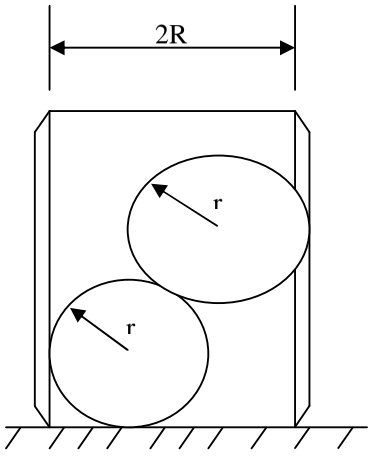

Figure 2
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3. a) Deduce an expression for centrifugal tension of belt drive.
   b) The maximum allowed tension in a belt is 1500 N. The angle of lap is 170^0 and coefficient of friction between the belt and material of the pulley is 0.27. Neglecting the effect of centrifugal tension, calculate the net driving tension and power transmitted if the belt speed is 2 m/s. (7M+8M)

4. a) Determine the product of inertia of shaded area as shown in Figure 3 about the x-y axis.
   b) Define mass moment of inertia and explain Transfer formula for mass moments of inertia. (7M+8M)

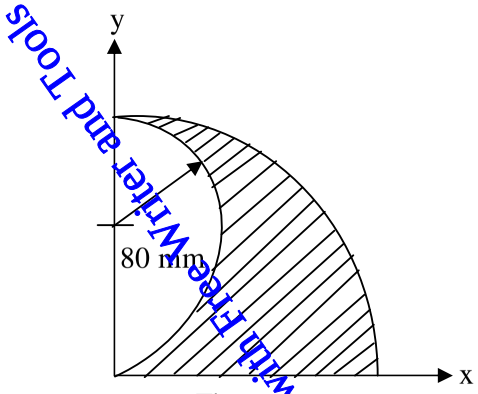

Figure 3

5. a) A tapering rod has diameter d_1 at one end and it tapers uniformly to a diameter $d2$ at the other end in a length L. If the modulus of elasticity is E, find the change in length when subjected to an axial force P.
   b) Derive the relationship between
   i) Modulus of elasticity and modulus of rigidity
   ii) Modulus of elasticity and bulk modulus. (7M+8M)

6. Draw the bending moment and shear force diagram for the beam loaded as shown in Figure 4. Mark the values at the salient points. Determine the point of contraflexure also. (15M)

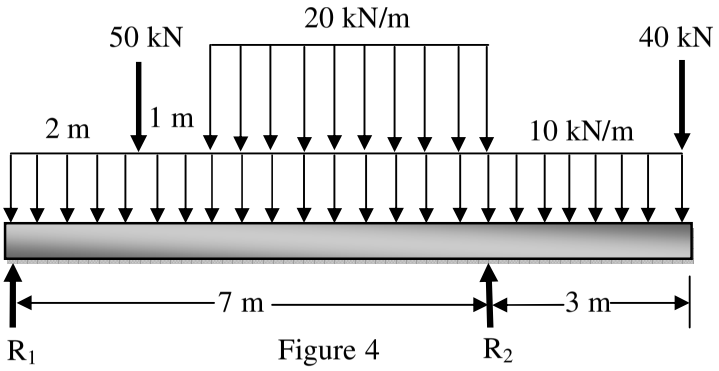

Figure 4

7. A symmetric I-section of size 200mm × 500mm, 15 mm thick is strengthened with 300mm ×20 mm rectangular plate on top flange as shown is Figure 5. If permissible stress in the material is 150 N/mm^2, determine how much concentrated load the beam of this section can carry at centre of 6 m span. Given ends of beam are simply supported. (15M)

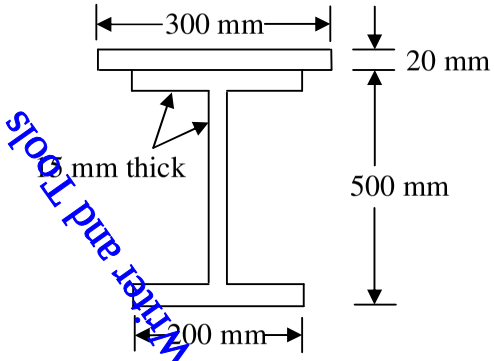

Figure 5

8. a) Derive the expression for shear stress distribution of a rectangular section.
   b) For a circular section of a diameter D. determine formula of shear stress at a distance 'a' from neutral axis at a section of a beam where shearing force is F. Hence find the ratio of shear stresses, q_{max} to $q_{average}$. (7M+8M)

Code No: R21015/R10 **Set No. 1**

II B.Tech I Semester Regular Examinations, March 2014
SURVEYING
(Comm to CE,PE)

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

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) a) Explain clearly the points of difference between the prismatic compass and Surveyor's compass.
   (b) What are the sources of errors in compass Surveying and what precautions are to be taken to eliminate them. [8+7]

2. (a) Explain the different methods of plotting a compass traverse.
   (b) The following are the bearings of a closed traverse. Find out which of the stations are affected by local attraction. Tabulate the corrected bearings of lines. [8+7]

Line	F.B	B.B
AB	$N50^0 30'W$	$S49^0 30'E$
BC	$N54^0 00'E$	$S53^0 00'W$
CD	$S3^0 30'E$	$N4^0 00'W$
DE	$S41^0 30'E$	$N41^0 30'W$
EA	$S79^0 30'W$	$N78^0 00'E$

3. (a) Describe the test for the adjustments of level tube giving neat sketches.
   (b) Give the desired relation, object and necessity of the adjustment of level tube [9+6]

4. The following observations were made with a planimeter placing the anchor point outside the fig. in both cases with the same setting of tracing arm [15]

	Area	Imtial reading	Final reading	N
(a)	Known area of 600 sg cm	2.326	8.286	0
(b)	Unknown area	8.286	5.220	+1

   (a) Calculate the multiplier constant and
   (b) the unknown area.

5. What are the different errors in Theodolite work? How are they eliminated? [15]

6. (a) What is tacheometry? What are different systems of tacheometric measurements?
   (b) A tacheometer was set up at an intermediate point on a line AB and the following observations were made on a vertically held staff:

Staff at	Vertical angle	Central hair reading (m)	Staff interval (m)
A	$+9^0 45'$	1.910	2.300
B	$+5^0 30'$	1.750	2.105

The instrument is fitted with an analytic lens and the multiplying constant is 100. Determine the length AB and R.L. of B if the R.L. of A is 150.50m. [6+9]

7. (a) What are the elements of a simple circular curve. Give their relationships.
   (b) Two roads meet an angle of $127^0 30'$. Calculate the necessary data for setting out a curve of 15 chains radius to connect two straight portions of the road if it is intended to set out the curve by chain and offsets only. Take length of chain as 30m [8+7]

8. (a) How the Geographic Information System is different from traditional cartography?
   (b) What is the difference between Raster Data & Vector Data in the context of GIS? How do you convert raster data into vector data? [7+8]

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Code No: R21015/R10 **Set No. 2**

II B.Tech I Semester Regular Examinations, March 2014
SURVEYING
(Comm to CE,PE)

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

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) List out the different accessories of plane table Surveying. Also explain the purpose for which they are used.
   (b) State Three point problem in plane Table Surveying and describe how it is solved by Bessel's method. [8+7]

2. (a) Define Dip, Magnetic Declination, Azimuth, Isogonic Lines.
   (b) The following bearings are observed with a compass. Where do you suspect local attraction. Find the correct bearings. [8+7]

Line	F.B	B.B
AB	$74^o00'$	$254^o00'$
BC	$91^o00'$	$271^o00'$
CD	$166^o00'$	$343^o00'$
DE	$177^o00'$	$0^o00'$
EA	$189^o00'$	$9^o00'$

3. (a) Describe the two peg test for the adjustment of line of collimation.
   (b) What is the desired relation and necessity of the above adjustment? [9+6]

4. What is Simpsons rule? Derive an expression for it. How does it compare with other rules. [15]

5. A closed traverse was conducted round an obstacle and the following observations were made. Work out the missing quantities: [15]

Side	Length (m)	Azimuth
AB	500	$98^0 30'$
BC	620	$30^0 20'$
CD	468	$298^0 30'$
DE	?	$230^0 0'$
EA	?	$150^0 10'$

6. A tacheometer is set up on a bench mark of R.L. 60.00m. The horizontal axis of the instrument is 1.240m above the bench mark. The following observations were made with staff held vertically:

Staff station	Vertical angle	Stadia hair reading	Central hair reading
A	$+3^0 30'$	0.400 1.660	1.030
B	$-8^0 20'$	0.900 1.640	1.270
C	$+9^0 50'$	1.00 2.320	1.660

If the instrument constants k and c are 100 and 0.0m, respectively, determine the R.L. of the staff stations. [15]

7. (a) What are the usual difficulties in ranging simple curves and how are they obviated.
   (b) Calculate the ordinates from a 150m long chord at 10m interval to set out a simple circular curve of 8^0 [8+7]

8. (a) What are the components of a GIS and give a brief account of them?
   (b) Give an account of sources of GIS Data.
   (c) What are the Spatial data models accounted in GIS and describe of each model? [7+4+4]

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Code No: R21015/R10 **Set No. 3**

II B.Tech I Semester Regular Examinations, March 2014
SURVEYING
(Comm to CE,PE)

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

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Draw a neat sketch of a prismatic compass and explain it in detail.
   (b) Explain bearing. What are different systems of designation of bearings. Explain. [8+7]

2. (a) Explain the procedure of chaining. How will you record the measurements of Chain Survey. Enumerate the points to be kept in view while booking the field notes.
   (b) A Survey line BAC crosses a river, A and C being on the near and opposite banks respectively. A perpendicular AD 40m long is set out at A. If the bearings of AD and DC are $78^0\ 45^1$ and $278^0\ 45^1$ respectively and the chainage at A is 862m. find the chainage at C. [8+7]

3. The following consecutive readings were taken on a continuously sloping ground at a common interval of 20m: .385, 1.034, 1.925, 2.825, 3.730, 4.685, 0.625, 2.005, 3.110, 4.485m. If the R.L of first point was 208.125. Calculate the R.L of the points by the rise and fall method. Also find the gradient of the line joining first and last points. [15]

4. The following observations were made with a planimeter placing the anchor point outside the fig. in both cases with the same setting of tracing arm [15]

	Area	Imtial reading	Final reading	N
(a)	Known area of 600 sg cm	2.326	8.286	0
(b)	Unknown area	8.286	5.220	+1

   (a) Calculate the multiplier constant and
   (b) the unknown area.

5. Discuss various methods of traversing by fast needle. What are the merits and demerits of different methods? [15]

6. Two observations are taken upon a vertical staff by means of a Theodolite. For the first, the line of sight is directed to give a staff reading of 0.880m and an angle of elevation of $4^0 08'$. In the second case, the staff reading is 3.340m and the angle of elevation is $5^0 30'$. If the elevation of trunnion axis of the instrument is 195.60m, compute the R.L. of the staff station and its horizontal distance from the instrument. [15]

7. (a) Describe the method of setting out a simple circular curve by the method of deflection angles, using a chain and Theodolite.

(b) Calculate the ordinates from the long chord at 7.5m interval to set out a simple circular curve of 10^0. The length of long chord is 100m. [8+7]

8. (a) How the Geographic Information System is different from traditional cartography?

(b) What is the difference between Raster Data & Vector Data in the context of GIS? How do you convert raster data into vector data? [7+8]

⋆ ⋆ ⋆ ⋆ ⋆

Code No: R21015/R10 **Set No. 4**

II B.Tech I Semester Regular Examinations, March 2014
SURVEYING
(Comm to CE,PE)

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Give a detailed classification of Surveys.
   (b) A line 3.2 km long is measured with a steel tape which is 20m under no pull at 30^{o}C. The tape in section is 1/8 cm wide and 1/20 cm thick. If one half of the line is measured at a temparature of 40$^o c$ and the other half at 50^{o}C and the tape is attached to a pull of 200N, find the corrected total length of the line given the coefficient of expansion is 11.5×10^{-6} per degree C, weight of tape per Cubic cm of steel = 0.77504N, and $E = 2.1 \times 10^5 N/mm^2$. [7+8]

2. (a) Explain compensating and cumulative errors in chain Surveying.
   (b) What are the Survey stations. How will you select them.
   (c) A Survey line CD intersects a high building. To prolong the line beyond this obstacle, a perpendicular DE, 200m long is set out at D. From E, two lines EF and EG are set out at angles of 45^0 and 60^0 with ED respectively. Determine the length of EF and EG in order that the points F and G may lie on the prolongation of CD, and also find the obstructed length DF. [6+4+5]

3. The following readings were taken with a dumpy level. If the R.L of station A =560.500 m, find the H.I and the R.Ls of all other stations. Check your results.[15]

Section	B-S	I.S	F.S
A	0.865		
B	1.025		2.105
C		1.580	
D	2.230		1.865
E	2.355		2.825
F			1.760

4. With the help of neat sketches explain briefly the theory of "planimeter" covering zero circle, Multiplier constant and instrument constant. [15]

5. Differentiate between Bowditch's rule and the transit rule for the adjustment of a traverse. Explain both the methods of adjustment. [15]

6. (a) What are the advantages of tacheometric surveying over other methods?
   (b) Determine the distance between the instrument station P and the staff station Q from the following data:
   R.L. of the instrument axis =200.150 m
   Vertical angle=-3^{0}45'
   Staff readings= 1.450; 0.900; 0.350 m

Also determine the R.L of Q
Take k=100 and C=0.0 [6+9]

7. (a) What are the elements of a simple circular curve. Give their relationships.
   (b) Two roads meet an angle of $127^0 30'$. Calculate the necessary data for setting out a curve of 15 chains radius to connect two straight portions of the road if it is intended to set out the curve by chain and offsets only. Take length of chain as 30m [8+7]

8. (a) What are the components of a GIS and give a brief account of them?
   (b) Give an account of sources of GIS Data.
   (c) What are the Spatial data models accounted in GIS and describe of each model? [7+4+4]

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