

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016**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 about Elasticity (3M)
- b) Explain the Concept of shear force (4M)
- c) What is bending stress (4M)
- d) Draw Shear stress distribution for circular section (4M)
- e) Define Mohr's theorem (4M)
- f) What is Thin cylinder? (3M)

PART -B

2. A hollow cylinder 2 m long has an outside diameter of 50 mm and inside diameter of 30 mm. If the cylinder is carrying a load of 25 kN, find the stress in the cylinder. Also find the deformation of the cylinder, if the value of modulus of elasticity for the cylinder material is 100 GPa. (16M)
3. a) Define the following : (6M)
 - i) Bending Moment.
 - ii) Shear force.
 - iii) Point of contraflexure.
- b) A cantilever beam of length 2m carries an uniformly distributed load of 3KN/m over a length of 1.5m from its fixed end and a point load 5 KN at its free end. Draw the shear force and bending moment diagrams. (10M)
4. Obtain the shear stress distribution for a rectangular cross section 230X40mm subjected to a shear force of 40KN. Calculate the maximum and average shear stress. (16M)
5. a) What is moment area method? Explain the two Mohr's theorems, as applicable to the slope and deflection of a beam. (8M)
- b) A cantilever of uniform cross-section of length l carries two point loads, W at the free end and 2W at a distance a from the free end. Find the maximum deflection due to this loading. (8M)



6. a) Derive an expression for the deflection of a simply supported beam subjected to uniformly distributed load using integration method. (8M)
- b) A rectangular R.C simply supported beam of length 2m and cross section 100mmX200mm is carrying a uniformly distributed load of 10KN/m through its span. Find the maximum slope and deflection. Take $F = 2 \times 10^4 \text{N/mm}^2$ (8M)
7. A thin cylinder 75 mm internal diameter, 250 mm long with walls 2.5 mm thick is subjected to an internal pressure of 7 MN/m². Determine the change in internal diameter and the change in length. If, in addition to the internal pressure, the cylinder is subjected to a torque of 200 N m, find the magnitude and nature of the principal stresses set up in the cylinder. $E = 200 \text{ GN/m}^2$. $\nu = 0.3$ (16M)



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PART -A

1. a) Define Resilience (3M)
- b) What is Point of contraflexure (4M)
- c) Write section modulus of circular sections (4M)
- d) Explain about shear centre. (4M)
- e) Write the formula of slope for cantilever beam subjected to UDL? (4M)
- f) Define Thick cylinder? (3M)

PART -B

2. An aluminum bar 60mm diameter when subjected to an axial tensile load 100KN elongates 0.20mm in a gauge length 300mm and the diameter is decreased by 0.012mm. Calculate the Modulus of elasticity and the poisson's ratio of the material. (16M)
3. A simply supported beam 6 m long is carrying a uniformly distributed load of 5 kN/m over a length of 3 m from the right end. Draw shear force and bending moment diagrams for the beam and also calculate the maximum bending moment on the beam. (16M)
4. a) Prove that for a rectangular section the maximum shear stress is 1.5times the average stress. Sketch the variation of shear stress. (8M)
- b) A timber beam 120m wide and 185mm deep supports a u.d.l of intensity w KN/m length over a span of 2.7m. If the safe stresses are 29Mpa in bending and 3Mpa in shear, calculate the safe intensity of the load which can be supported by the beam. (8M)
5. a) What is moment area method? Explain the two Mohr's theorems, as applicable to the slope and deflection of a beam. (8M)
- b) A cantilever of uniform cross-section of length l carries two point loads, W at the free end and 2W at a distance a from the free end. Find the maximum deflection due to this loading. (8M)
6. Compare the values of maximum and minimum hoop stresses for a cast steel cylindrical shell of 600mm external diameter and 400mm internal diameter subjected to a pressure of 30N/mm² applied internally and externally (16M)
7. Derive the formula for the thickness of the thin cylindrical shell and solve the following problem. A thin cylindrical shell of 1 m diameter is subjected to an internal pressure of 1 N/mm². Calculate the suitable thickness of the shell, if the tensile strength of the plate is 400 N/mm² and factor of safety is 4 (16M)



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**PART -A**

1. a) What is Hooke's law (3M)
- b) Explain the Concept of bending moment (3M)
- c) Write section modulus of circular sections (4M)
- d) Draw Shear stress distribution for rectangular section (4M)
- e) Define Volumetric strains (4M)
- f) Write the formula of slope for Simply supported beam subjected to UDL? (4M)

**PART -B**

2. a) Derive relation between three elastic moduli. (8M)
- b) Draw stress - strain diagram for mild steel. Indicate salient points and define them. (8M)
3. a) Devise the relations among loading, shear force and bending moment in a beam. (8M)
- b) A cantilever beam AB span 6m is subjected to a uniformly varying load of 8 kN/m intensity at the fixed end A and zero at the free end B. draw SFD and BMD. (8M)
4. Two wooden planks 150mm x 50mm each are connected to form a T- section of a beam. If a moment of 3.4KN-m is applied around the horizontal neutral axis, inducing tension below the neutral axis, find the stresses at extreme fibres of the cross-section. Also calculate the total tensile force on the cross-section. (16M)
5. a) Prove that for a rectangular section the maximum shear stress is 1.5times the average stress. Sketch the variation of shear stress (8M)
- b) A rolled steel joist of I section has top flange 90 mm x 20 mm bottom flange 170 mm x 20 mm and web of size 220 mm x 20 mm. It is used as a simply supported beam over a span of 5m to carry a u.d.l. of 65kN/m over its entire span. Obtain the shear stress values at salient points and sketch the variation of shear stress. (8M)



6. A simply supported beam of span 3 m is subjected to a central load of 10 kN. Find the maximum slope and deflection of the beam. Take  $I = 12 (10)^6 \text{ mm}^4$  and  $E = 200 \text{ GPa}$ . (16M)
7. a) Derive the equations for the circumferential and longitudinal stresses in a thin cylindrical shell. (8M)
- b) A thin cylinder of 300mm internal diameter, 3 m long and made from 3 mm thick metal, has its ends blanked off. Working from first principles, except that you may use the equations derived above, find the change in capacity of this cylinder when an internal fluid pressure of 20 bar is applied.  $E = 200 \text{ GN/m}^2$ ;  $\nu = 0.3$ . (8M)

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**PART -A**

1. a) Define Factor of safety (3M)
- b) What are the different types of beams (3M)
- c) Write section modulus of rectangular sections (4M)
- d) Draw Shear stress distribution for Triangular section (4M)
- e) What is Hoop stress (4M)
- f) Write the formula of deflection for Simply supported beam subjected to UDL? (4M)

**PART -B**

2. a) An aluminium bar 60mm diameter when subjected to an axial tensile load 100KN elongates 0.20mm in a guage length 300mm and the diameter is decreased by 0.012mm. Calculate the modulus of elasticity and the poisson's ratio of the material. (8M)
- b) Explain about composite bars and Temperature stresses. (8M)
3. a) Circular beam of 120mm diameter is subjected to a shear force of 7KN. Calculate i) Average shear stress. ii) Maximum shear stress. (8M)  
 Also sketch the variation of the shear stress along the depth of the beam.
- b) From first principles derive the expression for shear stress at any point in any cross-section of a beam which is subjected to a shear force F. (8M)
4. a) A cantilever of length 2.8 m fails when a load of 4.7 kN is applied at the free end. If the section of the beam is 65 × 105 mm find the stress at failure. (8M)
- b) A T-beam having flange 210× 20 mm and web 250 × 20 mm is simply supported over a span of 5 m. It carries a u.d.l of 8.8kN/m over its entire span. Calculate the maximum compressive and tensile stress occurring in the section. What is the magnitude of flexural stress at the junction of flange and web? Draw the variation of stress across the section. (8M)



5. A beam of 6m length simply supported at ends A & B is loaded with two point loads of 60 KN and 50 KN at distance 1m and 3m respectively from end A. Determine the deflection under each load and the position and magnitude of maximum deflection in the beam. take  $E = 2 \times 10^5 \text{ N/mm}^2$  and  $I = 8500 \times 10^4 \text{ cm}^4$ . (16M)
6. Derive a formula for the difference of radii for shrinkage of a compound thick cylindrical shell (16M)
7. a) Explain why 'wire wound their cylinders' are more efficient than 'ordinary thin cylinders'. (8M)
- b) A seamless pipe of 1m diameter is carrying a fluid under a pressure of 10  $\text{N/mm}^2$ . Calculate the necessary thickness of the pipe, if the maximum allowable stress in the pipe material is  $100 \text{ N/mm}^2$ . (8M)

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**II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016**  
**COMPLEX VARIABLES AND STATISTICAL METHODS**  
 (Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 70

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

1. a) Show that  $w = z^n$  ( $n$ , a positive integer) is analytic and find its derivative (4M)
- b) Evaluate  $\int_0^{2+i} z^2 dz$  along the real axis to 2 and then vertically to  $(2+i)$  (3M)
- c) Find the residue of  $f(z) = \cot z$  at each pole. (4M)
- d) Find the image of the region  $x > 1$  under  $w = 1/z$  (3M)
- e) Calculate a 99% confidence interval for the true mean weight loss if 16 persons on diet control after one month had a mean weight loss of 3.42 kgs with S.D of 0.68kgs. (4M)
- f) Experience had shown that 20% of a manufactured product is of the top quality. In one day's production of 400 articles only 50 are of top quality. Test the hypothesis at 0.05 level. (4M)

**PART -B**

2. a) Show that the function  $f(z) = \sqrt{|xy|}$  is not analytic at the origin, although Cauchy-Riemann equations are satisfied at the point. (8M)
- b) Show that  $u(x, y) = x^3 - 3xy^2$  is harmonic and find its harmonic conjugate and corresponding analytic function  $f(z)$  in terms of  $z$ . (8M)
3. a) Evaluate using Cauchy's integral formula. (8M)  

$$\int_C \frac{z^3 e^{-z}}{(z-1)^3} dz$$
 where  $C$  is  $|z-1| = \frac{1}{2}$
- b) Expand the Laurent series of  $\frac{z^2 - 1}{(z+2)(z+1)}$  for (i)  $1 < |z| < 2$  (ii)  $|z| > 2$  (8M)



4. a) Evaluate  $\int_0^{\infty} \frac{\cos x}{(1+x^2)^2} dx$  (8M)
- b) Show that  $\int_0^{\pi} \frac{d\theta}{(a+b\cos\theta)^2} = \frac{\pi a}{(a^2-b^2)^2}, a > b > 0.$  (8M)
5. a) Determine the Bilinear transformation which maps  $z = 0, -i, 2i$  into  $w = 5i, \infty, -i/3$  (8M)
- b) Prove that the transformation  $w = \sin z$  maps the families of lines  $x = \text{constant}$  and  $y = \text{constant}$  into two families of confocal central conics. (8M)
6. a) If a random variable has the standard normal distribution, find the probability that will take on value (i) Less than 1.75, (ii) greater than 2.06 (iii) lies between 1.22 and 2.43 (iv) greater than 2.43 (8M)
- b) Samples of size 2 are taken from the population 4,8,12,16,20,24 without replacement. Find (i) Mean of the sampling distribution of means (8M)  
(ii) The standard deviation of the sampling distribution of means
7. a) Sample of students were drawn from two universities and from their weights in kilograms, mean and standard deviations are calculated and shown below. Make a large sample test to test the significance of the difference between the means at 5% level of significance. (8M)

|              | Mean | S.D | Size of Sample |
|--------------|------|-----|----------------|
| University A | 55   | 10  | 400            |
| University B | 57   | 15  | 100            |

- b) In a one sample of 10 observations the sum of squares of deviations from mean was 90 and other sample of 12 observations it was 108. Test whether the difference is significant at 5% level of significance. (8M)

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**PART -A**

1. a) Verify whether  $f(z) = z^2$  is analytic or not (4M)
- b) Evaluate  $\int_0^{2+i} z^2 dz$  along the imaginary axis to  $i$  and then horizontally to  $2+i$  (3M)
- c) Find the residue of (4M)  

$$f(z) = \frac{z^2 - 2z}{(z+1)^2(z^2 + 1)} \text{ at } z = i$$
- d) Find the fixed point of  $w = \frac{2i - 6z}{iz - 3}$  (3M)
- e) A random sample of 400 items is found to have mean 82 and S.D of 18. Find the maximum error of estimation at 95% confidence interval (4M)
- f) If 80 patients are treated with an antibiotic 59 got cured. Test at 99% confidence limits to the true population of cure is 50%. (4M)

**PART -B**

2. a) If  $f(z)$  is a regular function of  $z$ , prove that  $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right)|f(z)|^2 = 4|f'(z)|^2$  (8M)
- b) Find the imaginary part whose real part is  $e^x(x \cos y - y \sin y)$  (8M)
3. a) Using Cauchy's integral formula, evaluate  $\int_c \frac{z}{(z-1)(z-2)^2} dz$  where (8M)  
 $c: |z-2| = \frac{1}{2}$
- b) Find Taylor's expansion of  $f(z) = \frac{2z^3 + 1}{z^2 + z}$  about the point (i)  $z = i$  (ii)  $z = 1$  (8M)



4. a) Show that  $\int_0^{\pi} \frac{\cos 2\theta}{1-2a\cos\theta+a^2} d\theta = \frac{\pi a^2}{1-a^2}$ , ( $a^2 < 1$ ) (8M)
- b) Evaluate  $\int_0^{\infty} \frac{\cos mx}{(x^2+a^2)^2} dx$  By residue theorem (8M)
5. a) Find the bilinear transformation that maps the points  $(\infty, i, 0)$  into the points  $(0, i, \infty)$  (8M)
- b) Find the image of the triangle with vertices  $i, 1+i, 1-i$  in the  $z$ -plane under the transformation  $w=3z+4-2i$ . (8M)
6. a) Samples of size 2 are taken from the population 3, 6.9, 15, 27 with replacement. (8M)  
Find i) Mean of the sampling distribution of means  
ii) The standard deviation of the sampling distribution of means
- b) Determine the expected member of random sample having their means (8M)  
(i) between 22.39 and 22.41 (ii) Greater than 22.42  
(iii) less than 22.47 for population size  $(N)=1500$ , sample size  $(n)=36$ , standard deviation of the population is 0.48 and population mean  $(\mu) = 22.4$
7. a) The means of two large samples of sizes 1000 and 2000 members are 67.5 inches and 68.0 inches respectively. Can the samples be regarded as drawn from the same population of S.D 2.5 inches? (8M)
- b) From the following data, find whether there is any significant liking in the habit of taking soft drinks among the categories of employees at 5% level of significance (8M)

| Soft drinks | Clerks | Teachers | officers |
|-------------|--------|----------|----------|
| Pepsi       | 10     | 25       | 65       |
| Thump up    | 15     | 30       | 65       |
| Fanta       | 50     | 60       | 30       |

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**PART -A**

1. a) Show that both real and imaginary parts of an analytic functions are harmonic (4M)
- b) Evaluate  $\int_0^{3+i} z^2 dz$  along the line  $x = 3y^2$  (3M)
- c) Find the residue of  $\frac{Ze^z}{(Z-1)^3}$  at its pole. (4M)
- d) Find the image of the domain in the z-plane to the lines  $x = -3$  under the transformation  $w = z^2$ . (3M)
- e) A random sample of size 81 was taken whose variance is 20.25 and means is 32, construct 98% confidence interval (4M)
- f) A sample of 26 bulbs gives a mean life of 990 hrs with S.D of 20hrs. The manufacturer claims that the mean life of bulbs 1000 hrs. Is the sample not up to the standard at 5% level? (4M)

**PART -B**

2. a) If  $f(z) = u + iv$  is analytic and  $v = \frac{2 \sin x \sin y}{\cos 2x + \cosh 2y}$ , find u. (8M)
- b) Show that  $\left( \frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} \right) \log |f'(z)| = 0$ , where  $f(z)$  is analytic function. (8M)
3. a) Evaluate  $\int_c \frac{z+4}{z^2+2z+5} dz$  where c is the circle i)  $|z+1-i|=2$  ii)  $|z+1+i|=2$  (8M)
- b) Expand  $f(z) = \frac{1}{(z-1)(z-2)}$  in the region (i)  $|z|<1$  (ii)  $1<|z|<2$  (iii)  $|z|>2$ . (8M)



4. a) Evaluate  $\int_0^{\infty} \frac{dx}{x^6+1}$ . Using Residue theorem (8M)
- b) Evaluate  $\int_0^{2\pi} \frac{1}{(5-3\cos\theta)^2} d\theta$  Using Residue theorem (8M)
5. a) Under the transformation  $w = \frac{1}{z}$  find the image of the circle  $|z-2i|=2$ . (8M)
- b) Find the bilinear transformation whose fixed points are 1, 1 and maps 0 to -1 (8M)
6. a) The mean of certain 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. (8M)
- b) Of a large group of mean 5% are under 60 inches in height and 40% are between 60 and 65 inches. Assuming a normal distribution, find the mean height and standard deviation. (8M)
7. a) A cigarette manufacturing firm claims that brand A line of cigarettes outsells its brand B by 8% .if it is found that 42 out of a sample of 200 smokers prefer brand A and 18 out of another sample of 100 smokers prefer brand B. Test whether 8% difference is a valid claim. (8M)
- b) A die is thrown 264 times with the following results .show that the die is unbiased (8M)

|                    |    |    |    |    |    |    |
|--------------------|----|----|----|----|----|----|
| No appeared on die | 1  | 2  | 3  | 4  | 5  | 6  |
| Frequency          | 40 | 32 | 28 | 58 | 54 | 52 |

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**PART -A**

1. a) Prove that an analytic function with constant real part is constant (4M)
- b) Evaluate  $\int_0^{3+i} z^2 dz$  along the line  $y = \frac{x}{3}$  (3M)
- c) Find the residue of  $f(z) = \frac{z^2 - 2z}{(z+1)^2(z^2 + 1)}$  at  $Z = -1$  (4M)
- d) Find the image of the straight line  $x = c$  under the transformation  $w = 4/z$  (3M)
- e) Define unbiased estimator and Show that  $x/n$  is an unbiased estimator of binomial parameter  $p$  (4M)
- f) A sample of 11 rats from a central population had an average blood Viscosity of 3.92 with a S.D of 0.61. Test for the mean blood Viscosity of the population is 3.5 with 5% level of significance (4M)

**PART -B**

2. a) Find an analytic function whose real part is  $v e^{-x}(x \sin y - y \cos y)$ . (8M)
- b) Show that for the function  $f(z) = \begin{cases} \frac{z^5}{|z|^4}, & z \neq 0 \\ 0, & z = 0 \end{cases}$  Cauchy- Riemann equation are satisfied at  $z = 0$ , but  $f(z)$  is not differentiable at 0. (8M)
3. a) Evaluate  $\int_C \frac{e^z}{(z^2 + \pi^2)^2} dz$  where C is  $|z| = 4$ . Using Cauchy's integral formula (8M)
- b) Find the Laurent series expansion of the function  $f(z) = \frac{z^2 - 6z - 1}{(z-1)(z-3)(z+2)}$  in the region  $3 < |z+3| < 5$ . (8M)



4. a) Evaluate  $\int_0^{2\pi} \frac{\cos 2\theta}{(5+4\cos\theta)} d\theta$  Using Residue theorem (8M)

b) Evaluate  $\int_0^{\infty} \frac{\cos x}{(1+x^2)^2} dx$  Using Residue theorem (8M)

5. a) Show that the transformation  $w = \frac{5-4z}{4z-2}$  maps the unit circle  $|z|=1$  into a circle of radius unity and center  $\frac{-1}{2}$  (8M)

b) Determine the bilinear transformation that maps the points  $(1-2i, 2+i, 2+3i)$ , into the points  $(2+i, 1+3i, 4)$  (8M)

6. a) A population consists of six numbers 4,8,12,16,20,24 consider all samples of size two. Which can be drawn without placement from this population? Find  
i) The mean of the sampling distribution of means.  
ii) The standard deviation of the sampling distribution of means (8M)

b) Find the mean and standard deviation of a normal distribution in which 7% of items are under 35 and 89% are under 63. (8M)

7. a) In an investigation on machine performance the following results are obtained

|            | No. of units inspected | No. of defectives |
|------------|------------------------|-------------------|
| Machine I  | 375                    | 17                |
| Machine II | 450                    | 22                |

Test whether there is any significance performance of two machines at  $\alpha = 0.05$ .

b) The no. of automobile accidents per week in a certain area as follows: 12,8,20,2,14,10,15,6,9,4 . Are these frequencies in agreement with the belief that accidents were same in the during last 10 weeks. (8M)

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**II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016**  
**MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**  
 (Com. to ME, ECE, CSE, IT, ECC, MTE)

Time: 3 hours

Max. Marks: 70

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**PART -A**

1. a) Limitations of Law of Demand (4M)
- b) Properties of Iso-Quants(Iso-Product) Curves (4M)
- c) Features of Monopoly Competitions (3M)
- d) Features of Business Organization (4M)
- e) Dual Aspect Concept of Double Entry Book Keeping (3M)
- f) Features of Capital Budgeting Decisions (4M)

**PART -B**

2. a) What are the nature, characteristics, importance & scope of managerial economics? (8M)
- b) What is the importance of price elasticity and illustrate different models of price elasticity with suitable formulas and graphs? (8M)

3. a) What is law of variable proportions and identify the behavior of total physical product curve, average physical product curve and marginal physical product curve? (8M)
- b) Determine P/V Ratio %, Fixed Cost and BEP with the help of following Information: (8M)

| Description  | 2014-15 | 2015-16 |
|--------------|---------|---------|
| Sales(Rs.)   | 200000  | 1000000 |
| Profits(Rs.) | 25000   | 225000  |

4. a) Determine price & output for both firm & industry in both short run period and long run period under perfect competition? (8M)
- b) What are the different managerial theories of Firm? (8M)

5. a) Differentiate Private and Public Limited Companies in their features & merits? (8M)
- b) What is the importance of Business Cycle and what are the different phases of Business Cycles? (8M)

6. a) List out various Accounting Concepts and Conventions and illustrate any six of them? (8M)
- b) What is a Ratio, what are the different types ratios that prevail to assess the performance of various companies? (8M)

7. a) Differentiate traditional & DCF Techniques of capital budgeting techniques (8M)
- b) Determine Pay Back Period for the following projects: (8M)

| Year      | Initial Cost | Rs. In Lakhs |      |      |      |      |      |
|-----------|--------------|--------------|------|------|------|------|------|
|           |              | 2011         | 2012 | 2013 | 2014 | 2015 | 2015 |
| Project-X | 25.00        | 5.00         | 7.50 | 8.50 | 6.00 | 5.00 |      |
| Project-Y | 30.00        | 7.00         | 8.00 | 6.50 | 9.00 | 4.50 |      |

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 (Com. to ME, ECE, CSE, IT, ECC, MTE)

Time: 3 hours

Max. Marks: 70

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

**PART -A**

1. a) Factors Influencing Law of Demand (4M)
- b) Producers Equilibrium (3M)
- c) Features of Monopolistic Competitions (3M)
- d) Features of Partnership (4M)
- e) Debit and Credit Governing Rules for Real & Personal Accounts (4M)
- f) Merits of Pay Back Period (4M)

**PART -B**

2. a) What are the nature, characteristics, importance & scope of managerial economics? (8M)
- b) Illustrate income, advertisement, cross and price elasticities with suitable formulas and graphs? (8M)
3. a) What is producer's equilibrium and identify the behavior of Iso-product and Iso-Cost curves? (8M)
- b) Determine P/V Ratio %, Fixed Cost and BEP with the help of following (8M)

Information:

| Description  | 2014-15 | 2015-16 |
|--------------|---------|---------|
| Sales(Rs.)   | 500000  | 2000000 |
| Profits(Rs.) | 100000  | 600000  |

4. a) Determine price & output for both firm & industry in both short run period and long run period under monopoly competition? (8M)
- b) What are the objectives, situations, methods of pricing? (8M)



5. a) What are the features, merits and demerits of cooperative society? (8M)  
 b) What are the different phases of Business Cycles, how these concepts are correlated for industrial development? (8M)

6. a) Identify the recording process of Journal Entry in a systematic manner? (8M)

| Date       | Description                              | Amount Rs. |
|------------|------------------------------------------|------------|
| 01-07-2016 | Business Commenced with a cash           | 5,00,000   |
| 02-07-2016 | Deposited in Lokesh Bank Ltd             | 3,00,000   |
| 05-07-2016 | Goods Purchased from Heritage Ltd.       | 25,00,000  |
| 10-07-2016 | Sold Goods to Brahmani Ltd.              | 45,00,000  |
| 15-07-2016 | Salaries & Rent Paid                     | 3,00,000   |
| 21-07-2016 | Received a Bank Cheque From Brahmani Ltd | 30,00,000  |
| 30-07-2016 | Paid to Heritage Ltd.                    | 20,00,000  |
| 31-07-2016 | Paid Office Expenses                     | 1,00,000   |

- b) Compute Current Ratio and Quick Ratio. If Cash is Rs.1.50 Lakhs, ST Investments are Rs.2.50 Lakhs, Bank is Rs.8.50 Lakhs, Debtors is Rs.5.50 Lakhs, Creditors is Rs.3.50 Lakhs, Outstanding Expenses are Rs.2.50 Lakhs, Bills Receivables are Rs.5.50 Lakhs, Stock is Rs.8.00 Lakhs and Bills Payables are Rs.6.50 Lakhs,? (8M)

7. a) Differentiate Accounting Rate of Return(ARR) and Internal Rate of Return(IRR) techniques of capital budgeting? (8M)

- b) Determine Accounting Rate of Return for the following projects, assuming that the company follow straight line method of depreciation: (8M)

|           |              | Rs. In Lakhs |      |      |      |      |       |
|-----------|--------------|--------------|------|------|------|------|-------|
| Year      | Initial Cost | 2011         | 2012 | 2013 | 2014 | 2015 | Scrap |
| Project-X | 25.00        | 5.00         | 7.50 | 8.50 | 6.00 | 5.00 | 1.00  |
| Project-Y | 30.00        | 7.00         | 8.00 | 6.50 | 9.00 | 4.50 | 2.50  |

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**II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016**  
**MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**  
 (Com. to ME, ECE, CSE, IT, ECC, MTE)

Time: 3 hours

Max. Marks: 70

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

1. a) Characteristics of Managerial Economics (4M)
- b) Determine BEP if Fixed Cost is Rs.10.00 Lakhs, Contribution Margin Per Unit is Rs.20/- (4M)
- c) Features of Perfect Competitions (3M)
- d) Features of Public Sector Undertakings (4M)
- e) Find Inventory Turnover Ratio & Velocity if Sales is 20.00 Lakhs, Opening Stock is Rs. 3.00 Lakhs, Closing Stock is Rs. 5.00 Lakhs and Number of Days in a Year is 365. (4M)
- f) Demerits of Accounting Rate of Return (3M)

**PART-B**

2. a) What are the properties of demand curve and also identify different factors influencing demand? (8M)
- b) What are the objectives, types and methods of demand forecasting? (8M)
3. a) What are sources, reasons and types internal and external economies of scale ? (8M)
- b) Determine P/V Ratio %, Fixed Cost and BEP with the help of following (8M)

Information:

| Description  | 2014-15 | 2015-16 |
|--------------|---------|---------|
| Sales(Rs.)   | 1000000 | 4000000 |
| Profits(Rs.) | 200000  | 1200000 |

4. a) Determine price & output for both firm & industry in both short run period and long run period under monopolistic competition? (8M)
- b) What are the theories and methods of pricing? (8M)



5. a) What are the features, merits and demerits of Partnership form of business organization? (8M)
- b) What are the different phases of Business Cycles, identify recent trends of business cycles in Indian and its impact on industry? (8M)
6. a) Identify the recording process of Journal Entry in a systematic manner? (8M)

| Date       | Description                                      | Amount Rs. |
|------------|--------------------------------------------------|------------|
| 01-07-2016 | Business Commenced with a cash                   | 10,00,000  |
| 03-07-2016 | Deposited in Bhuvanewari Bank Ltd                | 8,00,000   |
| 08-07-2016 | Goods Purchased from Hindu Heritage Ltd.         | 50,00,000  |
| 12-07-2016 | Sold Goods to Amaravathi Infra Ltd.              | 75,00,000  |
| 18-07-2016 | Salaries & Rent Paid through bank                | 8,00,000   |
| 25-07-2016 | Received a Bank Cheque From Amaravathi Infra Ltd | 30,00,000  |
| 28-07-2016 | Paid to Hindu Heritage Ltd.                      | 25,00,000  |
| 31-07-2016 | Paid Office Expenses through bank                | 5,00,000   |

- b) Compute Current Ratio and Quick Ratio. If Cash is Rs.3.50 Lakhs, ST Investments are Rs.6.50 Lakhs, Bank is Rs.5.50 Lakhs, Debtors is Rs.7.50 Lakhs, Creditors is Rs.4.50 Lakhs, Outstanding Expenses are Rs.1.50 Lakhs, Bills Receivables are Rs.2.50 Lakhs, Stock is Rs.6.00 Lakhs and Bills Payables are Rs.8.50 Lakhs,? (8M)
7. a) Differentiate Net Present Value Methods, Profitability Index Method and Internal Rate of Return(IRR) technique of capital budgeting? (8M)
- b) Determine NPV & Profitability Index for the following project: (8M)

| Year      | Initial Cost | Rs. In Lakhs |       |       |       |       |       |
|-----------|--------------|--------------|-------|-------|-------|-------|-------|
|           |              | 2011         | 2012  | 2013  | 2014  | 2015  | Scrap |
| Project-Y | 30.00        | 7.00         | 8.00  | 6.50  | 9.00  | 4.50  | 2.50  |
| PV @ 10%  | 1.000        | 0.909        | 0.826 | 0.751 | 0.682 | 0.621 | 0.621 |

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**II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016**  
**MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**  
 (Com. to ME, ECE, CSE, IT, ECC, MTE)

Time: 3 hours

Max. Marks: 70

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

**PART -A**

1. a) Determine Price Elasticity with an Increase & Decrease by 20% if original Price is Rs.50/- and Quantity Demanded is 1000 Units (4M)
- b) Determine BEP if Fixed Cost is Rs.15.00 Lakhs, Contribution Ratio is 33.33% (3M)
- c) Differentiate Monopoly and Monopolistic Competitions (4M)
- d) Differentiate Private Limited and Public Limited Companies (3M)
- e) Find Debtors Turnover Ratio & Velocity if Sales is 20.00 Lakhs, Opening Balance of Debtors is Rs. 3.00 Lakhs, Closing Balance of Debtors is Rs. 5.00 Lakhs and Number of Days in a Year is 365. (4M)
- f) Steps in Working Capital Estimation (4M)

**PART -B**

2. a) What are the properties of demand curve and also identify different factors influencing demand? (8M)
- b) What are the objectives, types and methods of demand forecasting? (8M)
3. a) What are sources, reasons and types internal and external economies of scale ? (8M)
- b) Determine Margin of Safety for two periods and BEP with the help of following Information: (8M)

| Description  | 2014-15 | 2015-16 |
|--------------|---------|---------|
| Sales(Rs.)   | 2000000 | 8000000 |
| Profits(Rs.) | 500000  | 2000000 |

4. a) Differentiate very short period, short period, and long period markets? How price & output determined for increasing costs, constant costs and decreasing costs to industry? (8M)
- b) What are the different methods of pricing? How strategic pricing different from cost based pricing? (8M)
5. a) Compare features, merits and demerits of Departmental Undertakings to that of Public Corporations? (8M)
- b) How Business Cycles help market analysts to forecast new product development? (8M)



6. a) Identify the recording process of Journal Entry in a systematic manner? (8M)

| Date       | Description                              | Amount<br>Rs. |
|------------|------------------------------------------|---------------|
| 01-07-2016 | Business Commenced with a cash           | 5,00,000      |
| 05-07-2016 | Deposited in Bhuvanewari Bank Ltd        | 3,00,000      |
| 09-07-2016 | Goods Purchased from Hindu Heritage Ltd. | 25,00,000     |
| 14-07-2016 | Sold Goods to Amar Infra Ltd.            | 50,00,000     |
| 19-07-2016 | Salaries & Rent Paid through bank        | 6,00,000      |
| 23-07-2016 | Received a Cheque From Amar Infra Ltd    | 40,00,000     |
| 29-07-2016 | Paid to Hindu Heritage Ltd.              | 20,00,000     |
| 30-07-2016 | Draw Cash for Office Expenses            | 5,00,000      |

- b) Compute Inventory Turnover Ratio & Velocity and Debtors Turnover Ratio & Velocity, assuming there are 360 days in a year. (8M)

| Description                             | Rs. In<br>Lakhs |
|-----------------------------------------|-----------------|
| Opening Balance of Debtors              | 7.50            |
| Closing Balance of Debtors              | 4.50            |
| Opening Balance of Bills<br>Receivables | 2.50            |
| Closing Balance of Bills<br>Receivables | 1.50            |
| Sales(60% Credit)                       | 80.00           |
| Opening Balance of Stock                | 4.00            |
| Closing Balance of Stock                | 8.00            |
| Gross Profit                            | 25%             |

7. a) What is the nature & process of Capital Budgeting Decisions and what are its limitations? (8M)

- b) Determine Internal Rate of Return(IRR) for the following project: (8M)

| Year      | Initial Cost | Rs. In Lakhs |       |       |       |        |       |
|-----------|--------------|--------------|-------|-------|-------|--------|-------|
|           |              | 2011         | 2012  | 2013  | 2014  | 2015   | Scrap |
| Project-Y | 30.00        | 7.00         | 8.00  | 6.50  | 9.00  | 4.50   | 2.50  |
| PV @ 14%  | 1.000        | 0.877        | 0.769 | 0.675 | 0.592 | 0.5197 | 3.25  |

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

(Com. to CE, CHEM, BT, PE)

Time: 3 hours

Max. Marks: 75

Answer any FIVE Questions  
 All Questions carry Equal Marks

- ~~~~~
1. a) State and prove orthogonal property of Bessel's function (8M)  
 b) Express  $x - \frac{5}{3}x^3$  as Legendre's polynomial (7M)
  2. a) Find 'k' such that  $f(x, y) = x^3 + 3kxy^2$  is harmonic and find its harmonic conjugate (8M)  
 b) Prove that  $f(z) = \sin z$  is analytic everywhere in the complex plane and also find  $f'(z)$  (7M)
  3. a) Find all the roots of  $\cos z = \frac{1}{2}$  (8M)  
 b) Find real and imaginary parts of  $\tan z$  (7M)
  4. a) Evaluate  $\int_{(1,1)}^{(2,4)} z^2 dz$  along the parabola  $x = t, y = t^2$  (8M)  
 b) Evaluate  $\int_c \frac{z^2 - 1}{(z^2 + 1)} dz$  along  $c: |z - i| = 1$  (7M)
  5. a) Expand  $f(z) = \frac{z}{z^2 + 1}$  about  $|z - 3i| > 2$  by Laurent's series (8M)  
 b) Find the zeros and poles of (i)  $f(z) = e^{\tan z}$  (ii)  $f(z) = (z-1)^3$  (7M)
  6. a) Evaluate  $\int_c \frac{2z-1}{z(z+2)(2z+1)} dz$  around  $c: |z| = 2$  by Residue theorem (8M)  
 b) Evaluate  $\int_0^{2\pi} \frac{d\theta}{(a + b \cos \theta)}$  by Residue theorem (7M)
  7. a) State and prove Maximum Modulus principle. (8M)  
 b) Use Rouché's theorem, find the number of zero's of  $z^{10} - 6z^7 + 3z^3 + 1$  (7M)
  8. a) Discuss the transformation  $w = \cosh z$  (8M)  
 b) Find the image of the strip  $0 < y < \frac{1}{2}$  under the transformation  $w = 1/z$  (7M)

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

## ELECTRO MAGNETIC FIELDS

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions  
All Questions carry **Equal** Marks

- ~~~~~
1. a) State and describe the coulombs law with units. (8M)  
b) Calculate the total charge within each of the indicated volumes: (7M)  
(i)  $0.1 \leq |x|, |y|, |z| \leq 0.2$ ,  $\rho_v = \frac{1}{x^3 y^3 z^3}$  (ii)  $0 \leq \rho \leq 0.1$ ,  $0 \leq \Phi \leq \pi$ ,  $2 \leq z \leq 4$ ,  
 $\rho_v = \rho^2 z^2 \sin 0.6\Phi$ .
  2. a) Define the term electric dipole and hence derive the expression for electric field (8M)  
due to a dipole with its center located at origin.  
b) Find the magnitude of the current density in a sample of silver for which (7M)  
 $\sigma = 6.17 \times 10^7$  S/m and  $\mu_e = 0.0056$  m<sup>2</sup>/V.s if  
(i) the drift velocity is 1.5  $\mu$ m/s  
(ii) the electric field intensity is 1 mV/m.
  3. a) Derive the expression for capacitance of capacitor formed of two concentric (8M)  
spherical conducting shells.  
b) The surface  $x = 0$  separates two perfect dielectrics. For  $x > 0$  let  $\epsilon_{r1} = 3$ , while (7M)  
 $\epsilon_{r2} = 5$  where  $x < 0$ . If  $\mathbf{E}_1 = (80\mathbf{a}_x - 60\mathbf{a}_y - 30\mathbf{a}_z)$  V/m. Find  $\mathbf{D}_{N2}$ ,  $\mathbf{D}_{T2}$ ,  $\mathbf{D}_2$  and  $\mathbf{P}_2$ .
  4. a) Derive the expression for magnetic field due to an infinitely long straight filament (8M)  
carrying a direct current 'I' by using Biot – Savart's law.  
b) Compare electrostatic fields and magnetostatic fields. (7M)
  5. a) A current sheet  $\mathbf{K} = 8 \mathbf{a}_x$  A/m flows in the region  $-2 < y < 2$  in the plane  $z = 0$ . (8M)  
Calculate H at (0, 0, 3).  
b) A long, straight, non magnetic conductor of 0.2 mm radius carries a uniformly (7M)  
distributed current of 2 A dc. (i) Find  $\mathbf{J}$  within the conductor and  
(ii) Find  $\mathbf{H}$  and  $\mathbf{B}$  within and outside the conductor using Ampere's circuit law.
  6. a) Explain about force on moving charged particle due to magnetic field. (8M)  
b) The point charge  $Q = 18$  nC has a velocity of  $5 \times 10^6$  m/s in the direction of (7M)  
 $\mathbf{a}_v = 0.60\mathbf{a}_x + 0.75 \mathbf{a}_y + 0.30 \mathbf{a}_z$ , calculate the magnitude of the force exerted on the  
charge by the field: (i)  $\mathbf{B} = (-3\mathbf{a}_x + 4 \mathbf{a}_y + 6 \mathbf{a}_z)$  mT  
(ii)  $(\mathbf{E} = -3\mathbf{a}_x + 4 \mathbf{a}_y + 6 \mathbf{a}_z)$  kV/m  
(iii) B and E acting together.
  7. a) Describe the self inductance and mutual inductance. (8M)  
b) Given the magnetic vector potential  $\mathbf{A} = -\rho^2/4 \mathbf{a}_z$  Wb/m, calculate the total (7M)  
magnetic flux crossing the surface  $\Phi = \pi/2$ ,  $1 \leq \rho \leq 2$  m,  $0 \leq z \leq 5$  m.
  8. a) Explain the concept of displacement current. (8M)  
b) Within a certain region,  $\epsilon = 10^{-11}$  F/m and  $\mu = 10^{-5}$  H/m. (7M)  
If  $B_x = 2 \times 10^{-4} \cos 10^5 t \sin 10^{-3} y$  T, find  $\mathbf{E}$  using Maxwell equations.

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

**ELECTRO MAGNETIC FIELDS**  
(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions  
All Questions carry **Equal** Marks

- ~~~~~
1. a) Describe the Coulombs law in electrostatics and give the unit for each quantity  
b) Two point charges  $Q_1 = 6\text{nC}$  and  $Q_2 = -8\text{nC}$  are kept at  $(3, 0, 0)$  and  $(4, 0, 0)$ . Determine electric field at  $(2, -1, 1)$ .
  2. a) Discuss the behavior of conductors in electric field  
b) A dipole at the origin in free space has  $\vec{P} = 50\pi \epsilon_0 u_z \text{ C-m}$ . Determine  $V$  and  $E$  at  $P(x, y, z)$  in Cartesian coordinates.
  3. A certain homogeneous slab of lossless dielectric material is characterized by an electric susceptibility of 0.12 and carries a uniform electric field density within it is  $1.6 \text{ nC/m}^2$ . Find (i) Electric field intensity, (ii) polarization, (iii) the average dipole moment if there are  $2 \times 10^{19}$  dipoles per cubic meter. (iv) Voltage between two equi-potentials of 1 inch apart.
  4. a) Using Biot-Savart's find an expression for the magnetic field intensity in the vicinity of a straight current carrying conductor of finite length?  
b) A circuit carrying a direct current of 5A forms a regular hexagon inscribed in a circle of radius of 1m. Calculate the magnetic flux density at the centre of the hexagon. Assume the medium to be free space.
  5. a) Explain Ampere's circuital law.  
b) A solid cylindrical conductor of radius  $R$  has a uniform current density. Derive expressions for  $H$  both inside and outside the conductor. Plot the variation of  $H$  as a function of radial distance from the centre of the wire.
  6. a) Derive the expression for force on a differential current element.  
b) A charge  $Q = 5 \times 10^{-18} \text{ C}$  is moving through a uniform magnetic field  $\vec{B} = (-0.4 U_x + 0.2 U_y - 0.1 U_z) \text{ T}$  with a velocity  $\vec{V} = (2 U_x - 3 U_y + 6 U_z) 10^5 \text{ m/s}$  at  $t = 0$   
(i) what electric field is present at  $t = 0$  if net force on the electron is zero  
(ii) if electric field intensity is entirely in the  $U_x$  direction and  $|F_{\text{net}}| = 2 \text{ p N}$  at  $t = 0$ , find  $E_x$ .
  7. a) Derive the expression for determination of energy density in a magnetic field  
b) Derive an expression for self inductance of a toroid.
  8. a) Explain the statically and dynamically induced EMFs  
b) Write Maxwell's equations in good conductors for time varying fields and static fields in point and integral forms.

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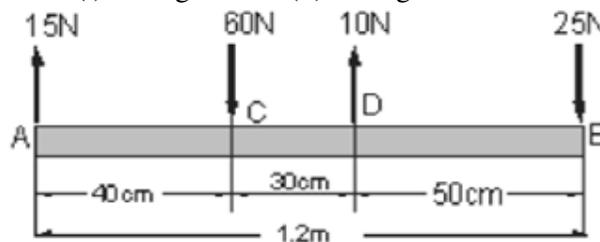
**II B. Tech I Semester Supplementary Examinations, Oct/Nov - 2016**  
**ENGINEERING MECHANICS**  
 (Com to ME, AE, AME, MM)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions  
 All Questions carry **Equal** Marks

1. a) A particle is acted by three forces with magnitude 2 kN,  $2\sqrt{2}$  kN and 1.5 kN. The first force is along horizontal direction, second makes an angle of  $45^\circ$  with the horizontal and third is along vertical direction. Determine the resultant of the given forces. (7M)
- b) A rigid bar is subjected to a system of parallel forces as shown in figure below. Reduce this system to. (i) A single force (ii) A single force-moment system at B. (8M)



2. a) Two identical rollers, each of weight 300 N, are supported by an inclined plane and a vertical wall as shown in Figure 2, below. Assuming smooth surfaces, find the reactions induced at the points of support A, B and C. (9M)

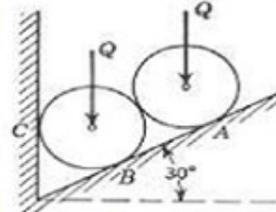


Figure 2

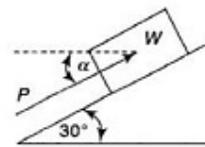
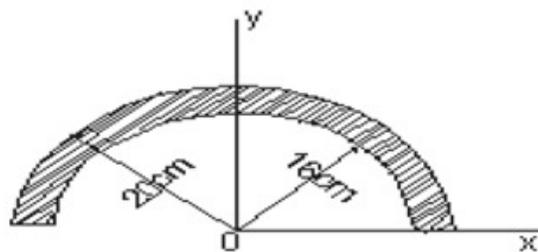
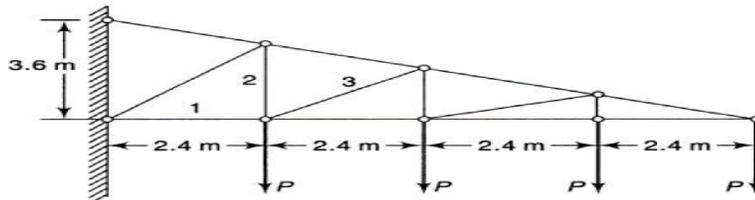


Figure 3

- b) Determine the magnitude and direction of the smallest force P, which will maintain the body of weight 500 N on an inclined smooth plane as shown below Figure 3, is in equilibrium. (6M)
3. a) i) Differentiate centroid, centre of gravity and mass centre. (8M)  
 ii) State and prove Pappu's theorem I.
- b) Find the coordinates of centroid of shaded area as shown in below figure. All dimensions are in cm. (7M)



4. a) i) What is moment of inertia? Explain its significance. (7M)  
 ii) What do you understand from transfer theorem? Explain.
- b) Starting from the first principles determine the moment of inertia of a triangle with respect to its base. (8M)
5. a) Using method of sections calculate the axial force in each of the bars 1, 2 and 3 of the plane cantilever truss loaded as shown below. (10M)



- b) Differentiate between truss and frame including applications. (5M)
6. a) A man of height 2 m walks away from a lamp which is at a height of 6 m above the ground. If the man walks with a speed of 2.5 m/sec, determine the speed of the tip of the man's shadow. (7M)
- b) A car of mass 800kg traverses an unbanked curve of 150m radius to 60Kmph. The wheel base width is 2m and the centre of gravity of the car is 500mm above the road. Calculate the normal reaction at each wheel. (8M)
7. a) The figure 4 shown below has a rightward velocity of 3 m/s. Determine the constant force P that will give it a leftward velocity of 6 m/s in a time interval of 30 seconds. (7M)

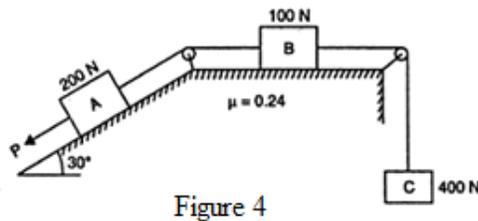


Figure 4

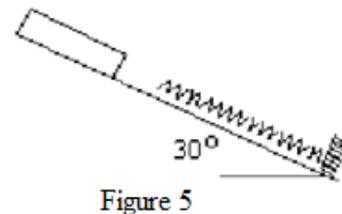
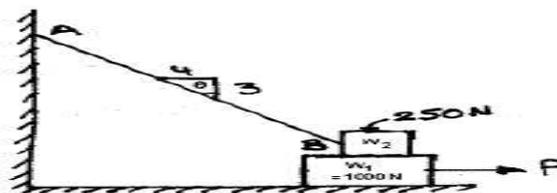


Figure 5

- b) A block of mass 5Kg resting on a 30° inclined plane is released. The block after travelling a distance of 0.5m along the inclined plane hits a spring of stiffness 15N/cm. Find the maximum compression of spring. Assume coefficient of friction between the block and the inclined plane is 0.2. (8M)
8. A block of weight  $W_1=1000\text{N}$  rests on a horizontal surface and supports on top of it another block of weight  $W_2=250\text{N}$  as shown in figure. The block  $W_2$  is attached to a vertical wall by the inclined string AB. Find the magnitude of the horizontal force 'P' applied to the lower block as shown, that will be necessary to cause slipping to impend. The coefficient of static friction for all contact surfaces is  $\mu=0.3$ . (15M)



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**II B. Tech I Semester Supplementary Examinations, Oct/Nov - 2016**  
**PROBABILITY THEORY AND STOCHASTIC PROCESSES**  
 (Electronics and Communications Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions  
 All Questions carry **Equal** Marks  
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1. a) State and prove *total probability theorem*. (8M)
 b) Three regular dice are thrown. Assign probabilities to the following events: the sum of the points appearing on the three dice is (7M)
 i) 4 ii) 9 iii) 15
2. a) In an experiment, a trial consists of four successive tosses of a coin. If we define a random variable X as the number of heads appearing in a trial, determine the CDF, $F_X(x)$. (8M)
 b) Show that $P(x_1 < X \leq x_2) = F_X(x_2) - F_X(x_1)$. (7M)
3. a) If $Y = X^2$, determine $f_Y(y)$ in terms of $f_X(x)$. (7M)
 b) Determine the variance of Bernoulli random variable. (8M)
4. a) State the central limit theorem for equal and unequal distributions. (7M)
 b) Show that the PDF of Z is the convolution between $f_X(x)$ and $f_Y(y)$, where $Z = X + Y$. (8M)
5. a) The joint PDF of random variables X and Y is given by (8M)
 $f_{XY}(x, y) = ke^{-(x^2+xy+y^2)}$
 Determine
 i) the constant k ii) the correlation between X and Y
 b) Define joint characteristic function and list its properties. (7M)
6. a) Consider a random process $X(t)$ given by (7M)
 $X(t) = A\cos(\omega t + \Theta)$
 where A and ω are constants and Θ is a uniform random variable over $[-\pi, \pi]$. Show that $X(t)$ is WSS.
 b) Let $X(t)$ be a WSS random process. Show that (8M)
 i) $R_{XX}(-\tau) = R_{XX}(\tau)$
 ii) $|R_{XX}(\tau)| \leq R_{XX}(0)$
7. a) Consider a WSS process $X(\tau)$ with autocorrelation $R_{XX}(t)$ and power spectrum $S_{XX}(\omega)$. Let $X'(t) = \frac{dX(\tau)}{dt}$. Show that $S_{X'X'}(\omega) = \omega^2 S_{XX}(\omega)$. (8M)
 b) State and prove the properties of power spectral density. (7M)
8. a) Derive an expression for average noise figure of cascaded networks. (8M)
 b) Determine the mean value of output of LTI system with WSS random input. (7M)



II B. Tech I Semester Supplementary Examinations, Oct/Nov - 2016
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE AND ENGINEERING
 (Com. to CSE, IT, ECC)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions
 All Questions carry **Equal** Marks

- ~~~~~
1. a) Write the converse, inverse, contra positive for the implication “If two angles in triangle are equal, then triangles are isosceles”.
 - b) What is the truth value of the statement formula: $(p \rightarrow p) \rightarrow (p \rightarrow \sim p)$, if p is true.
 2. a) Apply the Euclidean algorithm to find $\gcd\{2076, 1024\}$
 - b) Discuss in detail about the principle of mathematical induction
 - c) Prove by the method of induction that every even power of every odd number greater than when divided by 8, leaves 1 as a remainder
 3. a) What is a partial order relation? Let $S = \{x, y, z\}$ and consider the power set $P(S)$ with relation R given by set inclusion. Is R a partial order?
 - b) Let (L, \leq) be a lattice and $a, b, c \in L$. Then prove the following
 $a \vee b = b$ iff $a \leq b$
 - c) Draw a poset diagram representing the positive divisors of 36 and determine all maximal, minimal, elements and greatest, least elements if they exist
 4. a) Explain about the adjacency matrix representation of graphs. Illustrate with an example
 - b) Explain the algorithm for breadth first search traversal of a graph.
 5. a) Explain Prim’s algorithm with example.
 - b) Find whether K_5 is planar or not.
 6. a) Define a lattice. Explain its properties
 - b) If $(G, *)$ and (H, Δ) are two groups and $f: G \rightarrow H$ is Homomorphism, then prove that kernel is a normal function.
 7. a) State and explain the properties of pigeon hole principle.
 - b) Apply pigeon hole principle and show that, any 14 integers are selected from the set $S = \{1, 2, 3, \dots, 25\}$. There are at least two where sum is 26. Also write a statement that generalizes it
 8. a) Solve $u_n = 3u_{n-1}$, $n \geq 1$ using generating function.
 - b) Solve $a_n = a_{n-1} + f(n)$ for $n \geq 1$ by substitution



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

ELECTRO MAGNETIC FIELDS

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 80

Answer any **FIVE** Questions
All Questions carry **Equal** Marks

- ~~~~~
1. a) State and describe the coulombs law with units. (8M)
 - b) Calculate the total charge within each of the indicated volumes: (8M)
 - (i) $0.1 \leq |x|, |y|, |z| \leq 0.2$, $\rho_v = \frac{1}{x^3 y^3 z^3}$ (ii) $0 \leq \rho \leq 0.1$, $0 \leq \Phi \leq \pi$, $2 \leq z \leq 4$,
 $\rho_v = \rho^2 z^2 \sin 0.6\Phi$.
 2. a) Define the term electric dipole and hence derive the expression for electric field (8M)
due to a dipole with its center located at origin.
 - b) Find the magnitude of the current density in a sample of silver for which (8M)
 $\sigma = 6.17 \times 10^7$ S/m and $\mu_e = 0.0056$ m²/V.s if (i) the drift velocity is 1.5 μ m/s
(ii) the electric field intensity is 1 mV/m.
 3. a) Derive the expression for capacitance of capacitor formed of two concentric (8M)
spherical conducting shells.
 - b) The surface $x = 0$ separates two perfect dielectrics. For $x > 0$ let $\epsilon_{r1} = 3$, while (8M)
 $\epsilon_{r2} = 5$ where $x < 0$. If $\mathbf{E}_1 = (80\mathbf{a}_x - 60\mathbf{a}_y - 30\mathbf{a}_z)$ V/m. Find \mathbf{D}_{N2} , \mathbf{D}_{T2} , \mathbf{D}_2 and \mathbf{P}_2 .
 4. a) Derive the expression for magnetic field due to an infinitely long straight filament (8M)
carrying a direct current 'I' by using Biot – Savart's law.
 - b) Compare electrostatic fields and magnetostatic fields. (8M)
 5. a) A current sheet $\mathbf{K} = 8 \mathbf{a}_x$ A/m flows in the region $-2 < y < 2$ in the plane $z = 0$. (8M)
Calculate H at (0, 0, 3).
 - b) A long, straight, non magnetic conductor of 0.2 mm radius carries a uniformly (8M)
distributed current of 2 A dc. (i) Find \mathbf{J} within the conductor and
(ii) Find \mathbf{H} and \mathbf{B} within and outside the conductor using Ampere's circuit law.
 6. a) Explain about force on moving charged particle due to magnetic field. (8M)
 - b) The point charge $Q = 18$ nC has a velocity of 5×10^6 m/s in the direction of (8M)
 $\mathbf{a}_v = 0.60\mathbf{a}_x + 0.75 \mathbf{a}_y + 0.30 \mathbf{a}_z$. calculate the magnitude of the force exerted on the
charge by the field: (i) $\mathbf{B} = (-3\mathbf{a}_x + 4 \mathbf{a}_y + 6 \mathbf{a}_z)$ mT
(ii) $(\mathbf{E} = -3\mathbf{a}_x + 4 \mathbf{a}_y + 6 \mathbf{a}_z)$ kV/m
(iii) B and E acting together.
 7. a) Describe the self inductance and mutual inductance. (8M)
 - b) Given the magnetic vector potential $\mathbf{A} = -\rho^2/4 \mathbf{a}_z$ Wb/m, calculate the total (8M)
magnetic flux crossing the surface $\Phi = \pi/2$, $1 \leq \rho \leq 2$ m, $0 \leq z \leq 5$ m.
 8. a) Explain the concept of displacement current. (8M)
 - b) Within a certain region, $\epsilon = 10^{-11}$ F/m and $\mu = 10^{-5}$ H/m. (8M)
If $\mathbf{B}_x = 2 \times 10^{-4} \cos 10^5 t \sin 10^{-3} y$ T, find \mathbf{E} using Maxwell equations.



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

MECHANICS OF SOLIDS
(Com. to ME, MMT, AME, MM)

Time: 3 hours

Max. Marks: 80

Answer any **FIVE** Questions
All Questions carry **Equal** Marks

1. a) Two vertical rods one of steel and the other of copper are each rigidly fixed at the top and 600 mm apart. The diameter and length of each rod are 30 mm and 375 mm respectively. A cross bar fixed to the rods at the lower ends carries a load of 5 kN such that the cross bar remains horizontal even after loading. Find the stress in each rod and the position of the load on the bar. (8M)
 $E_S = 200 \text{ Gpa}$ and $E_C = 100 \text{ Gpa}$.
- b) Define and explain the terms (8M)
- i) Modulus of Elasticity ii) Modulus of Rigidity
iii) Poisson's ratio iv) Bulk Modulus
2. Draw B.M. diagram, S.F. diagram and axial thrust diagram for the frame shown (16M) in the figure 1 below.

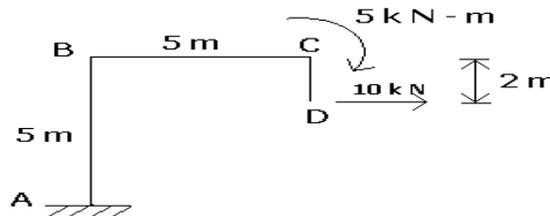


Figure 1

3. a) Derive the relationship $M/I = f/y = E/R$. (6M)
- b) A beam of a T-section is used as a cantilever with flange at top. The flange is 120 mm wide \times 20mm deep and web is 15mm wide and 120 mm deep is 2m long. Determine the maximum permissible load which may be suspended from the free end of the cantilever if the limiting stresses in tension and compression are 90 N/mm^2 and 150 N/mm^2 respectively. (10M)
4. a) Obtain from first principles the expression for maximum shear stress in a triangular section of a beam. Sketch the variation of shear stress. (8M)
- b) A beam of I-section is having overall depth as 600mm and overall width as 200mm. The thickness of flanges is 25mm where as the thickness of the web is 20mm. If the section carries a shear force of 55kN, calculate shear stress at salient points and sketch the shear stress distribution across the section. (8M)



5. Figure 2 shows a cantilever truss ABCDE, subjected to a vertical load $P = 100$ KN at joint D. Determine the forces in the members and reactions at the supports. (16M)

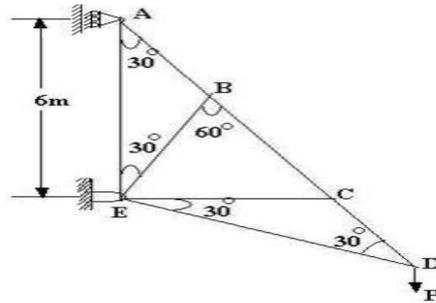


Figure 2

6. a) What is moment area method? Explain the two Mohr's theorems, as applicable to the slope and deflection of a beam. (6M)
- b) A cantilever of uniform cross-section of length l carries two point loads, W at the free end and $2W$ at a distance a from the free end. Find the maximum deflection due to this loading. (10M)
7. a) Derive the relation for the change of diameter and length of a thin cylindrical shell subjected to an internal pressure. (9M)
- b) A thin cylinder steel shell of diameter 200 mm and wall thickness 4 mm has spherical ends. Determine the thickness of hemispherical ends if there is no distortion of the junction under pressure. (7M)
8. Compare the values of maximum and minimum hoop stresses for a cast steel cylindrical shell of 600 mm external dia. And 400 mm internal dia. Subjected to a pressure of 30N/mm^2 applied (16M)
- (i) Internally and (ii) Externally.



II B. Tech I Semester Supplementary Examinations, Oct/Nov - 2016
MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE
 (Com. to CSE, IT)

Time: 3 hours

Max. Marks: 80

Answer any **FIVE** Questions
 All Questions carry **Equal** Marks

- ~~~~~
1. a) Obtain equivalent PDNF for the propositional function $\sim(P \vee Q) \leftrightarrow (P \wedge Q)$. (8M)
 b) Obtain PCNF for the Propositional function $(\sim PVQ) \rightarrow (P \leftrightarrow \sim Q)$. (8M)
 2. a) Show that $P \rightarrow (Q \rightarrow R), Q \rightarrow (R \rightarrow S) \Rightarrow P \rightarrow (Q \rightarrow S)$. (8M)
 b) Using automatic theorem proving, show that (8M)
 $(P \vee Q) \wedge (Q \rightarrow R) \wedge (P \rightarrow M) \Rightarrow (R \vee M)$.
 3. a) Draw the Hasse diagram for $X = \{2, 3, 6, 24, 36, 48\}$ and relation \leq be such that (8M)
 $x \leq y$, if x divides y .
 b) Verify the following relation R on $X = \{1, 2, 3, 4\}$ is equivalence relation or not? (8M)
 Given $R = \{(1, 1), (1, 4), (4, 1), (2, 2), (2, 3), (3, 4), (3, 3), (3, 2), (4, 3), (4, 4)\}$.
 4. a) Let $X = \{1, 2, 3, 4\}$ and $f : X \rightarrow X$ such that $f = \{(1, 2), (2, 3), (3, 4), (4, 1)\}$ and (8M)
 $F = \{f_0, f_1, f_2, f_3\}$, where $f_1 = f, f_2 = f \circ f, f_3 = f_2 \circ f$ and f_0 is identity function. Verify
 the algebraic system (F, \circ) is a group, where \circ is composition of functions.
 b) What is a permutation group? Explain with example. (8M)
 5. a) In how many ways can 23 different books be given to 5 students so that 2 of the (8M)
 students will have 4 books each and the other 3 will have 5 books each.
 b) Using Multinomial theorem, expand $(2x-3y+4z)^3$? (8M)
 6. a) Solve the recurrence relation $a_n - 7a_{n-1} + 12a_{n-2} = 0$ for $n \geq 2, a_0=1$ and $a_1=2$. (8M)
 b) Solve the recurrence relation of Fibonacci series. (8M)
 7. a) Prove that a connected plane graph with 7 vertices and degree $(V) = 4$ for each vertex V of (8M)
 G must have 8 regions of degree 3 and one region of degree 4.
 b) Discuss graph coloring problem with required examples. (8M)
 8. a) Describe an algorithm to decide whether a graph is bipartite. (8M)
 b) State the Prims algorithm for Finding Minimal Spanning Tree. Explain it with an Example (8M)

