AR16

CODE: 16CE2002 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, December- 2017

Strength of Materials-I

(Civil Engineering)

Time: 3 Hours **Max Marks: 70**

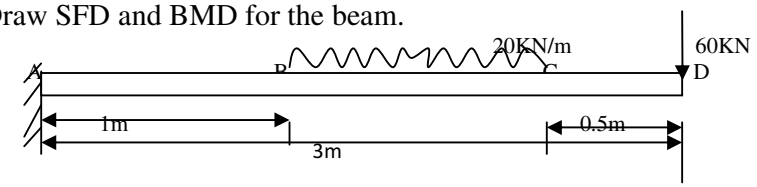
Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1.	a	Draw stress – strain diagram for the mild steel , mark salient points and explain them	7
	b	An axial pull of 40000N is acting on a bar consisting of three sections of length 30cm ,25cm and 20cm and diameters 2cm , 4cm and 5cm respectively. If the Young's Modulus = 2 X 10^5 N/mm^2 Determine Stress in each section and total extension of the bar.	7
		(OR)	
2.	a	Derive the relationship between three elastic constants Modulus of Elasticity E,Modulus of Rigidity G and Bulk Modulus K	7
	b	A short steel tube of external diameter 75mm and internal diameter 50mm is surrounded by a brass tube of same length and having external diameter 100mm internal diameter 75mm. The tubes are rigidly fixed and an axial load of 20KN is placed on tubes. Find the load carried by each and also shortening of each tube if it is 25cm long. Take Es = 2 X 10^5 N/mm^2 and E_b = 1 X 10^5 N/mm^2.	7

UNIT-II

3.	a	Mention the difference between statically determinant and statically indeterminate beams.	4
	b	A cantilever beam 3m long is loaded with UDL and point load as shown in Fig. Draw SFD and BMD for the beam.	10



(OR)

4.		How and where will be the supports for cantilever,simply supported and over hang beams	4
		A simply supported beam of 16m carries point loads of 40KN,50KN and 30KN at distances of 3m, 7m and 11m respectively from left support. Draw SFD and BMD	10

UNIT-III

5.	a	Derive the bending Equation M/I = σ/y = E/R	8
	b	A rectangular beam 300 mm deep is simply supported over a span of 4m.What uniformly distributed load per metre, the beam may carry if the bending stress is not to exceed 120N/mm^2 take I = 8 X 10^6 mm^4.	6
		(OR)	

6.	a	Draw the bending stress distribution for rectangular beam	4
	b	An iron pipe of internal and external diameters 200mm and 250mm respectively and is simply supported at a span 7m apart. If unit weight of iron and water are $70KN/m^3$ and $10KN/m^3$ respectively, find the maximum stress induced in pipe when it is running full.	10

UNIT-IV

7.	a	Draw the shear stress distribution for a circular cross section	4
		The average shear stress at a section of a simply supported rectangular beam of cross section 100mm X 200mm is $0.4\ N/mm^2$. (Take width 100mm and depth 200mm) Determine 1) The shear force at the section. 2) Maximum shear stress at the section 3) Shear stress at a point on the section 5 cm above centroidal axis.	10

(OR)

8.	a	What is the relationship between Maximum shear stress and average shear stress for a rectangular cross section and prove it.	4
	b	Derive the formula for the shear stress	10

UNIT-V

9.	a	Define polar moment of inertia and write the expression for polar moment of inertia for a hollow shaft.	4
	b	Determine the diameter of a solid steel shaft which will transmit 90KW at 160 r.p.m. Also determine the length of the shaft if the twist must not exceed 1^0 over the entire length. The maximum shear stress is limited to $60N/mm^2$. Take the Value of Modulus of rigidity as $8 \times 10^4\ N/mm^2$.	10

(OR)

10.	a	Derive the Expression for maximum bending stress developed in plate of the leaf spring	6
	b	A closely coiled helical spring of round steel wire 10mm in diameter having 10 complete turns with a mean diameter of 12cm is subjected to an axial load of 200N. Determine the deflection of the spring, Maximum shear stress in the wire and stiffness of the spring. Take modulus of rigidity of spring is $8 \times 10^4\ N/mm^2$.	8

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AR16

CODE: 16EE2007 SET-1

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, December- 2017

ELECTRICAL MACHINES-I

(Electrical and Electronics Engineering)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a Explain the classification of a dc generators with respect to type of excitation.
   b An 8 pole dc shunt generator with 887 wave connected armature conductors & running at 500rpm supplied a load of 12.5ohms resistance at terminal voltage of 250volts.Armature resistance is 0.24ohms & field resistance is 250 ohms. Find armature current, induced emf.

(OR)

2. a Derive the EMF equation of D.C Generator.
   b A 4 pole lap wound generator having 400 armature conductors supplies a current of 150A. If the brushes are given an actual lead of 10^{o}. Calculate the demagnetizing and cross magnetizing ampere turns per pole.

UNIT-II

3. a Explain dc shunt motor characteristics and its applications.
   b A 220V series motor takes 50 A its armature resistance is 0.1ohm &series field resistance 0.12ohm.If the iron and friction losses is equal to copper losses at this load .Find out the out put and commercial efficiency?

(OR)

4. a Name the losses of D.C machine and classify them into constant and variable losses.
   b The armature of a 6-pole lap wound d.c shunt motor takes 400A at a speed of 350rpm.the flux/pole is 80m wb ,the no. of turns is 600 & 3% of torque is lost in windage, friction &iron loss. Calculate the B.H.P?

UNIT-III

5. a Explain the working of 3 - Point starter with a neat diagram .
   b What are the various methods for speed control of DC shunt motor? Explain any one of them.

(OR)

6. a Explain the Swinburne's test to determine efficiency of D.C machine and what are the limitations of the test?
   b In a brake test on D.C shunt motor the load on one side of the brake drum was3Kgs and the other side is 5Kgs.The motor was running at a speed of 1350rpm.Input current is70A at 420VD.C.The pulley diameter is 1mt.Determine the torque, output power and efficiency.

UNIT-IV

7. a Write short notes on constructional features of single phase transformer.
   b Explain the differences between the core and shell type transformers.

(OR)

8. Explain the working of practical transformer on no – load and load with necessary diagrams.

UNIT-V

9. A 15KVA,2200/220V,50Hz transformer gave the following results.
   O.C test (L.V side):V =220V, I=2.742A,p=185W.
   S.C test (H.V side): V =112V,I=6.3A,p=197W.
   Compute the efficiency , voltage regulation at full load 0.8p.f leading & lagging.

(OR)

10. Explain clearly how to perform the O.C and S.C tests on single phase transformer? Write the formulae.

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AR16

CODE: 16ME2005 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, December- 2017

MECHANICS OF SOLIDS

(Mechanical Engineering)

Time: 3 Hours **Max Marks: 70**

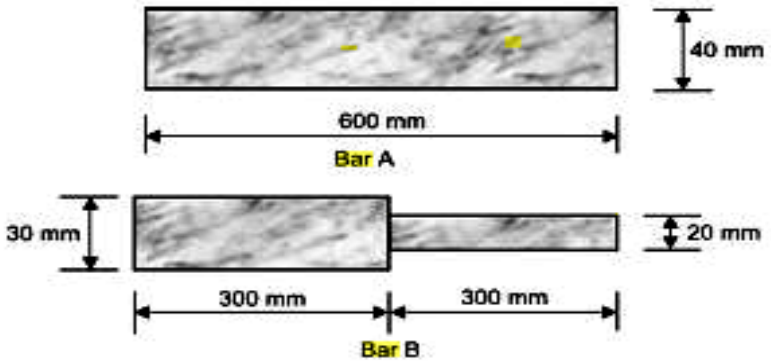
Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1. a) Explain the following: (6M)
   i) Hooke's law ii) Poisson's ratio iii) Factor of safety iv) Resilience
   b) Two parallel walls 8 m apart are stayed together by a steel rod 3 cm diameter at a temperature of 80°C passing through washers and nuts at each end. Calculate the pull exerted by the rod when it has cooled to 22°C i)If the walls do not yield and ii) If the total yield at the two ends is 1.5 mm. Given E = 2 x 10^5 N/mm^2 and $\alpha = 11 \times 10^{-6}$/°C (8M)

(OR)

2. a) A steel rod of 20 mm diameter and 200 mm length is subjected to a 20 kN tensile force. The extension is found to be 0.53 mm and the decrease in diameter is equal to 0.0022 mm. Determine i) Young's modulus of elasticity, ii) Change in volume and iii) Poisson's ratio (6M)
   b) Compare the strain energy stored in the two bars of the same material, shown in figure if i) gradually applied load is same and ii) Maximum stress produced is same.



(8M)

UNIT-II

3. a) Briefly explain the construction of Mohr's circle for plane stress. (6M)
   b) The state of stress at a point in a stressed material is given by σ_x = 50 N/mm^2, σ_y = 150 N/mm^2 and τ_{xy} = –100 N/mm^2. Determine a) principal stresses and position of principal planes on which they act and b) maximum shear stress and planes on which they act, and show them on a sketch of properly oriented element. (8M)

(OR)

4. a) What are the different types of beams and loads? Explain with sketches. (6M)

b) A simply supported beam of span 6 m is subjected to a concentrated load of 25 kN acting distance of 2 m from the left end. It is also subjected to a uniformly distributed load of 10 kN/m over the entire span. Draw the bending moment and shear force diagrams. Also determine the position and magnitude of maximum bending moment. (8M)

UNIT-III

5. a) Starting from the fundamentals, derive the bending equation from the theory of simple bending (6M)

b) A beam of circular section of 100 mm diameter is subjected to a shear force of 5 kN. Calculate i) average shear stress ii) maximum shear stress. Also sketch the variation of shear stress along the depth of the beam. (8M)

(OR)

6. a) A wooden beam 2 m long simply supported at its ends and has a cross-section 150 mm wide and 600 mm deep. It carries a UDL of 90 kN/m over the entire span. Find the maximum bending stress. (6M)

b) Prove that the maximum shear stress is 1.5 times the average shear stress in case of beam with rectangular cross- section. (8M)

UNIT-IV

7. A solid cylindrical shaft has to transmit 300 kW at 250 rpm. The maximum torque exceeds the mean torque by 30%. Suggest a suitable diameter of the shaft if the shear stress is not to exceed 40 MPa and the angle of twist is limited to 6° in a length of 3 m. Also calculate the percentage of saving in the material if the solid shaft is to be replaced by a hollow shaft of diameter ratio 0.8, the length, the material and the maximum shear stress being the same. Take G = 84 GPa. (14M)

(OR)

8. a) State the assumptions made in the analysis of columns by Euler's buckling theory. What are its limitations? (5M)

b) Find the Euler critical load for a hollow cylindrical cast iron column 200 mm external diameter and 25 mm thick, 6 m long and is hinged at both ends. Take E = 1.2×10^5 N/mm^2. Compare the load with the critical load as given by the Rankine's formula taking $\sigma_c = 550$ N/mm^2 and $\alpha = 1/1600$. For what length of the column would these two formulae give the same critical load? (9M)

UNIT-V

9. A beam ABC of length 12 m has one support at the left end A and the other support at point B i.e. at a distance of 8 m from the left end. The beam carries a point load of 8 KN at right end point C and also carries a uniformly distributed load of 2 KN/m over a length of 4 m starting from midpoint of span AB. Determine the slope and deflection at point C. Take E = 2×10^5 N/mm^2 and I = 5×10^8 mm^4. (14M)

(OR)

10. a) State and explain moment area theorems. (6M)

b) A cantilever of length 2 m carries a uniformly varying load of 25 kN/m at the free end to 75 kN/m at the fixed end. If E = 1×10^5 N/mm^2 and I = 1×10^8 mm^4, determine the slope and deflection of the cantilever at the free end. (8M)

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AR16

CODE: 16EC2003 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, December- 2017

SIGNALS AND SYSTEMS

(Electronics and Communication Engineering)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1. a Show that the signals $\emptyset_k(t) = e^{\frac{j(2\pi kt)}{T}}$,k= 0,±1,±2,... form an orthogonal set on the interval 0<t<T. 7M

   b Define the following systems (i) memory less (ii) Stable, (III) Causal (iv)Linear (v) Time – invariant. 7M

(OR)

2. a Consider the discrete-time signal 7M

$$x(n) = 1 - \sum_{k=3}^{\infty} \delta(n-1-k)$$

Determine the values of the integers M and n_0 so that x(n) may be expressed as $x(n)=u(Mn-n_0)$.

   b Define Mean square error and derive the expression for evaluating Mean square error. 7M

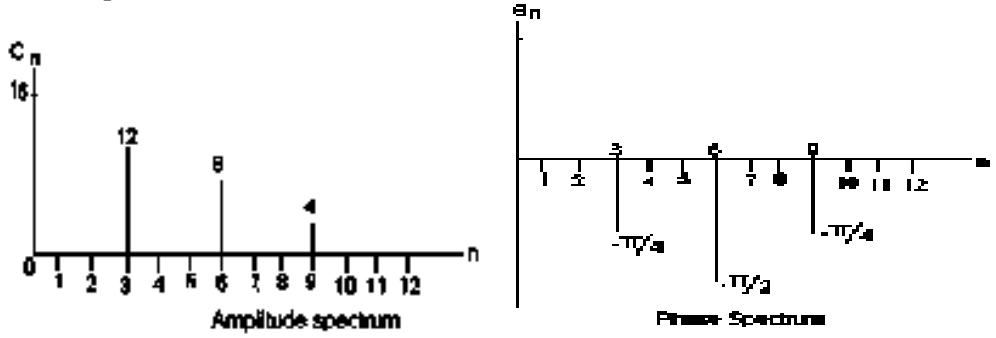
UNIT-II

3. a Show that for half-wave symmetry ic, $x(t)=-x\left(t \pm \frac{T}{2}\right)$; 7M

$a_o=0$; $a_n=b_n=0$ for n even ; $a_n=\frac{4}{T}\int_0^{T/2} x(t)\cos(n\omega_0 t)\,dt$ n odd

$$b_n = \frac{4}{T}\int_0^{T/2} x(t)\sin(n\omega_0 t)\,dt \quad \text{n odd}$$

   b The trigonometric Fourier spectra (line spectra) of a certain periodic signal x(t) are shown below. By inspecting these spectra, sketch the corresponding exponential Fourier spectra. 7M



(OR)

4. a Find the Fourier transform of the following signals Using Fourier Transform properties. (i) $g(t) = A\,rect\left(\frac{t}{T}\right)\cos(\omega_c t)$ (ii) 7M

b State and prove time and frequency shifting properties of Fourier transform. 7M

UNIT-III

5. a Show that ideal low pass filters are physically unrealizable 7M

b Using Paley-Wiener criterion, prove that $|H(\omega)| = e^{-\omega^2}$ is not a suitable magnitude response for causal LTI system 7M

(OR)

6. a A causal and stable LTI system S has the frequency response 8M

$$H(\omega) = \frac{4 + j\omega}{6 - \omega^2 + 5j\omega}$$

1) Determine a differential equation relating the input x(t) and output y(t) of S.
2) Determine the impulse response h(t) of S.
3) What is the output of S when the input is

$$x(t) = e^{-4t}u(t) - te^{-4t}u(t)$$

b For the LTI system described by the impulse response 6M

$$h(t) = \delta(t) - 2e^{-2t}u(t)$$

Determine and sketch the frequency response. Name the type of filter the system represents.

UNIT-IV

7. a Find the autocorrelation function Rxx(τ)of sine wave signal $x(t) = A\sin(\omega_0 t + \emptyset)$, $\omega_0 = \frac{2\pi}{T}$. 7M

b Find the convolution of the two continuous time signals 7M

x(t)=$e^{-(t)}$ for all t and h(t)=$\begin{cases} e^{-2t}, t \geq 1 \\ 0 \quad t < 1 \end{cases}$

(OR)

8. a A signal $x(t) = \cos(200\pi t) + 2\cos(320\pi t)$ is ideally sampled at f_s=300 Hz.If the sampled signal is passed through an ideal low-pass filter with a gain $1/f_s$ and cutoff frequency of 250 Hz,what frequency components will appear in the output 7M

b Prove that the power spectral density of the periodic signal x(t) with period T is $G_x(\omega) = 2\pi \sum_{n=-\alpha}^{\alpha} |X_n|^2 \delta(\omega - n\omega_0)$ Where X_n are the Fourier series coefficients of x(t) and $\omega_0 = \frac{2\pi}{T}$. 7M

UNIT-V

9. a Find the inverse Laplace transform of $H(S) = \frac{4S^2 + 15S + 8}{(S+2)^2(S-1)}$ assuming that i) h(t) is Causal and (ii) The Fourier transform of h(t) exists i.e., h(t) is absolutely integrable. 7M

b Using Laplace Transform properties find the Laplace transforms and mention ROC s of the following signals: i) g(t)=$te^{-at}u(t)$. ii) g(t)= u(-2t-1). 7M

(OR)

10. a Determine the Z transform of the signals and mention their ROCs i) g(n)=nu(n) ii)$g(n) = |n|a^{|n|}$ 8M

b State and prove the initial and final value theorems of Z transforms. 6M

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AR16

CODE: 16BS2005 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, December- 2017

Probability and Statistics

(Common to CSE & IT)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1. a) From a city three news papers A, B and C are being published. A is read by 20%, B is ready by 16%, C is read by 14%, both A and B are read by 8%, both A and C are read by 5% both B and C are read by 4% and all the three are read by 2%. What is the percentage of the population that read at least one paper 7M

   b) Of the three men, the chances that a politician, a business man or an academician will be appointed as a Vice-Chancellor of a University are 0.5, 0.3 and 0.2 respectively. The chances that research is promoted by these persons if they are appointed as Vice-Chancellors are 0.3, 0.7 and 0.8 respectively. (i) Determine the chance that research is promoted? (ii) If research is promoted, what is the chance that the Vice-Chancellor is an academician? 7M

(OR)

2. a) Define probability mass function and distribution function of a discrete random variable 7M

   b) A random variable X has the following probability function: 7M

X	0	1	2	3	4	5	6	7	8
P(x)	K/45	K/15	K/9	K/5	2K/45	6K/45	7K/45	8K/45	4K/45

Determine: (i) K (ii) mean (iii) variance and standard deviation

UNIT-II

3. a) Define Poisson distribution and obtain its mean 7M

   b) In a sample of 100 cases, the mean of a certain test is 14 and standard deviation is 2.5. Assuming the distribution is to be normal, find (i) how many students score between 12 and 15 (ii) how many score above 18? 7M

(OR)

4. Fit a binomial distribution to the following data 14M

X	0	1	2	3	4	5	6
f	13	25	52	58	32	16	4

UNIT-III

5. A population consists of 5 observations 2, 3, 6, 8 and 11. Consider all possible samples of size two which can be drawn without replacement from this population. Find (i) the mean and standard deviation of the population (ii) the mean of the sampling distribution of mean (iii) show that the mean of sampling distribution of mean is equal to the population mean 14M

(OR)

6. a) What is the maximum error that one can expect to make with probability 0.90 when using the mean of a random sample of size 64 to estimate the mean of a population with variance 2.56 7M

   b) It is desired to estimate the mean time of continuous use until an answering machine will first require service. If it can be assumed that the standard deviation is 60 days, how large a sample is needed so that one will be able to assert with 90% confidence that the sample mean is off by at most 10 days. 7M

UNIT-IV

7. a) A simple sample of 6400 Englishmen has a mean height of 67.85 inches with a standard deviation of 2.56 inches, while simple sample of heights of 1600 Australians has a mean height of 68.55 inches with a standard deviation of 2.52 inches. Do the data indicate that Australians on the average taller than Englishmen? Use 0.01 level of significance. 7M

   b) A manufacturer claims that only 4% of his products are defective. A random sample of 500 were taken among which 100 were defective. Test the hypothesis at 0.05 level of significance? 7M

(OR)

8. A pair of dice are thrown 360 times and the frequency of each sum is indicated below 14M

Sum	2	3	4	5	6	7	8	9	10	11	12
Frequency	8	24	35	37	44	65	51	42	26	14	14

Would you say that the dice are fair on the basis of the chi-square test at 0.05 level of significance

UNIT-V

9. In a partially destroyed laboratory record of an analysis of correlation data , the following results are only eligible: 14M
Variance of X = 9. Regression Equations: 8X – 10Y + 66 = 0, 40X – 18Y =214. What were i) the mean values of X and Y ii) the correlation coefficient between X and Y iii) standard deviation of Y

(OR)

10. Fit a curve of the form $y = a + b\,x + c\,x^2$ for the following data and hence find the value of y when x = 23 14M

x	10	15	20	25	30	35
y	35.3	32.4	29.2	26.1	23.2	20.5

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AR13

CODE: 13CE2001 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, December- 2017

STRENGTH OF MATERIALS-I
(Civil Engineering)

Time: 3 Hours **Max Marks: 70**

PART-A

ANSWER ALL QUESTIONS **[1 x 10 = 10 M]**

1. a) Discuss briefly about the elastic modulie.
   b) What is lateral strain?
   c) Define point of contraflexure?
   d) Highlight the need of Shear Force calculation.
   e) What is meant by flexural stress?
   f) Define section modulus.
   g) Write the procedure involved in finding the slope and deflection profile of an I section.
   h) What is shear stress?
   i) Define percentage of elongation.
   j) Discuss the need of finding deflection of beam s.

PART-B

Answer one question from each unit **[5x12=60M]**

UNIT-I

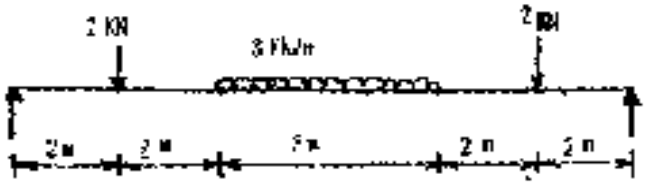
2. A piece of material is subjected to two perpendicular stresses as follows: 12 M
   i) Tensile stresses of 100 MPa and 60 MPa
   ii) Tensile stress of the 100 MPa and compressive stress of 60 MPa
   iii) Compressive stress of 100 MPa and 60 MPa
   Determine normal and tangential stress on a plane inclined at 30^0 to the plane of 100 MPa stress. Also find the resultant and its inclination with the normal stress?

(OR)

3. a Show that if E is assumed correct, an error of 1% in the determination of G will involve an error of about 5% in the calculation of Poisson's ratio when its correct value is 0.25 8 M
   b Derive the strain and stress for a vertical bar due to self weight 4 M

UNIT-II

4. Draw the S.F. and B.M. diagrams of a simply supported beam of length 8m carrying uniformly distributed loads of 5KN/m over a length of 3m from the left support and 6KN/m over a length of 2m from the right support For the beam shown in figure, draw the shear force and bending moment diagram showing the position of maximum bending moment and its value 12 M



(OR)

5. Draw the S.F. and B.M. diagrams for the 5 m long simply supported beam carrying uniformly distributed load of 2 KN/m over the entire length and a point load of 2 KN at the middle. 12 M

UNIT-III

6. a Discuss in detail the concetual relation between the bending moment and bending stress 6 M
   b Derive the bending equation from the first principle and state the assumptions of simple bending theory? 6 M

(OR)

7. For a given stress compare the moment of resistance of beam of a square section when place, 12 M
   i) with its two sides horizontal and
   ii) with its diagonal horizontal

UNIT-IV

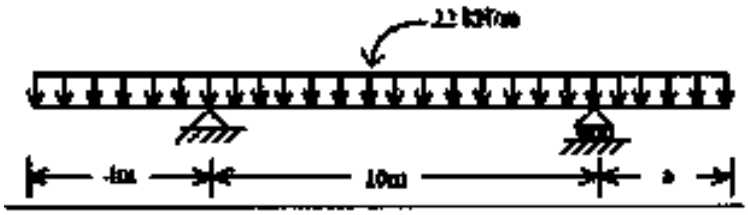
8. a Derive an expression for shear stress distribution across a circular section. 6 M
   b Explain the procedure involved in finding the shear stress distribution across triangular beam sections. 6 M

(OR)

9. An elemental cube is subjected to tensile stresses of 50N/mm^2 and 30N/mm^2 acting on two mutually perpendicular planes and a shear stress of 20N/mm^2 on these planes. Draw the Mohr's circle of stresses and hence or otherwise find the magnitudes and direction of principal stresses and also the greatest shear stress. 12 M

UNIT-V

10. Determine the length of overhang of the beam as shown in figure below, such that deflection at the free ends of the beam is zero 12 M



(OR)

11. Explain the following indetail 12 M

   i) Elastic line of a beam

   ii) Moment area method

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AR13

CODE: 13EE2005 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, December- 2017

ELECTRICAL MACHINES-I
(Electrical and Electronics Engineering)

Time: 3 Hours **Max Marks: 70**

PART-A

ANSWER ALL QUESTIONS **[1 x 10 = 10 M]**

1. a) What is energy balance equation? (1M)
   b) Why square pole is preferred? (1M)
   c) What is the purpose of Slot Insulation? (1M)
   d) What is meant by Cross magnetizing in DC Generators? (1M)
   e) Define Critical speed of a DC Shunt Generators? (1M)
   f) What are the advantages of Parallel Operation of DC Generators? (1M)
   g) Why a differentially compound motor is not used in Practice? (1M)
   h) Calculate the number of conductors on each pole piece required in a compensating winding for a 6-Pole Lap Wound DC armature containing 286 conductors. The compensating winding carries full armature current. Assume ratio of pole arc/ pole pitch = 0.7? (1M)
   i) Draw the power flow diagram in Motoring Mode (stray iron - loss is included in Pi and stray copper-loss in Pc)? (1M)
   j) List out Drawbacks of Hopkinson's Test? (1M)

PART-B

Answer one question from each unit **[5x12=60M]**

UNIT-I

2. (a) Explain the energy flow in electromechanical systems with energy flow Diagrams? (7M)
   (b) Compare Lap and Wave windings in a DC Machine? (5M)

(OR)

3. (a) With neat diagrams explain about DC CompoundGenerators? (5M)
   (b) With neat diagrams explain about armature windings in a DC Machine? (7M)

UNIT-II

4. (a) With neat diagrams explain about Armature reaction in a DC generator? (7M)
   (b) Explain about Cross magnetizing and de- magnetizing AT/pole? (5M)

(OR)

5. (a) Explain about commutation Process in a DC generators? (7M)
   (b) Explain about different methods for improving commutation a DC generator? (5M)

UNIT-III

6. (a) Explain about causes for failure to build up voltage self-excited DC Generators? And remedial measures (7M)
   (b) Explain internal and external characteristics of DC Generators? (5M)

(OR)

7. (a) Explain about load sharing in DC generators? (5M)
   (b) With neat diagrams explain about Internal & External characteristics of DC Compound Generator? (7M)

UNIT-IV

8. (a) With neat diagrams Explain the significance of Back - Emf (Eb) in a DC Motor? (5M)
   (b) A 4-pole DC Motor is lap wound with 400 conductors. The pole shoe is 20c.m long and the average flux density over one pole pitch is 0.4T, the armature diameter being 30 cm. find the torque and gross mechanical power developed when the motor is drawing 25A and running at 1000 rpm. (7M)

(OR)

9. (a) With neat diagrams explain about the speed control of DC motors? (7M)
   (b) Explain about different types of Losses takes place in a DC Machine? (5M)

UNIT-V

10. (a) Explain about Field Test for series machines? (5M)
    (b) A 10 kW, 250V DC Shunt Motor with armature resistance of 0.8 Ω and field resistance of 275 Ω takes 3.91A when running light at rated voltage and rated speed. (7M)
        (a) What calculations can u draw from above data regarding machine losses?
        (b) Calculate the machine efficiency as a generator when delivering an output of 10kW at rated voltage and speed as a motor drawing an input of 10 kW. What assumptions if any do you have to make in this computation?

(OR)

11. (a) Explain about Swinburne's Test? (5M)
    (b) Explain about Brake Test on a DC Shunt Motor? (7M)

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AR13

CODE: 13ME2004 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, December- 2017

MECHANICS OF SOLIDS
(Mechanical Engineering)

Time: 3 Hours **Max Marks: 70**

PART-A

ANSWER ALL QUESTIONS **[1 x 10 = 10 M]**

1. a) Define the term Shear stress
   b) What do you mean by Resilience ?
   c) Define the term Principal stresses.
   d) Write the relation between Shear force and Bending Moment.
   e) List the types of supports.
   f) What do you mean by Shear force ?
   g) Define the term Neutral axis.
   h) Write the expression for the section modulus of the Circular section.
   i) State the Moment area Theorem.
   j) Write Lami's equations for thick cylinders.

PART-B

Answer one question from each unit **[5x12=60M]**

UNIT-I

2. A steel rod of 10 mm diameter passes centrally through a copper tube of external diameter 40 mm and internal diameter 30 mm and of length 2 m. The tube is closed at each end by 20 mm thick steel plates which are screwed by nuts. The nuts are tightened until the copper tube is reduced to length 1.9996 m. Find the stresses in the rod and the tube. If the whole assembly is heated through 60^0 C, What are the stresses in the rod and the tube, assuming that the thickness of the plates remains unchanged ? Take E_S = 210 GN/m^2, E_C = 100 GN/m^2,α_s = 12X10^{-6}/^{0}C, α_c = 17.5X10^{-6}/^{0}C — 12M

(OR)

3. a) An element in a stressed material has tensile stress of 500 MN/m^2 and a compressive stress of 350 MN/m^2 acting on two mutually perpendicular planes and equal shear stresses of 100 MN/m^2 on these planes. Find the principal stresses and position of the principal planes. Find also the maximum shearing stress. — 6M
   b) The principal stresses at a point across two perpendicular planes are 75 MN/m^2 (tensile) and 35 MN/m^2 (tensile).Find the normal, tangential stresses and the resultant stress and its obliquity on a plane at 20^0 with the major principal plane. — 6M

UNIT-II

4. A beam AB 10 m long has supports at its ends A and B. It carries a point load of 2.5 kN at 3 m from A and at a point load of 2.5 kN at 7 m from A and a uniformly distributed load of 0.5 kN/m between the point loads. Draw the Shear force and Bending moment diagrams. — 12M

(OR)

5. An overhanging beam ABC is simply supported at A and B over a span of 6 m and BC overhangs by 3 m. If the supported span AB carries central concentrated load of 8 kN and overhanging span BC carries 2 kN/m completely. Draw the Shear force and Bending moment diagrams. — 12M

UNIT-III

6. a) A cast iron water main 12 metres long of 500 mm inside diameter and 25 mm wall thickness runs full of water and is supported at its ends. Calculate the maximum stress in the metal if density of cast iron is 7200 kg/m^3 and that of water is 1000 kg/m^3. 6M

   b) A symmetrical section 200 mm deep has a moment of inertia of 2.26X10^{-5} m^4 about its neutral axis. Determine the longest span over which, when simply supported, the beam would carry a uniformly distributed load of 4 kN/m run without the stress due to bending exceeding 125 MN/m^2. 6M

(OR)

7. a) A circular beam 150 mm diameter is subjected to a shear force of 7 kN. Calculate the value of maximum shear stress and sketch variation of shear stress along the depth of the beam. 5M

   b) An I-section with rectangular ends has the following dimensions: 7M
   Flanges : 15 Cm X 2 Cm Web: 30 Cm X 1 Cm. Find the maximum shearing stress developed in the beam for a shearing force of 10 kN.

UNIT-IV

8. A beam AB of span 8 metres is simply supported at the ends. It carries a uniformly distributed load of 30 kN/m over its entire length and a concentrated load of 60 kN at 3 m from the support A. Determine the maximum deflection in the beam and the location where the deflection occurs. 12M

(OR)

9. A cantilever 2.5 m long is carrying a load of 25 kN at free end and 35 kN at a distance of 1.3 m from the end. Find the slope and deflection at the free end. Take E = 2X 10^8 kN/m^2 and I = 1.5 X10^{-4} m^4. 12M

UNIT-V

10. a) Calculate the thickness of the metal required for a Cast iron main 800 mm in diameter for water at a pressure head of 100 m if the maximum permissible tensile stress is 20 MN/m^2 and weight of water is 10 kN/m^3. 6M

    b) A cylindrical vessel whose ends are closed by means of rigid flange plates is made of steel plate 3 mm thick. The internal length and diameter of vessel are 50 Cm and 25 Cm respectively. Determine the longitudinal and circumferential stresses in the cylindrical shell due to an internal fluid pressure of 3 MN/m^2.Also Calculate increase in length, diameter and volume of the vessel. E = 200 GN/m^2 and 1/m = 0.3. 6M

(OR)

11. a) Derive the Lami's equations for thick cylinders. 8M

    b) Briefly discuss about the Compound cylinders in Thick cylindrical shells. 4M

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AR13

CODE: 13EC2004 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, December- 2017
SIGNALS AND SYSTEMS
(Electronics and Communication Engineering)

Time: 3 Hours **Max Marks: 70**

PART-A

ANSWER ALL QUESTIONS **[1 x 10 = 10 M]**

1. a) Find the fundamental period of $x(t) = \cos\left(\frac{\pi}{3}\right)t + \sin\left(\frac{\pi}{5}\right)t$
   b) Plot $2u(t-3)$.
   c) Give the equation for trigonometric Fourier series
   d) State dirichlet's conditions.
   e) Define LTI system.
   f) What is the condition for a LTI system to be stable?
   g) State Nyquist rate and Nyquist interval for sampling a given signal
   h) List the properties of convolution.
   i) State initial and final value theorem of LT.
   j) What is pole-zero plot?

PART-B

Answer one question from each unit **[5x12=60M]**

UNIT-I

2. a. Test whether the given signal is energy or power signal. [4M]
   $x(n) = \left(\frac{1}{3}\right)^n u(n)$
   b. Write about elementary continuous time signals in detail [8M]

(OR)

3. a. Verify whether the following system is linear and time-invariant system [6M]
   y(n) = Ax[n]+ B, where A and B are constants
   b. Check whether the following system is i) static or dynamic ii) linear or non-linear iii) causal or non-causal iv) time variant or time invariant. [6M]
   $y(n) = x(n)x(n-1)$

UNIT-II

4 a. Obtain the Fourier series representation of half-wave rectified sine wave. [6M]

b. Explain the significance of waveform symmetry in Fourier analysis. [6M]

(OR)

5. a. Find the Fourier transform of $x(t) = \begin{cases} e^{-|t|}, & -1 \le t \le 1 \\ 0, & otherwise \end{cases}$ [8M]

b. Find the Fourier transform of rectangular pulse. [4M]

UNIT-III

6. a. What is impulse response? Show response of an LTI system is convolution integral of its impulse response with its input signal? [6M]

b. Explain the properties of convolution integral? [6M]

(OR)

7. Draw a circuit diagram of physically realizable LPF. Sketch its impulse response. [6M]

What are the conditions for distortion less transmission from through a system? [6M]

UNIT-IV

8. a. State and explain sampling theorem for the band limited signals [8M]

b. Determine the Nyquist Sampling rate and interval for the signal $x(t) = \text{sinc}^2 200\pi t$ [4M]

(OR)

9. a. Explain briefly detection of periodic signals in the presence of noise by correlation. [8M]

b. Write the properties of autocorrelation. [4M]

UNIT-V

10. Find the inverse Laplace transform of $X(s) = \frac{2}{(s+4)(s-1)}$ if the region of convergence is a) $-4 < Re(s) < 1$ b) $Re(s) > 1$ c) $Re(s) < -4$ [12M]

(OR)

11. Determine the *Z*-transform of the following [6M+6M]

(i) $x(n) = \begin{cases} 1, & n \ge 0 \\ 3^n, & n<0 \end{cases}$

(ii) $x(n) = n(-1)^n u(n)$

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AR13 **Set 02**

Code: 13BS2006

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, December- 2017

PROBABILITY AND STATISTICS
(Common to CSE & IT)

Time: 3 hours **Max. Marks: 70**

PART-A

Answer all Questions [10X1=10M]

1. a) One card is selected at random from 25 cards numbered 1 to 25. Find the probability that the number on card is divisible by 5 ?
   b) What is the mathematical expectation if win Rs. 100 if a fair coin comes up head and loose Rs. 50 if it comes up with tail?
   c) When the binomial distribution tends to Poisson distribution?
   d) If a random variable has a probability distribution such that p(1)=p(2) then find mean of Poisson of distribution?
   e) When the t-test is used?
   f) Define alternative hypothesis.
   g) The intersection of two regression lines gives what?
   h) Write the control limits for mean chart?
   i) What is the steady state condition in queuing theory?
   j) In a single server queuing system with queue size is infinite what is the probability that the customer will directly enter in to the server room if $\lambda = 4$ and $\mu = 6$?

PART-B

Answer one question from each unit.

UNIT-I

2. a) In a class 40% students read mathematics, 25% physics, and 15% both mathematics and physics. One student is selected at random find (i) the probability that he reads mathematics if it is known that he reads physics (ii) the probability that he reads physics if he reads mathematics.
   b) The uniform distribution is given by f(x)=k for $a \leq x \leq b$
   = '0' elsewhere
   Find (i) k (ii) mean (iii) variance [6M+ 6M]

(OR)

3. a) state and prove Bayes theorem
   b) probability density function of random variable X is given by f(x)= 1/2 sinx for $0 \leq x \leq \pi$ = '0 ' elsewhere
   Find (i) median (ii) find the probability between 0 and $\pi/2$ [6M+ 6M]

UNIT-II

4. a) Out of 500 families with 5 children each , how many would you expect to have
   (i) 3 boys (ii) 5 girls
   Assume equal probabilities for boys and girls.
   b) calculate mean and variance of exponential distribution. [6M+ 6M]

(OR)

5. a) In a Poisson distribution P(x=0)= 2P(x=1), find p(x=2) and p(x=3)
   b) If X is normally distributed with mean 30 and standard deviation 5 then find (i) $p(26 < x < 40)$ (ii) $p(x \geq 45)$ [6M+ 6M]

UNIT-III

6. a) Two independent samples of 8 and 7 items respectively had the following values

Sample-I	11	11	13	11	15	9	12	14
Sample-II	9	11	10	13	9	8	10	-

Is the difference between the means of samples significant?

b) Explain the F-test for the equality of two variances. [6M+ 6M]

(OR)

7. a) Define (i) Type-I and Type-II errors (ii) degrees of freedom

b) 1000 students at college level were graded according to their I.Q and the economic conditions of their home. Use chi-square test to find out whether there is any association between conditions at home and I.Q at 0.05 L.O.S.

Economic conditions\I.Q	High	Low	Total
Rich	460	140	600
Poor	240	160	400
Total	700	300	1000

[6M+ 6M]

UNIT-IV

8. a) The regression lines of two variables X and Y are $3x + 2y = 26$ and $6x + y = 31$. Find the means of x and y and also the coefficient of correlation.

b) Briefly explain control charts for variables. [6M+ 6M]

(OR)

9. a) Determine the least square regression line of (i) Y on X (ii) X on Y(iii) find Y when x=8

X	12	10	14	11	12	9
Y	18	17	23	19	20	15

b) Explain the construction of control charts. [6M+ 6M]

UNIT-V

10.a) Write (i) Kendal and Lee notation for queuing model (b) operating characteristics

b) In a store with one server , 9 customers arrive on an average of 5 minutes. Service is done for 10 customers in 5 minutes. Find (i) the average number of customers in the system (ii) the average time a customer spends in a store (iii) the average time a customer waits before being served. [6M+ 6M]

(OR)

11.a) Explain queuing system

b) In a telephone booth, the arrivals follow poison distribution with an average of 9 minutes between two consecutive arrivals. The duration of a telephone call is exponential with an average of 3 minutes. Find (i) the probability that a person arriving at the booth has to wait. (ii) The company will install a second booth if a customer has to wait for phone, for at least 4 minutes. If so, find the increase in the flow of arrivals in order that another booth will be installed. [6M+ 6M]