Hall Ticket Number :										

R-14

Code: 4G236

II B.Tech. I Semester Supplementary Examinations May 2019

Electrical Engineering and Electronics Engineering

(Common to ME, CSE & IT)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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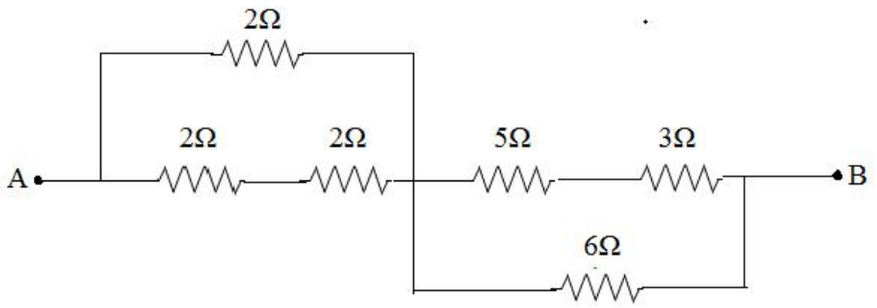
UNIT–I

1. a) Define the following i) Resistance ii) Inductance iii) Capacitance. Also give the V-I relationship for the above elements.

   b) Find the equivalent resistance between A & B terminals.



OR

2. a) Derive the expression for star to delta transformation.

   b) Two resistors of each 4Ω and 2Ω are connected in parallel across a 10V DC supply. Find the current through each resistor by current division technique.

UNIT–II

3. a) Explain the operation of principle of DC generator.

   b) Derive the expression for Torque in a DC Motor.

OR

4. a) Explain the speed control methods of a DC shunt motor.

   b) Elaborate about Swinburne's test on dc machine.

UNIT–III

5. A 400V, 10KVA, 3-Φ alternator with star connected stator winding has an effective armature resistance per phase of 1.0 Ω. The alternator generates an open circuit voltage per phase is 90V with a field current of 1.0A. During the short circuit test, with 1.0A of field current the short circuit current flowing in the armature is 15A. Calculate

   The synchronous impedance B) Synchronous reactance

OR

6. a) Explain the principle of operation of single phase Transformer with neat sketch.

   b) Explain Torque-Slip Characteristics of a Three phase induction motor.

UNIT–IV

7. Explain the operation of Bridge rectifier with relevant diagrams.

OR

8. a) Explain the operation of P-N junction diode mentioning its applications.

   b) Explain the input and output characteristics of transistor in CE configuration.

UNIT–V

9. Enumerate the applications of dielectric heating and induction heating.

OR

10. a) Describe how voltage, current and time period are measured by using CRO.

    b) List the applications of CRO.

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Hall Ticket Number :										

R-14

Code: 4GC31

II B.Tech. I Semester Supplementary Examinations May 2019

Mathematics-II

(Common to CE & ME)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Test for consistency and solve 5x+3y+7z=4; 3x+26y+2z=9; 7x+2y+10z=5 8M

   b) Show that the Eigen values of diagonal matrix are just the diagonal elements of the matrix 6M

OR

2. a) Determine the rank of the matrix $\begin{bmatrix} 0 & 1 & -3 & -1 \\ 1 & 0 & 1 & 1 \\ 3 & 1 & 0 & 2 \\ 1 & 1 & -2 & 0 \end{bmatrix}$ by reducing into Echelon form 7M

   b) Investigate the values of λ and μ so that the equations

   2x+3y+5z=9; 7x+3y-2z=8; 2x+3y+λz=μ

   have (i) no solution (ii) a unique solution and (iii) an infinite number of solutions 7M

UNIT–II

3. a) Find a root of the equation $x^2 - 4x - 9 = 0$ using bisection method correct to three decimal places 7M

   b) Find the missing term in the table

x	2	3	4	5	6
y	45	49.2	54.1	-	67.4

7M

OR

4. a) Find the Cubic polynomial which takes the values. $y(0)=1$, $y(1)=0$, $y(2)=1$ and $y(3)=10$ 7M

   b) Using Newton-Raphson Method, compute $\sqrt{41}$ correct to four decimal places 7M

UNIT–III

5. Apply Fourth order Runge-Kutta Method to find an approximate value of y when $x=1.2$ in step of 0.1, given that $y' = x^2 + y^2$, $y(1)=1.5$. 14M

OR

6. Employ Taylor's method to obtain approximate value of y at $x=0.2$ for the differential equation $\frac{dy}{dx} = 2x + 3e^x$ $y(0)=0$. Compare the numerical solution obtained with the exact solution 14M

UNIT–IV

7. Prove that $x^2 = \frac{®^2}{3} + 4\sum_{n=1}^{\infty} \frac{(-1)^n \cos nx}{n^2}$, $-® < x < ®$.

Hence show that

$(i) \sum \frac{1}{n^2} = \frac{®^2}{6}$

$(ii) \sum \frac{1}{(2n-1)^2} = \frac{®^2}{6}$

$(iii) \frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + ---- == \frac{®^2}{12}$ 14M

OR

8. Find the half range sine and cosine series of $f(x) = x$ in $0 < x < 2$ 14M

UNIT–V

9. a) Apply C-R conditions to $f(z) = z^2$ and show that the function is analytic everywhere. 7M

b) Evaluate $\int_c \frac{1}{(z-1)(z-3)} dz$ with C: $|z| = 2$ using Cauchy's Integral Formula 7M

OR

10. a) Using Cauchy's Integral Formula $\int_c \frac{\sin^2 z}{\left(z - \frac{®}{6}\right)^3} dz$ Evaluate where C is Unit Circle. 7M

b) If $u = x^2 + y^2$, find harmonic conjugate $v(x, y)$ and write the corresponding complex potential $f(z) = u + iv$ 7M

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Hall Ticket Number :										

R-14

Code: 4G531

II B.Tech. I Semester Supplementary Examinations May 2019

Mechanics of Solids

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) A 40mm cubical block is subjected to shear stress and it is observed that τ_e = 240 N/mm^2. If shear modulus G = 84 kN/mm^2,determine
   (i) the modulus of resilience,
   (ii) the shear strain at elastic limit and
   The total strain energy absorbed at elastic limit? 8M

   b) Two aluminum strips are rigidly fixed to a steel strip of section 25 mm x 8 mm and 1m long. The aluminum strips are 0.5 m long each with section 25 mm x 5 mm. the composite bar is subjected to a tensile force of 10 kN as shown in fig.a. Determine the deflection of point B. E_s=E_a=210 kN/mm^2

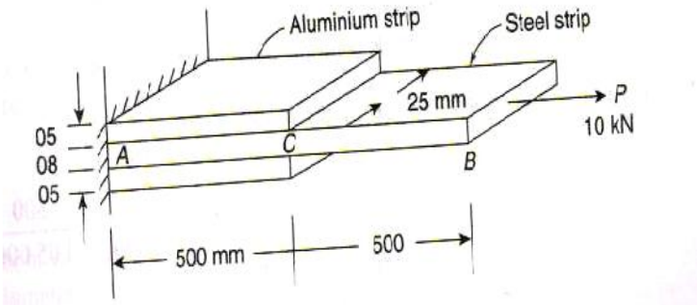


Fig a 6M

OR

2. a) A steel wire rope of a diameter of 10 mm is used for hoisting purpose during construction of a building. If a 50 m long wire rope is hanging vertically and 1kN load is being lifted at lower end of the wire determine the total extension of wire. Given the specific weight of the rope =0.06 N/cm^3 and E = 200 kN/mm$^{2.}$? 10M

   b) Define and explain the differences between the resilience and toughness briefly? 4M

UNIT–II

3. a) What do you understand by the positive and negative shear force? 4M

   b) Draw the shear force and bending moment diagrams for the beam show in fig.b?

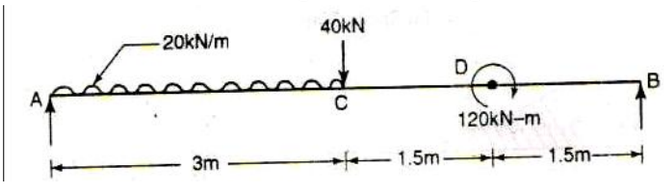


Fig b. 10M

OR

4. a) Draw the SFD and BMD for the overhanging beam shown in fig.c indicate the significant values including point of contra flexure?

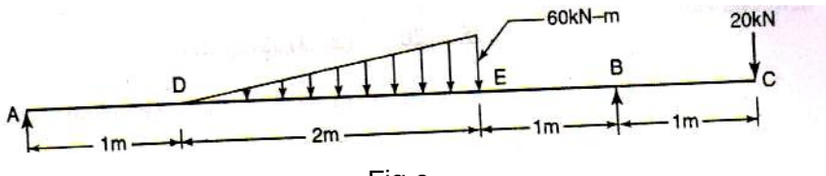
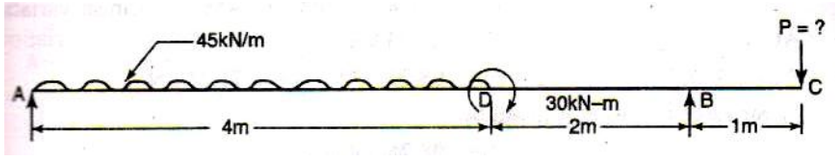


Fig c 7M

b) For the beam AC shown in fig.d, determine the magnitudes of load P acting at C, such that the reaction at supports A & B are equal?



figd 7M

UNIT–III

5. a) A CI beam of unequal I-section with top flange 150 mm x 10 mm, bottom flange 200 mm x 15 mm and web 275 mm x 10 mm is supported as a cantilever of length 3 m. What load can be applied at the free end of the cantilever if the tensile stress in the section is limited to 80 N/mm^2, the top flange of the beam comes under tension? 7M

b) Define the modulus of rupture and state its significance? 7M

OR

6. a) A wooden beam of rectangular section 15 cm x 30 cm is simply supported over a length of 4 m. It carries a UDL of 4kN/m throughout its length. What is the maximum shear stress developed in the beam section? 7M

b) A beam is of a circular section of diameter 80 mm. At particular section SF is 40kN. Draw the shear stress distribution along the depth of the section? 7M

UNIT–IV

7. a) An ISBM 150 rolled steel section is held as a cantilever of length 2 m. A weight of 200 N is dropped at the free end of the cantilever producing an instantaneous stress of 90 N/mm^2. Calculate height from which the weight was dropped and the maximum instantaneous deflection in the cantilever. I= 726.4 $x10^{-8}$ m^4, E=200 GPa 7M

b) A beam ABCD, 7m long hinged at A and roller supported at D carries 7kN load at B and 4 kN/m UDL over BC= 3m. If EI = 14,000 kNm^2 for the beam, determine the slope at A and deflection at point C. 7M

OR

8. a) An I section steel girder with I_{xx} = 2,502 x 10^4 mm^4 is used as a beam for a span length of 4 m. The beam carries a UDL of 4 kN/m throughout its length. Determine the maximum deflection in the beam and slope at the end of the beam? 10M

b) Derive the relationship between the bending moment and curvature in deflection of beams? 4M

UNIT–V

9. a) State the scientific reason why cylinders burst along longitudinal direction when they subjected to high pressure? 3M

b) A thin cylindrical shell made of 5 mm thick steel plate is filled with water under pressure of 3 N/mm^2. The internal diameter of the cylinder is 200 mm and its length is 1m. Determine the additional volume of the water pumped inside the cylinder to develop the required pressure. Take for steel E = 208 kN/mm^2 and 1/m= 0.3 and for water K = 2,200 N/mm^2? 11M

OR

10. a) A compound cylinder is made by shrinking one cylinder over another such that the outer diameter is 200 mm, the inner diameter is 100 mm and the junction diameter is 150 mm. If the junction pressure developed between the two cylinders is 10 N/mm^2 and the internal pressure is 50N/mm^2, what are the hoop stresses at inner and outer radii of both the cylinders? 7M

b) For what length of a CI column of 80 mm in diameter, the Euler's theory is applicable, if σ_c = 550 N/mm^2 for CI and E = 102 kN/mm^2, the column is hinged at both the ends? 7M

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Hall Ticket Number :										

R-14

Code: 4G533

II B.Tech. I Semester Supplementary Examinations May 2019

Basic Thermodynamics

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Explain quasi-static process. Explore its importance in Engineering. 7M

   b) An electric generator coupled to a windmill produces an average electrical power output of 5 kW. The power is used to charge a storage battery. Heat transfer from the battery to the surroundings occurs at a constant rate of 0.6 kW. Determine the total amount of energy stored in the battery, in kJ, in 8 hr. of operation. 7M

OR

2. a) Explain the terms state, path, process and cyclic process. 7M

   b) Explain working of constant volume gas thermometer with a neat diagram. 7M

UNIT–II

3. a) Derive steady flow energy equation. 7M

   b) A new scale N of temperature is divided in such a way that the freezing point of ice is 1000N and the boiling point is 4000N. What is the temperature reading on this new scale when the temperature is 1500C? At what temperature both the Celsius and the new scale reading would be the same? 7M

OR

4. a) State the Kelvin-Plank and Clausius statements of the second law of thermodynamics and establish equivalence between them. 7M

   b) State and prove Carnot Principle or Carnot theorem. 7M

UNIT–III

5. a) A mass of air is initially at 2600C and 700 KPa and occupies 0.028m^3. The air is expanded at constant pressure to 0.084m^3 .A Polytrophic process with n = 1.5 is then carried out, followed by a constant temperature process, which completes a cycle. All the processes are reversible i. Sketch the cycle in the P-v &T-s planes ii. Find heat received & rejected in the cycle iii. Find efficiency (η) of the cycle. 7M

   b) What is the difference between ideal gas and a perfect gas? What is equation of state? 7M

OR

6. a) State Dalton's law of partial pressures. 7M

   b) 1 kg of air at 1.2 bar pressure and 18^0C is compressed isentropically to 7 bars. Find the final temperature and the work done. If the air is cooled at the upper pressure to the original temperature of 18^0C,what amount of heat is rejected and what further work of compression is done. 7M

UNIT–IV

7. a) A blower handles 1 kg/sec of air at 20^0C and consumes a power of 15 kW. The inlet and outlet velocities of air are 100 m/s and 150 m/s respectively. Find the exit air temperature, assuming adiabatic conditions. 7M

   b) Derive Clausius Clapeyron equation and explain its significance. 7M

OR

8. a) Write down the Vander Waal's equation of state. How does it differ from the ideal gas equation of state? 7M

   b) A mass of 0.25 kg of an ideal gas has a pressure of 300 kPa, a temperature of 80^0C, and a volume of 0.07m^3. The gas undergoes an irreversible adiabatic process to a final pressure of 300 kPa and a final volume of 0.1 m^3, during which the work done on the gas is 25 kJ. Evaluate the specific heat at constant pressure and constant volume of the gas and the increase in entropy of the gas. 7M

UNIT–V

9. a) Prove that heat and work are path functions. 7M

   b) Determine the power required to run a refrigerator that transfers 2000 KJ/min of heat from a cooled space at 0^0C to the surrounding atmosphere at 27^0C.The refrigerator operates on reversed Carnot cycle. 7M

OR

10. a) State the first law of thermodynamics and prove that for non-flow process it leads to $Q=W+\Delta U$. 7M

    b) A spherical balloon holds 5 kg of air at 200 kPa and 450 K. If the air pressure inside is always proportional to the square of the balloon diameter, determine the work done when the balloon volume doubles due to heating. 7M

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