Hall Ticket Number :										

R-11 / R-13

Code: 1GC31

II B.Tech. I Semester Supplementary Examinations May 2019

Mathematics-II

(Common to CE & ME)

Max. Marks: 70 Time: 3 Hours

Answer any **five** questions
All Questions carry equal marks (**14 Marks** each)

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1. a) Given the matrix $A=\begin{bmatrix}1 & 7 & 5\\ 0 & 2 & 9\\ 0 & 0 & 5\end{bmatrix}$, find the Eigen values and Eigen vectors. Prove that the sum of Eigen values is Trace of matrix A and Product of Eigen values is $|A|$.

   b) Show that the Eigen values of Diagonal matrix are diagonal elements of the Matrix.

2. Obtain the Fourier series for $f(x)=\left(\frac{® - x}{2}\right)^2$ in $0<x<2®$

3. a) Form a partial differential equation by eliminating the arbitrary constants $2z=\frac{x^2}{a^2}+\frac{y^2}{b^2}$.

   b) Form a partial differential equation by eliminating the arbitrary function from $z=f\left(x^2-y^2\right)$.

4. Find a real root of the equation $3x=\cos x+1$ by Newton-Raphson's method correct to four decimal places.

5. Using Taylor's series method, compute the value of y at x=0.2 and x=0.4 from $\frac{dy}{dx}=x+y;\ y(0)=1$.

6. From the following table of values of 'x' and 'y', obtain $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at x=1.5

X	1.5	2.0	2.5	3.0	3.5	4.0
y	3.375	7.0	13.625	24.0	38.875	59.0

7. Show that the function $f(z)=\sqrt{|xy|}$ is not analytic at the origin although the Cauchy Riemann equations are satisfied at the origin.

8. Expand $f(z)=\frac{1}{(z-1)(z-2)}$ in the region $(i):|z|<1$ $(ii):1<|z|<2$ $(iii):|z|>2$ $(iv):0<|z-1|<1$

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Hall Ticket Number :										

R-11 / R-13

Code: 1G531

II B.Tech. I Semester Supplementary Examinations May 2019

Mechanics of Solids

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

Answer any **five** questions

All Questions carry equal marks (**14 Marks** each)

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1. a) Derive the relationship between Elastic constants.

   b) A steel rod of 3cm diameter and 5m long is connected to two grips and
   The rod is maintained at a temperature of 95°C. Determine the stress and pull exerted when the temperature falls to 30°C, if
   (i) the ends do not yield, and (ii) the ends yield by 0.12 cm.
   Take E=2X10^5 MN/m^2 and Co-efficient of linear expansion=12xl0^{-6}/^{0}C.

2. A simply supported beam of length 5 m carries a uniformly increasing load of 600 N/m run at one end to 1200 N/m run at the other end. Draw the S.F. and B.M. diagrams for the beam. Also calculate the position and magnitude of maximum bending moment.

3. a) State the assumptions involved in the theory of simple bending.

   b) Derive the bending equation from first principle.

4. A simply supported wooden beam of span 2 m having a cross-section 150 mm wide by 250 mm deep carries a point load W at the centre. The permissible stress are 10 N/mm^2 is bending and 2 N/mm^2 in shearing. Calculate the safe load W.

5. a) State the assumptions made in the theory of torsion and derive torsion equation.

   b) A hollow shaft of external diameter120 mm transmits 300kW power at 200 r.p.m. Determine the maximum internal diameter if the maximum stress in the shaft is not to exceed 60 NImm$^{2.}$

6. A cantilever of length 2m carries a point load of 20 KN at the free end and another load of 20 KN at its center. If E = 10^5 N/mm^2 and I=10^8 mm^4 for the cantilever then determine by moment area method, the slope and deflection of the cantilever at the free end.

7. a) Derive the expression for the crippling load when both ends of the column are hinged.

   b) A solid round bar 6 cm in diameter and 2.5 m long is used as a strut. One end of the strut is fixed while its other end is hinged. Find the safe compressive load for this strut using Euler's formula. Assume E = 200 GPa and factor of safety = 3.

8. a) Derive Lami's equation of thick cylinders.

   b) A spherical shell of internal diameter 0.9 m and of thickness 10 mm is subjected to an internal pressure of 1.4 N/mm^2. Determine the increase in diameter and increase in volume. Take E = 2 x 10^5 N/mm^2 and Poisson's ratio is 0.33.

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Hall Ticket Number :										

R-11 / R-13

Code: 1G533

II B.Tech. I Semester Supplementary Examinations May 2019

Themodynamics

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

Answer any **five** questions
All Questions carry equal marks (**14 Marks** each)

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1. a) Classify thermodynamics systems with a suitable example for each.
   b) What do you understand by macroscopic and microscopic viewpoints? Explain.

2. Explain clearly the difference between a non-flow and a steady flow process. Derive Steady Flow Energy Equation for Turbine.

3. a) An inventor reports that he has developed an engine that operates between the temperature limits of 80^0C and -17^0C. During the process the engine absorbs 23 x 10^3 kJ/h of heat and develops 2 kW of power. Show with reason how far his claim is justified.
   b) Discuss about the limitations of First law of Thermodynamics.

4. a) Define Clausius inequality and prove its statement.
   b) Explain the concept of principle of increase of entropy.

5. a) Explain the combined separating and throttling calorimeter to obtain dryness fraction.
   b) Describe the Mollier diagram and explain its uses.

6. a) 1.5 kg of air at pressure 6 bar occupies a volume of 0.2 m^3.If this air is expanded to a volume of 1.1 m^3 ,find the work done and heat absorbed or rejected by the air for each of the following methods i)Isothermally , ii)Adiabatically
   b) Show that for an ideal gas the internal energy depends only on its temperature.

7. a) State and prove Daltons law of partial pressures and Avogadro's law of additive volumes.
   b) A gas mixture consists of 70% N_2 and 30% CO_2 by mole basis .Determine gravimetric analysis of the mixture .

8. a) An air standard Otto cycle has a compression ratio of 7. At the start of the compression process, the temperature is 30^0 C. and the pressure is 1 bar. If the maximum temperature of the cycle is 1100^0 C. Calculate i) The heat supplied per kg of air. ii) The network done per kg of air iii) The thermal efficiency of the cycle.
   b) Explain different processes in a Dual cycle with the help of PV & TS diagrams.

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Hall Ticket Number :										

R-11 / R-13

Code: 1G534

II B.Tech. I Semester Supplementary Examinations May 2019

Machine Drawing

(Mechanical Engineering)

Max. Marks: 70 Time: 4 Hours

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SECTION-I

Answer any two from the following (2 x 4 = 8Marks)

1 Draw the conventional representation of i) glass ii) liquids

2. Draw the T-headed bolt with dia 20mm.

3. Draw the flat saddle key by considering the dimensions.

SECTION-II

Answer any two from the following (2 x 10 = 20Marks)

4. Draw the hexagonal headed bolt with a nut and a washer in position considering dia as 25mm.

5. Draw the cotter joint with gib

6. Draw the split-muff coupling.

SECTION-III

Answer the following question (1 x 42 = 42 Marks)

7. Figure shows the details of a eccentric. Assemble the parts and draw the following views:
   (a) Front view – upper half in section.
   (b) Top view.

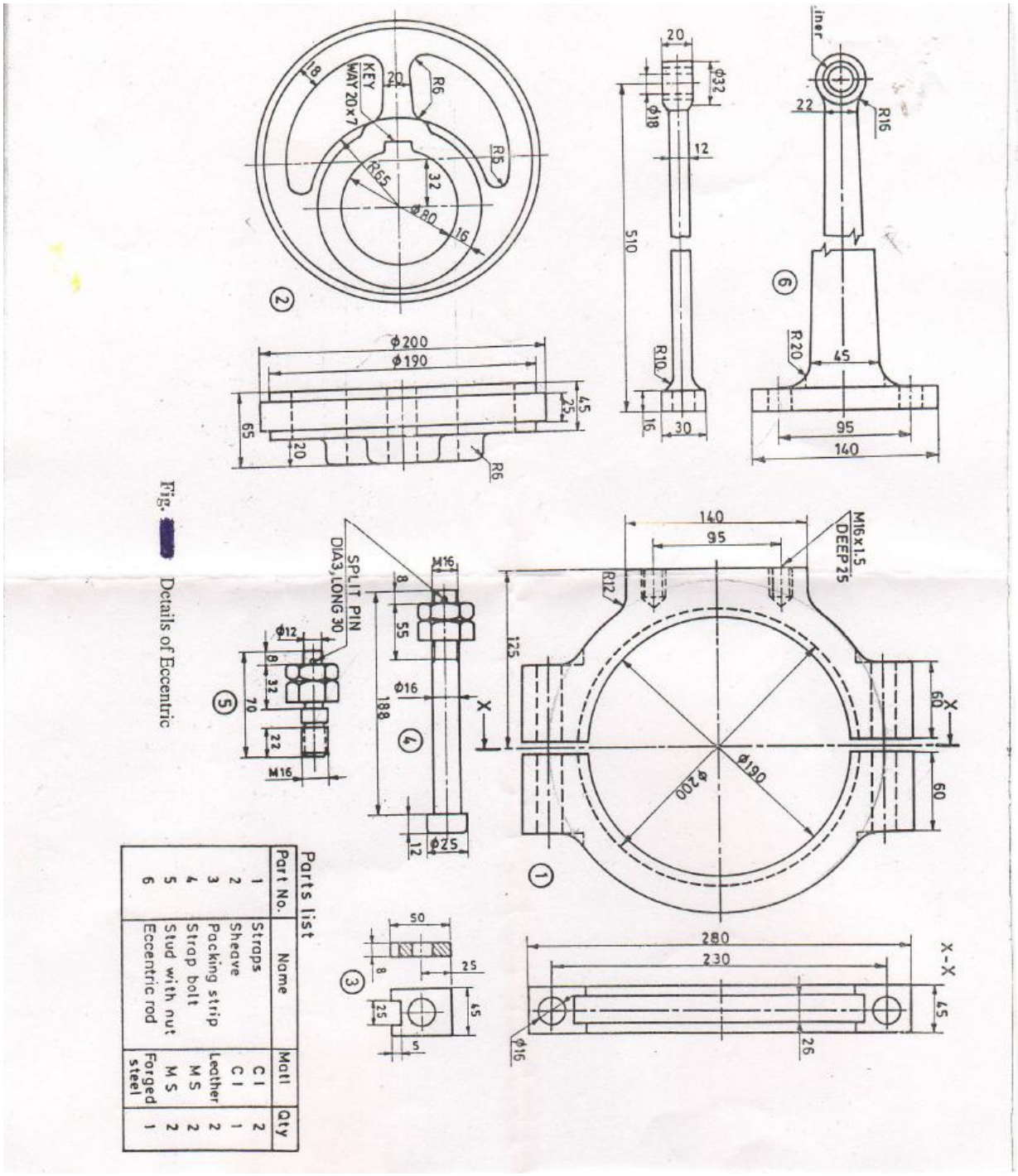

Fig. [redacted] Details of Eccentric