Hall Ticket Number :										

R-11/R-13

Code: 1GC31

II B.Tech. I Semester Supplementary Examinations November 2016

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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1. a) Verify Cayley-Hamilton theorem for the matrix $A=\begin{bmatrix}1&2&3\\2&4&5\\3&5&6\end{bmatrix}$ and hence find the inverse of *A* 8M

   b) Diagonalize the matrix $A=\begin{bmatrix}4&1\\2&3\end{bmatrix}$ 6M

2. a) Obtain the Fourier series of $f(x)=\frac{(\pi-x)}{2}$ in the interval $(0,2\pi)$.

   Deduce $\frac{\pi}{4}=1-\frac{1}{3}+\frac{1}{5}-\frac{1}{7}+\cdots$ 7M

   b) Find Fourier series of $f(x)=x^3$ in the interval $(-\pi,\pi)$ 7M

3. a) Form the partial differential equation by eliminating the arbitrary function $xyz=f(x+y+z)$ 7M

   b) Use the separation of variables technique to solve $3\frac{\partial u}{\partial x}+2\frac{\partial u}{\partial y}=0$ with $u(x,0)=4e^{-x}$ 7M

4. a) Apply Newton-Raphson method to evaluate approximately $\sqrt{12}$ 7M

   b) Using Newton's forward formula compute the pressure of the steam at temperature 142° from the following steam table

Temperature	140	150	160	170	180
Pressure	3.685	4.854	6.302	8.076	10.225

   7M

5. Using Runge-Kutta fourth order method find the solution of $\frac{dy}{dx}=x+y$ with initial condition $y(0)=0, h=0.25$ on the interval $[0,1]$. 14M

6. a) Find the first two derivatives at *x* = 16 from the following table:

x	15	17	19	21	23	25
y	3.873	4.123	4.359	4.583	4.796	5.8

   7M

   b) Given that $y=\log x$, and

x	4.0	4.2	4.4	4.6	4.8	5.0	5.2
y	1.3863	1.4351	1.4816	1.5261	1.5686	1.6094	1.6487

   Evaluate $I=\int_4^{5.2}\log x\ dx$ by i) Trapezoidal rule and ii) Simpson's rule 7M

7. a) Show that the function $u(x,y)=e^x\cos y$ is harmonic. Determine its harmonic conjugate $v(x,y)$ and the analytic function. 7M

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

8. a) Evaluate $\int_C \frac{e^z dz}{z(z-1)^3}$ where $C:|z|=2$ using Cauchy's integral formula 7M

   b) Obtain the Laurent's series expansion of the function $f(z)=\frac{z^2-1}{(z+3)(z+2)}$ in the region $2<|z|<3$. 7M

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Hall Ticket Number :										

R-11/R-13

Code: 1G237

II B.Tech. I Semester Supplementary Examinations November 2016

Electrical Engineering and Electronics Engineering

(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) State and explain KVL and KCL. 7M

   b) Find the current 'I' in the below circuit (shown in Figure.1).

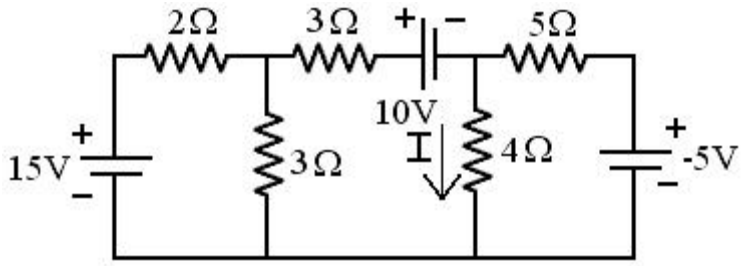

Figure 1 7M

2. a) Derive the expression for torque developed in the armature of a DC motor. State the factors on which the torque depends. 7M

   b) A 12 pole, DC generator has total flux of 0.3 wb and the armature conductors are lap wound with 600conductors. Calculate the generated emf on open circuit when it runs at 500rpm. If the armature is wave wound, at what speed it must be driven to generate the same voltage. 7M

3. a) Explain in detail O.C and S.C tests to be conducted on a transformer for calculation of regulation. 9M

   b) The open-circuit test readings on a 400/200 V, single phase transformer conducted from L.V side are : voltage = 200 V; current = 0.7 A ; power = 95 W. Calculate the no-load circuit parameters referred to H. V side. 5M

4. A rotating magnetic field is produced in the air gap of a 3-phase induction motor when a balanced supply is given to the stator. Justify the statement with necessary mathematical equations and phasor diagrams. 14M

5. a) Explain the operation of Half wave and Full wave rectifiers using the wave forms. 9M

   b) Explain the effect of temperature on volt-ampere characteristics of a diode. 5M

6. a) Describe the operation of NPN transistor. 9M

   b) Write the various applications of SCR. 5M

7. a) State the principle of operation application and relative merits & demerits of direct type of induction furnace. 7M

   b) Explain the Principle of dielectric heating and applications 7M

8. a) With the help of neat sketch describe the construction and working of various parts of a cathode ray tube. 9M

   b) Explain how a frequency can be measured using a CRO. 5M

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Hall Ticket Number :										

R-11/R-13

Code: 1G531

II B.Tech. I Semester Supplementary Examinations November 2016

Mechanics of Solids

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

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

1. a) A tensile test was conducted on a specimen. The following data was obtained from the test: Diameter =22mm; Gauge length of extensor meter = 200 mm; Least count of extensor meter = 0.001 mm; at a load of 22 kN, extensor meter reading = 60; at a load of 36 kN, extensor meter reading = 94; Yield load = 95 kN; Maximum load=157kN; Diameter at neck=15mm; Final length over 100 mm original length=132 mm. Find Young's Modulus, yield stress, ultimate stress, percentage elongation and percentage reduction in area. 10M

   b) Draw the stress-strain diagram of mild steel specimen subjected to tensile test and mark the salient points. 4M

2. Draw the shear force and bending moment diagrams and find the maximum bending moment for the beam shown in Fig.2.

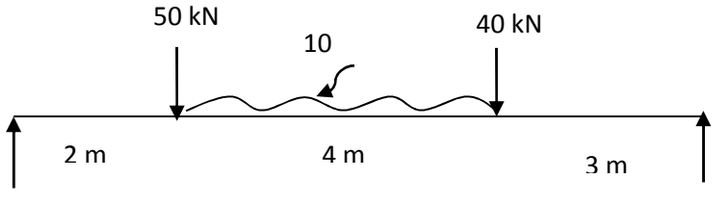

Fig.2

14M

3. a) Derive an expression for $M/I = Q/Y = E/R$ 7M

   b) A rectangular beam 300 mm deep is simply supported over the span of 4 m. Determine the uniformly distributed load per meter which the beam may carry, if the bending stress should not exceed 120 N.mm^2. Take I=8x10^6 mm^4. 7M

4. a) What is shear center? Mention its practical significance. 4M

   b) An I section beam 350 X 150 mm has a web thickness of 10mm and a flange thickness of 20 mm. If the shear force acting on a section is 40 kN, find the maximum shear stress developed in the I section. 10M

5. a) Write the assumptions made in torsion equation. 4M

   b) Find the angle of twist per metre length of a hollow shaft of 100 mm external diameter and 60 mm internal diameter, if the shear stress is not to exceed 35 MPa. Take modulus of rigidity G = 85 GPa. 10M

6. A simply supported beam of length 7m is supported at its ends. It is carrying two point loads of 5 kN at a distance of 1m and 2m respectively from the left end of the beam. Determine the slope at the support points, the deflection under the applied loads and the position and magnitude of maximum deflection. Take E as 90 GPa and I as 18x10^{-6} m^4. 14M

7. Find the Euler's crippling load for a hollow cylindrical steel column of 38 mm external diameter and 2.5 mm thick. Take length of the column as 2.3 m and hinged at its both ends. Take E= 205 kN/ mm^2. Also determine the crippling load by Rankine's formula using f_c= 335 N/mm^2 and a= 1/7500. 14M

8. A closed cylindrical vessel made of steel plates 4 mm thick, carries fluid under pressure of 3.5 N/mm^2. The diameter of the cylinder is 27 cm and length is 77 cm. Calculate the longitudinal and hoop stresses in the cylinder wall and determine the change in diameter, length and volume of the cylinder. Take E=2.1 x 10^5 N/mm^2 and Poisson's ratio = 0.3. 14M

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Hall Ticket Number :										

R-11/R-13

Code: 1G532

II B.Tech. I Semester Supplementary Examinations November 2016

Metallurgy and Material Science

(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)	Define APF (Atomic Packing Factor) and calculate APF for different crystal structures	7M
	b)	Explain different crystalline defects.	7M
2.	a)	Define Solid Solution with examples.	7M
	b)	What are different reactions in binary phase diagram?	7M
3.		Draw Iron Carbon Diagram with neat sketch; explain different reactions occur in Iron Carbon diagram.	14M
4.		What are different types of cast iron, and explain their properties	14M
5.	a)	What is annealing? , Explain the procedure.	7M
	b)	Explain the time-temperature-transformation(TTT) Characteristics of eutectoid steel.	7M
6.	a)	What are the major types alloys of Copper and explain their properties.	7M
	b)	Exemplify the industrial applications of different nonferrous metals.	7M
7.	a)	Explain any two manufacturing methods of Fiber Reinforced Plastics.	7M
	b)	What are the benefits of composite materials over the metals and alloys?	7M
8.		Discuss about different methods of steel making.	14M

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Hall Ticket Number :										

R-11/R-13

Code: 1G533

II B.Tech. I Semester Supplementary Examinations November 2016

Thermodynamics

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any* **five** questions

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

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1. a) Distinguish between Extensive and Intensive properties with examples. 4M

   b) A gas of mass 1.5 kg undergoes a quasistatic expansion which follows the relationship p = a + bv where a and b are constants. The initial and final pressures are 1000 kPa and 200 kPa respectively and the corresponding volumes are 0.2 m^3 and 1.2 m^3. The specific internal energy of the gas is given by u = 1.5pv - 85kJ/kg where p is in kPa and v is in m^3/kg. Calculate the work done during the process. 10M

2. a) What is PMM I ? Why is it impossible ? 4M

   b) The velocity and enthalpy of fluid at the inlet of a certain nozzle are 50 m/sec and 2800 kJ/kg respectively. The enthalpy at the exit of the nozzle is 2600 kJ/kg. The nozzle is horizontal and insulated so that no heat transfer takes place from it. Find **i**) velocity of fluid at the exit of the nozzle **ii**) Mass flow rate, if the area at inlet of nozzle is 0.09 m^2 **iii**) Exit area of the nozzle, if the specific volume at the exit of the nozzle is 0.495 m^3/kg 10M

3. a) A reversible heat engine operates between two reservoirs at temperatures 700°C and 50°C. The engine drives a reversible refrigerator which operates between reservoirs at temperatures of 50°C and – 25°C. The heat transfer to the engine is 2500 kJ and the net work output of the combined engine refrigerator plant is 400 kJ. Determine the heat transfer to the refrigerant and the net heat transfer to the reservoir at 50°C. 8M

   b) State and prove the Carnot's principle. 6M

4. a) Establish the inequality of Clausius. 6M

   b) Derive the Tds equation taking T and v as independent variables. 8M

5. a) 1 kg of steam initially dry saturated at 1.1 MPa expands in a cylinder following the law $pV^{1.13} = c$. The pressure at the end of expansion is 0.1 MPa. Determine **i**) the final volume **ii**) final dryness fraction **iii**) work done **iv**) change in internal energy **v**) heat transferred. 10M

   b) Draw the phase transformation diagram of a substance which expands on freezing. 4M

6. a) Derive Dalton's law of partial pressure. 8M

   b) Explain the significance of compressibility factor 'Z'. 6M

7. a) Define mass fraction and mole fraction. 4M

   b) A mixture of ideal gases consists of 2.5 kg of N_2 and 4.5 kg of Co_2 at a pressure of 4 bar and temperature of 25°C. Determine **i**) mole fraction of each constituent **ii**) equivalent molecular weight of the mixture **iii**) equivalent gas constant of the mixture **iv**) partial pressures and partial volumes **v**) volume and density of the mixture. 10M

8. a) Derive an expression for air standard efficiency of Diesel cycle with p-V and T-s diagram. 8M

   b) Compare Otto cycle, Diesel cycle and dual cycle. 6M

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Hall Ticket Number :										

R-11/R-13

Code: 1G534

II B.Tech. I Semester Supplementary Examinations November 2016

Machine Drawing

(Mechanical Engineering)

Max. Marks: 70 Time: 4 Hours

Section-I

Answer any **two** of the following 2x4=8M

1. Draw the Conventional representation of
   (i) Wood Material and
   (ii) Concrete
2. Draw Square Headed Bolt with diameter 25 mm.
3. Draw the Wood Ruff Key in its assemble.

Section-II

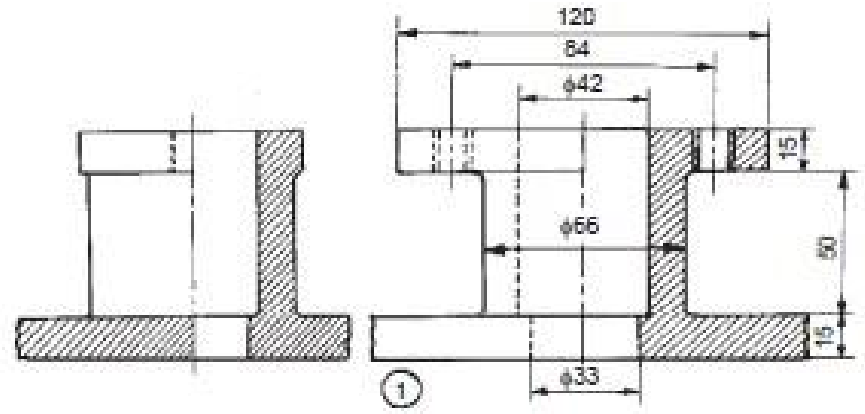
Answer any **two** of the following 2X10=20M

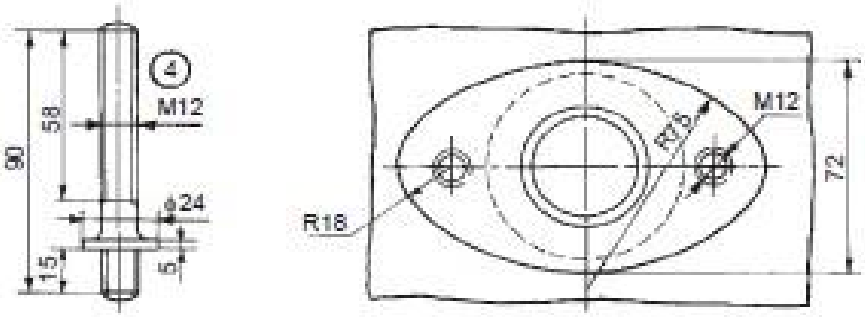
4. Draw the Eye-bolt with 25mm diameter.
5. Draw the Cotter Joint with gib for joining 25 mm diameter shafts.
6. Draw the two views of the protective Flange coupling for joining 25mm diameter shafts.

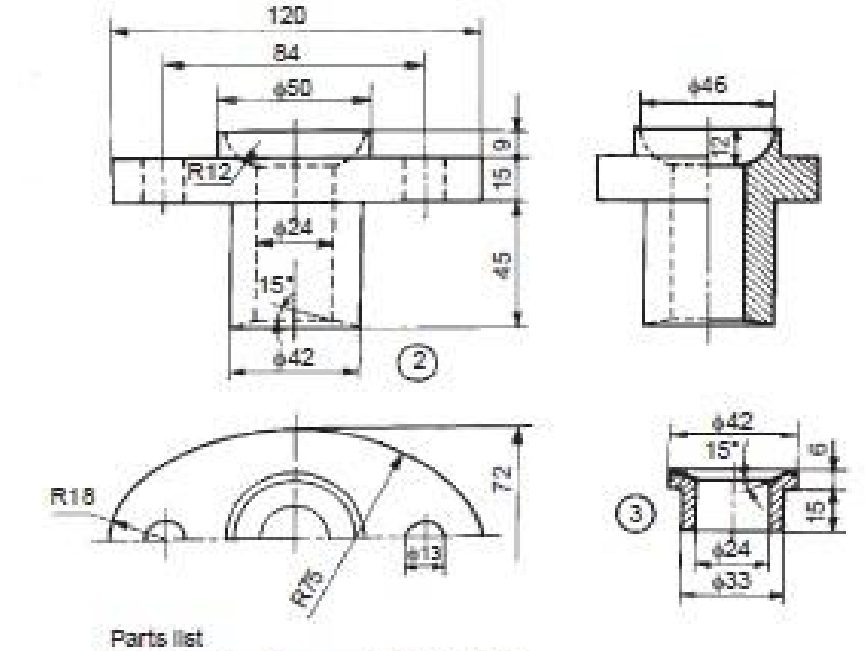
Section-III

Answer the following question 1X42=42M

7. Draw the following assembled views of a stuffing box shown in figure:
   (a) Half sectional view from the front.
   (b) Half sectional view from the right







Parts list

Part No.	Name	Matl	Qty
1	Body	CI	1
2	Gland	Brass	1
3	Bush	Brass	1
4	Stud	MS	2
5	Nut, M12	MS	2

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