II Year B. Tech II- Semester

MECHANICAL ENGINEERING

MODEL QUESTION PAPERS

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING

(Autonomous Institution-UGC, Govt. of India)
Secunderabad-500100, Telangana State, India.
www.mrcet.ac.in

APPLIED THERMODYNAMICS

R18

Code No: R18A0308

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Supplementary Examinations, February 2022

Applied Thermodynamics

(ME)

Roll No										

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

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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NOTE : Data books are permitted

SECTION-I

1 a) Explain the effect of operating variables on Rankine cycle performance. **[7M]**

b) Steam power plant has boiler and condenser pressures of 60 bar and 0.1 bar; respectively. Steam coming out of the boiler is dry and saturated. The plant operates on the Rankine cycle. Calculate thermal efficiency. **[7M]**

OR

2 a) Sketch and describe the operation of Cochran boiler. What are its special features? **[7M]**

b) Why boiler mountings are installed. Explain the operation of fusible plug with the help of simple diagram. **[7M]**

SECTION-II

3 Steam enters a group of convergent-divergent nozzles at a pressure of 22 bar and with a temperature of 240°C. The exit pressure is 4 bar and 9% of the total heat drop is lost in friction. The mass flow rate is 10kg/s and the flow up to throat may be assumed friction less. Calculate (i).The throat and exit velocities, and (ii) The throat and exit areas. **[14M]**

OR

4 a) Sketch and describe the operation of down flow surface condenser. **[7M]**

b) Explain the working of an evaporative condenser with a sketch. **[7M]**

SECTION-III

5 Sketch the velocity diagram of a single stage impulse turbine and determine the expression for the force, work done, diagram efficiency and axial thrust. **[14M]**

OR

6 Show that for maximum diagram efficiency of a reaction turbine the blade-steam speed ratio is equal to cos α, where α is the angle of absolute velocity at inlet. State the assumptions made. **[14M]**

SECTION-IV

7 In a simple gas turbine plant, air enters at 1 bar and 20^0C and compressed with isentropic efficiency of 80% to 4bar. Then it is heated in combustion chamber with A:F ratio=90:1. The Calorific value of a fuel used is 41.8 MJ/kg. If air flow is 3kg/sec, find the power developed and thermal efficiency by the plant. Take C_p= 1kJ/kg ^{0}C and ϒ=1.4 for air as well as gas. **[14M]**

OR

8	With the help of neat sketch, explain the working of Open cycle Gas Turbine Plant.	**[14M]**

SECTION-V

9	Explain the difference between a turbojet and turboprop unit by drawing sketches	**[14M]**

OR

10	a) Write short notes on liquid propellant engines.	**[5M]**
	b) What is meant by thrust augmentation? When is it necessary? Describe any one method of thrust augmentation.	**[9M]**

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R18

Code No: R18A0308

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Regular/Supplementary Examinations, July 2021

Applied Thermodynamics

(ME)

Roll No										

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

Answer Any **Five** Questions
All Questions carries equal marks.

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Note: Steam Tables and Mollier charts are permitted.

1	a) Explain the working and analysis of regenerative rankine cycle with one feed water heater.	**[7M]**
	b) In a Rankine cycle the steam at inlet to turbine is saturated at a pressure of 35 bar and exhaust pressure is 0.2bar. Determine (i) The pump work (ii) The turbine work (iii) The Rankine efficiency (iv) The condenser heat flow (v) The dryness fraction at the end of expansion. Take a flow rate of 10kg/sec.	**[7M]**
2	a) Compare and contrast the boiler mountings and accessories.	**[7M]**
	b) Draw the line diagram and explain the working of a Babcock and Wilcox boiler and mention its limits	**[7M]**
3	a) A convergent-divergent nozzle is required to discharge 2 kg of steam per second. The nozzle is supplied with steam of 10 bar and 200^0C and discharge takes place against a back pressure of 0.34 bar. Estimate the throat and exit areas. Assume isentropic flow and take the index n = 1.3. If the nozzle efficiency is assumed to be 85%, determine the exit area.	**[7M]**
	b) What is the effect of friction on the flow through a steam nozzle? Explain with help of h-s diagram.	**[7M]**
4	a) Explain working principle of Surface Condenser with neat sketch.	**[7M]**
	b) Discuss the merits and demerits of surface condensers over jet condensers.	**[7M]**
5	a) Draw the line diagram and explain pressure compounded impulse turbine.	**[7M]**
	b) A single stage of simple impulse turbine produce 120 kW at blade speed of 150 m/s when steam mass flow rate is 3 kg/s. Steam enters moving blade at 350 m/s and leaves the stage axially. Considering velocity coefficient of 0.9 and smooth entry without shock into blades, determine the nozzle angle and blade angles. Solve using velocity diagram.	**[7M]**
6	a) Derive the condition for maximum efficiency and blade height of reaction turbine.	**[7M]**
	b) In a Parson reaction turbine, the angles of receiving tips are 350 and of discharging tips, 200. The blade speed is 100 m/s. Calculate the tangential force, power developed, diagram efficiency and axial thrust of the turbine, if its steam consumption is 1 kg/min.	**[7M]**
7	Discuss briefly the methods employed for the improvement of thermal efficiency of an open cycle gas turbine plant.	**[14M]**
8	a) Explain the principle and working of liquid propellant rocket engine with neat sketch.	**[7M]**
	b) What are the desirable properties of a liquid propellant for a rocket engine?	**[7M]**

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R18

Code No: R18A0308

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Supplementary Examinations, February 2021

Applied Thermodynamics

(ME)

Roll No										

Time: 2 hours 30 min **Max. Marks: 70**

Answer Any **Five** Questions
All Questions carries equal marks.
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NOTE: Steam Tables are Permitted.

1	a) What are the methods, which can lead to increase in thermal efficiency of ranking cycle?	**[7M]**
	b) A steam turbine is supplied with dry saturated steam at 25 bar. The exhaust takes place at 0.2 bar. For a flow rate of 8 kg/s, calculate the (i) power required to drive the pump (ii) turbine power (iii) Rankine efficiency and quality of steam at the end of expansion	**[7M]**
2	a) State the difference between the High pressure boilers and low pressure boilers	**[7M]**
	b) What is an economiser, Explain its working and how does it impact on the efficiency of a boiler.	**[7M]**
3	Steam at 10.5 bar and 0.95 dryness is expanded through a convergent divergent nozzle. The pressure of steam leaving the nozzle is 0.85 bar. Find i) velocity of steam at throat for maximum discharge, ii) the area at exit iii) steam discharge if the throat area is $1.2cm^2$. Assume the flow is isentropic and there are no friction losses. Take n= 1.135.	**[14M]**
4	a) Classify the steam condensers. What are the differences between the jet condensers and Surface condensers?	**[7M]**
	b) In surface condenser the vacuum maintained is 700 mm of Hg. The barometer reads 754 mm. If the temperature of condensate is 18 ^{0}C. Determine (i) mass of air per Kg of steam (ii) Vacuum Efficiency	**[7M]**
5	a) Explain differences between impulse and reaction turbines	**[7M]**
	b) In a simple impulse turbine the nozzles are inclined at 20^0 to the direction of motion of the moving blades. The steam leaves the nozzle at 375m/s. The blade velocity is 165m/s. Calculate suitable inlet and outlet angles for the blades in order that the axial thrust is zero. The relative velocity of steam as it flows over the blades is reduced by 15% by friction. Also determine the power developed for a flow rate of 10kg/s.	**[7M]**
6	a) Explain with the help of neat sketch a single stage impulse turbine. Also explain the pressure and velocity variation along the axial direction.	**[7M]**
	b) In a reaction turbine, the blade tips are inclined at 35^0 and 20^0 in the direction of motion. The guide's blades are of the same shape as the moving blades, but	**[7M]**

reversed in direction. At a certain place in the turbine, the drum diameter is 1 meter and the blades are 10cm high. At this place, the steam has a pressure of 1.75 bar and dryness 0.935. If the speed of this turbine is 250 rpm and the steam passes through the blades without shock, find the mass of steam flow and power developed in the ring of moving blades.

7 a) Derive the expression for specific work out and efficiency of a simple gas turbine cycle with reheat. **[7M]**

b) A gas turbine plant works between temperature limits of 300 K and 900 K. The pressure limits are 1 bar and 4 bars. Estimate the thermal efficiency of the plant and shaft power available for the external load in KW. Assume mass flow rate of air to compressor is 1600Kg/min **[7M]**

8 a) Discuss various fuels used for rocket propulsion. **[7M]**

b) Explain the working of Pulse jet engine with neat sketch and mention its limitations. **[7M]**

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Code No: R18A0308 **R18**

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.TechII Semester Regular Examinations, October/November 2020

Applied Thermodynamics

(ME)

Roll No										

Time: 2 hours **Max. Marks: 70**

Answer Any **Four** Questions
All Questions carries equal marks.
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NOTE: Steam Tables and Mollier charts are permitted

1 a) With a schematic diagram explain the working of Regenerative Rankine cycle. Show the process on T-S and H-S diagram.

b) In a steam power plant operating on ideal Rankine cycle steam enters the turbine at 20 bar with an enthalpy of 3248 KJ/Kg-K and an entropy of 7.127 KJ/Kg-K. The condenser pressure is 0.1 bar. Find the cycle efficiency and specific steam consumption in Kg/KW-hr. Do not neglect pump work.

2 a) What are Boiler accessories? Explain any two in detail.
b) Explain the working of Benson boiler with the help of a neat sketch.

3 a) Define critical pressure ratio for the nozzle of the steam turbine. Obtain analytically its value in terms of the index of expansion.
b) Dry saturated steam at 10 bar is expanded isentropically in a nozzle to 0.1 bar using steam tables, find the dryness fraction of the steam at exit, also find the velocity of steam leaving the nozzle when (i) Initial velocity is negligible and (ii) Initial velocity of the steam is 135 m/s.

4 a) Discuss the merits and demerits of surface condenser and jet condenser, which type is recommended for large plants
b) Explain (i) Effects of air leakage (ii) Air pump.

5 a) What are the conditions for maximum efficiency of a reaction turbine?
b) In a 50 percent reaction turbine stage running at 3000 rpm the exit angles are 30^0 and the inlet angles are 50^0. The mean diameter is 1m. The steam flow rate is 10000 kg/min and the stage efficiency is 85%. Determine (i) Power output of the stage (ii) The specific enthalpy drop in the stage (iii) The percentage increase in the relative velocity of steam when it flows over the moving blades

6 a) Draw the velocity diagram of impulse turbine and find the work done on the blade, blade efficiency
b) In a Delaval turbine, the steam issues form nozzles with a velocity of 850 m/s. The nozzle angle is 20^0. Mean blade velocity is 350 m/s. The blades are equiangular. The mass flow rate is 1000 kg/min. Friction factor is 0.8. Determine

(i) Blade angles (ii) Axial thrust on the end bearing and (iii) Power developed in kW

7 a) Explain the working of a simple constant pressure open cycle gas turbine. Represent the cycle on P-V and T-S diagrams

b) A gas turbine has a pressure ratio of 6:1 and maximum cycle temperature of 610 ^{0}C. The isentropic efficiencies of compressor and turbine are 0.8 and 0.82 respectively. Calculate the power output in kW of an electric generator geared to the turbine when the air enters the compressor at 15 ^{0}C and at the rate of 16 kg/s. Take : Cp = 1.005 kJ/Kg-K and r =1.4

8 a) Explain the working of a turbo-jet engine with a neat sketch. List out its merits and demerits

b) Describe the classification of rocket engines

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R17

Code No: R17A0312

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech I Semester Supplementary Examinations, July/August 2021

Advanced Thermal Engineering

(ME)

Roll No										

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

Answer Any **Five** Questions
All Questions carries equal marks.

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Note: Data books are allowed

1 Explain the working and construction of any one type of water tube boiler with a neat sketch. **[14M]**

2 a. Describe the details and working of low level jet condenser. **[7M]**

b. Steam enters a condenser at 35^0C. The barometer reading is 760 mm of mercury. If the vacuum of 690 mm is recorded, calculate the vacuum efficiency. **[7M]**

3 What are the methods which can lead to increase in thermal efficiency of Rankine cycle? **[14M]**

4 A turbine having a set of 16 nozzles receives steam at 20 bar and 400^0C. The pressure of steam at the nozzle exit is 12 bar. If the discharge rate is 260 kg/min and the nozzle efficiency is 90%, calculate the cross sectional area at the nozzle exit.If the steam has a velocity of 80 m/s at entry to the nozzle, find the percentage increase in discharge. **[14M]**

5 Draw the velocity triangle diagram for an impulse turbine and derive the expression for work done and axial thrust. **[14M]**

6 A parson reaction turbine running at 400 rpm with 50% reaction develops 75 kW per kg of the steam. The exit angle of the blade is 20^0 and the steam velocity is 1.4 times the blade velocity. Determine (a) blade velocity, (b) blade inlet angle. **[14M]**

7 Sketch the neat diagram of regenerative gas turbine plant and deduce an expression for its thermal efficiency. **[14M]**

8 The diameter of the propeller of an aircraft is 2.5 m. It flies at a speed of 540 km/h at an elevation of 8000 m, where air density is 0.525 kg/m^3. The flight to jet speed ratio is 0.75. Calculate (a) the air flow rate through the propeller, (b) thrust produced, (c) specific thrust, (d) specific impulse, (e) thrust power. **[14M]**

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R17

Code No: R17A0312

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech I Semester Supplementary Examinations, Dec-21/Jan-22

Advanced Thermal Engineering

(ME)

Roll No										

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

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

Note: Steam Tables and Molliar chars are permitted

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SECTION-I

1 Explain the working and construction of any one type of fire tube boiler with a neat sketch **[14M]**

OR

2 With a neat sketch explain the working of a high level jet condenser and evaporative condenser **[14M]**

SECTION-II

3 a) Explain the working of Rankine cycle with Schematic diagram. **[7M]**

b) Dry saturated steam at 17.5 bar enters the turbine of a steam power plant and expands to the condenser pressure of 0.75 bar. Determine the Carnot and Rankine cycle efficiencies. Also find the work ratio of the Rankine cycle. **[7M]**

OR

4 a) Discuss the function of the convergent portion, throat and divergent portion of a convergent divergent nozzle with reference to flow of steam. **[7M]**

b) In a steam nozzle, the steam expands from 4bar to 1bar. The initial velocity is 60m/s and the initial temperature is 200^0C. Determine the exit velocity if the nozzle efficiency is 92%. **[7M]**

SECTION-III

5 a) Give the comparisons between Impulse and Reaction turbines. **[7M]**

b) Derive the condition for maximum efficiency of an impulse turbine. **[7M]**

OR

6 In a stage of a Parson's reaction turbine, the mean diameter of the wheel is 1.05m and the speed is 3000 rpm. The angles of receiving tips are $35^o$and the discharging tip is 20^o. If the steam flow rate is 1 kg/min, draw the velocity diagram for blades and Evaluate(i)Tangential thrust on blades, (ii)Axial thrust on blades , (iii) Power developed in the turbine. **[14M]**

SECTION-IV

7 Describe with neat sketches the working of a simple constant pressure open cycle gas turbine and explain the methods employed for improvement of thermal efficiency of open cycle gas turbine **[14M]**

OR

8 A gas turbine unit has a pressure of 6 and maximum cycle temperature of 610^0 C. The isentropic efficiency of turbine and compressor are 0.82 and 0.8 respectively. **[14M]**

Calculate the power output in kW of an electric generator, geared to the turbine, when air enters the compressor at 15^0 C at a rate of 16kg/s. Take C_P= 1.005 kJ/ kg. K and Υ=1.4 for compression process and C_P= 1.11 kJ/ kg. K and Υ=1.333 for expansion process.

SECTION-V

9 With a neat sketch explain the working principle of turbo jet and turbo propellant engines. State their merits and demerits **[14M]**

OR

10 Explain (i) Solid Propellant Rockets (ii) Liquid Propellant Rockets **[14M]**

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R17

Code No: R17A0312

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech I Semester Supplementary Examinations, October 2020

Advanced Thermal Engineering

(ME)

Roll No										

Time: 2 hours **Max. Marks: 70**

Answer Any **Four** Questions
All Questions carries equal marks.

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1 (a) With a neat sketch explain the principle of working of a Babcock and Wilcox water tube steam boiler.
(b) What are the advantages of fire tube over water tube boiler?

2 With neat sketch explain working of low level and high level jet condensers?

3 A steam power station uses the following cycle: Steam at boiler outlet 150 bar 550^0C, reheat at 40 bar to 550^0C, condenser at 0.1 bar. Using the Mollier chart assuming ideal process find: (i) Quality at turbine exhaust. (ii) Cycle efficiency. (iii) Steam rate.

4 A set of 16 nozzles for an impulse turbine receives steam at 16 bar and 300oC. The pressure of steam at exit is 10 bar. If the total discharge is 245 kg/min and efficiency of nozzle is 90%, calculate the cross sectional area at the exit of each nozzle. If the steam has a velocity of 100 m/sec at the entry to the nozzles, calculate the percentage increase in discharge

5 In a Delaval turbine, the steam issues from the nozzles with a velocity of 850 m/s. The nozzle angle is 20^0. Mean blade velocity 350 m/s. The blades are equiangular. The mass flow rate is 1000 kg/min. Friction factor is 0.8. Determine: (i) Blade angles. (ii) Axial thrust on the bearing. (iii) Power developed. (iv) Blade efficiency. (v) Stage efficiency if nozzle efficiency is 93%.

6 In a reaction turbine, the tips are inclined at $40^0$and 25^0 to the direction of motion. The guide blades are of the same shape as the moving blades, but reverse in direction. At some point in the turbine, the drum diameter is 1.2 m and blades are 100 mm high. At this place, the steam has a pressure of 2 bar and dryness fraction 0.9. If the speed of this machine is 300 rpm and the steam passes through the blades without shock, find the mass flow rate of steam and power developed in the ring of moving blades.

7 a) Explain multi stage compression with inter cooling of gas turbine?
b) Write comparisons between open cycle and closed cycle gas turbines?

8 a) A turbo-jet engine flying at a speed of 960 km/h consumes air at the rate of 54.5 kg/s. calculate i). Exit velocity of the jet when the enthalpy change for the nozzle is 200 KJ/kg and velocity coefficient is 0.97. ii) fuel flow rate in kg/s when air fuel ratio is 75:1 iii). Thrust specific fuel consumption iv) propulsive power v). propulsive efficiency.
b) Explain the working difference between propeller jet, turbo jet and turbo prop.

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R17

Code No: R17A0312

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech I Semester Regular Examinations, November 2019

Advanced Thermal Engineering

(ME)

Roll No										

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

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1 (a) What are the unique features of high pressure boilers when compared to lower pressure boilers? **[5M]**

(b) Explain the working of a Lamont boiler with a neat sketch. **[9M]**

OR

2 a) Classify types of condensers write difference between surface condensers and jet condensers? **[7M]**

b) What are the components of a steam condensing plant? What are the functions of each component working in steam condensing plant? **[7M]**

SECTION-II

3 Steam used in a reheat cycle for the working of steam engine. The steam leaves the boiler and enters the turbine at 3 MPa and 350^0C. After expansion in the turbine to 500 KPa, the steam is reheated to 500^0C and then expanded in the low pressure turbine to 20 KPa. Determine the efficiency of the reheat cycle. **[14M]**

OR

4 A convergent- divergent steam nozzle is required to deliver 2 kg of steam per second. The nozzle is supplied with steam at 10 bar (abs) and temperature 200^oC, while steam exists from the nozzle at 0.34 bar (abs). Calculate the throat and exit areas of the nozzle. Assume the flow of steam through the nozzle to be isentropic and the index of expansion to be 1.3. If the nozzle efficiency is assumed to be 85 %, calculate the exit area of the nozzle. **[14M]**

SECTION-III

5 A single state impulse turbine rotor has a diameter of 1.1 m and running at 3200 rpm. The nozzle angle is 22^0. The blade speed ratio is 0.45. The ratio of the blade velocity at outside to the relative velocity at inlet is 0.95. The outlet angle of the blade is 10^0 smaller than the inlet angle. The steam flow rate is 2 kg/sec. Draw the velocity diagram and estimate: **[14M]**

(a)Velocity of whirl. (b)Axial thrust on the bearings. (c)Blade angles. (d)Power developed.

OR

6 a) Define the term 'Degree of reaction' as applied to a steam turbine. Show that Parson's reaction turbine the degree of reaction is 50 % ? **[7M]**

b) Write comparison between impulse turbine and reaction turbines? **[7M]**

SECTION-IV

7 a) Discuss the relative advantages and disadvantages of gas turbines and steam turbines. **[5M]**

b) Describe with a suitable sketch the constant pressure open cycle gas turbine **[9M]**

OR

8 a) Draw the schematic diagram of closed cycle gas turbine and explain its working. **[6M]**

b) A constant pressure open cycle gas turbine plant works between temperature range of 15ºC and 700ºC and pressure ratio of 6. Find the mass of air circulating in the installation, if it develops 1100 kW. Also find the heat supplied by the heating chamber. **[8M]**

SECTION-V

9 a) Explain the Ram-Jet engine with neat sketch. **[7M]**

b) Explain the turbo prop with a neat sketch. **[7M]**

OR

10 A turbojet engine consumes air at the rate of 60.2 kg/s when flying at a speed of 1000 km/hr. Calculate: (i) Exit velocity of the jet when the enthalpy change for the nozzle is 230 kJ/kg and velocity coefficient is 0.96. (ii) Fuel flow rate in kg/s when air fuel ratio is 70:1. (iii) Thrust specific fuel consumption. (iv) Thermal efficiency of the plant when combustion efficiency is 92% and calorific value of the fuel used is 42000 kJ/kg. (v) Propulsion efficiency **[14M]**

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MANUFACTURING PROCESS

R18

Code No: R18A0311

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Supplementary Examinations, February 2022

Manufacturing Process

(ME)

Roll No										

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

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1	a) Give advantages and disadvantages of permanent mould casting compared to that of sandcasting.	**[7M]**
	b) Describe different types of patterns	**[7M]**
	OR	
2	What are the different types of furnaces used in foundry? Draw a neat diagram of Cupola	**[14M]**

SECTION-II

3	a) What are the kinds of joints that are normally employed for welding processes? Give their sketches.	**[7M]**
	b) Explain submerged arc welding process and its applications	**[7M]**
	OR	
4	What is the principle of laser welding? Explain the process along with its applications	**[14M]**

SECTION-III

5	a) Write a note on (i) Strain hardening (ii) Recrystallization	**[7M]**
	b) Explain the concept of theory of rolling	**[7M]**
	OR	
6	Explain the process of explosive forming with neat sketch. What are its advantages and disadvantages?	**[14M]**

SECTION-IV

7	a) Write a shot notes on i) Wire drawing and ii) Tube drawing.	**[7M]**
	b) What are the advantages and limitations of extrusion process?	**[7M]**
	OR	
8	a) Briefly explain hydrostatic extrusion process with neat sketch.	**[7M]**
	b) List out the different forging operations. Explain drop forging operation with neat sketch.	**[7M]**

SECTION-V

9	With a neat labelled sketch explain about the construction and working principle of 3-Dimensional Printing (3DP) and also explain about the material system involved in it.	**[14M]**
	OR	
10	With a neat labelled sketch explain about the construction and working principle of EBM & also brief the post processing involved in it	**[14M]**

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R18

Code No: R18A0311

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Regular/Supplementary Examinations, July 2021

Manufacturing Process

(ME)

Roll No										

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

Answer Any **Five** Questions
All Questions carries equal marks.

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1 a) List out the defects in casting process. Explain any five with neat sketch. **[7M]**

b) What are the advantages and limitations of casting process? **[7M]**

2 Describe the process of centrifugal casting with neat sketch. What are the advantages? **[14M]**

3 Explain the process of TIG welding process with a neat sketch also write its advantages and applications? **[14M]**

4 With sketch, explain the laser beam welding process. Mention advantages and limitation of laser welding also give application. **[14M]**

5 What are the various types of rolling mills? Explain with a neat sketch Three high and Four high rolling mills? **[14M]**

6 Explain the process of electro-magnetic forming with neat sketch. What are its advantages and disadvantages? **[14M]**

7 a) Explain forward extrusion and backward extrusion with neat sketches. **[7M]**

b) List and explain the sheet metal cutting operations. **[7M]**

8 With a neat labelled sketch explain about the working principle of SLA process & explain about the part building and post building process involved in SLA. **[14M]**

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R18

Code No: R18A0311

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Supplementary Examinations, February 2021

Manufacturing Process

(ME)

Roll No										

Time: 2 hours 30 min **Max. Marks: 70**

Answer Any **Five** Questions
All Questions carries equal marks.

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1	Sketch and explain the construction and operation of a cupola.	**[14M]**
2	a) List the different types of patterns and explain any 3 of them, with neat sketchs.	**[7M]**
	b) Explain briefly the common defects found in casting.	**[7M]**
3	Explain the following: (a) Forge welding (b) Oxy-Acetylene gas cutting (c) Electron beam welding.	**[14M]**
4	a) Differentiate between the soldering and brazing.	**[7M]**
	b) What are the different weld defects? And state its causes and remedies.	**[7M]**
5	a) Classify the various rolling mills. Describe briefly Cluster roll with sketch.	**[7M]**
	b) Discuss recovery, recrystallization and grain growth in metal forming.	**[7M]**
6	Explain the following: a) Stretch forming b) Explosive forming c) Electro-Magnetic forming d) Contour rolls forming.	**[14M]**
7	Explain the following in detail: a) Blanking and Piercing b) Punching c) Swaging d) Trimming.	**[14M]**
8	a) How can you classify the rapid prototyping process? Explain.	**[7M]**
	b) Explain the concepts of rapid manufacturing.	**[7M]**

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Code No: R18A0311

R18

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Regular Examinations, October/November 2020

Manufacturing Processes

(ME)

Roll No										

Time: 2 hours **Max. Marks: 70**

Answer Any **Four** Questions

All Questions carries equal marks.

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1 a) Briefly explain the basic steps involved in sand casting process.

b) What is pattern? What are the factors to be considered while selecting a pattern materials?

2 a) Explain squeeze casting technique, with suitable diagram.

b) Explain continuous casting process and mention its applications.

3 a) What is heat affected zone? State its characteristics.

b) Explain with neat sketches of a resistance welding process.

4 a) Explain in detail the gas metal arc welding process with a neat sketch.

b) Explain the principles of working of a laser beam welding process and list the various lasers used.

5 a) Discuss the advantages and limitations of hot and cold working process.

b) How do you estimate rolling load? What is the power required in rolling.

6 a) Distinguish between bending and forming. What are the different types of bending dies?

b) Explain the following terms applied to bending of sheet and plates.

i. Spring back

ii. Compensation for spring back.

7 (a) Describe impact extrusion with a neat sketch and mention its applications.

(b) Classify the methods of forging. Explain in detail any one of them.

8 a) Compare and explain the differences between conventional machining and rapid prototyping.

b) Explain with a neat sketch the working principle of Stereo-lithography (SLA) process with advantages and disadvantages.

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PROBABILITY & STATISTICS

R18

Code No: R18A0024

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Supplementary Examinations, February 2022

Probability & Statistics

(ME& AE)

Roll No										

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

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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Note: Probability Tables are permitted

SECTION-I

1 ***a)*** The probability density function of a random variable X is **[7M]**

X	0	1	2	3	4	5	6
$P(X)$	k	$3k$	$5k$	$7k$	$9k$	$11k$	$13k$

(i) Find $P(X < 5)$, (ii) What will be the minimum value of k so that $P(X < 2) > 3$ and (iii) Standard deviation.

b) If X is a continuous random variable and $Y = aX + b$ then prove that $E(Y) = aE(X) + b$ and $V(Y) = a^2V(X)$, where V stands for variance and a, b are constants. **[7M]**

OR

2 The probability density $f(x)$ of a continuous random variable is given by $f(x) = ce^{|x|}, -\infty < x < \infty$. Show that $c = \frac{1}{2}$ and find that the mean and variance of the distribution. Also find the probability that the variants lies between 0 and 4. **[14M]**

SECTION-II

3 ***a)*** Out of 800 families with 5 children each, how many would you expect to have (i) 3 boys, (ii) either 2 or 3 boys and (iii)atleast one boy? **[7M]**

b) If X is a normal variate with mean 30 and standard deviation 5. Find the probabilities that $(i)26 \leq X \leq 40$ and $(ii)X \geq 45$. **[7M]**

OR

4 ***a)*** A manufacturer of cotter pins knows that 5% of his product is defective. Pins are sold in boxes of 100. He guarantees that not more than 10 pins will be defective. What is the approximate probability that a box will fail to meet the guaranteed quality? **[7M]**

b) The marks obtained in mathematics by 1000 students are normally distributed with 78% and standard deviation 11%. Determine (i) How many students got above 90%. (ii) What was the highest mark obtained by the lowest 10% of the students. **[7M]**

SECTION-III

5 ***a)*** Find out the coefficient of correlation in the following case. **[7M]**

Height of father (in inches)	65	66	67	67	68	69	71	73
Height of son (in inches)	67	68	64	68	72	70	69	70

b) Price indices of cotton and wool are given below for the 12 months of a year. Obtain the equations of lines of regression between the indices. **[7M]**

Price index of cotton (X)	78	77	85	88	87	82	81	77	76	83	97	93
Price index of wool (Y)	84	82	82	85	89	90	88	92	83	89	98	99

OR

6 Following are the rank obtained by 10 students in two subjects Statistics and Mathematics. To what extent the knowledge of the students in two subjects is related? **[14M]**

Statistics	1	2	3	4	5	6	7	8	9	10
Mathematics	2	4	1	5	3	9	7	10	6	8

SECTION-IV

7 ***a)*** A population consists of $5, 10, 14, 18, 13, 24$. Consider all possible samples of size two which can be drawn without replacement from the population. Find (i) The mean of the population (ii) The standard deviation of the population (iii) The mean of the sampling distribution of means. **[7M]**

b) An oceanographer wants to check whether the depth of the ocean in certain is 57.4 fathoms, as had previously been recorded. What can he conclude at the 0.05 level of significance, if readings taken at 40 random locations in the given region yielded a mean of 59.1 fathoms with a standard deviation of 5.2 fathoms? **[7M]**

OR

8 ***a)*** The mean of certain normal 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. **[7M]**

b) The mean and standard deviation of a population are 11,795 and 14,054 respectively. What can one assert that 95% confidence about the maximum error if $\bar{x} = 11{,}795$ and $n = 50$. And also construct 95% confidence interval for the true mean. **[7M]**

SECTION-V

9 ***a)*** A random sample of size 25 from a normal population has the mean $\bar{x} = 47.5$ and the standard deviation $S = 8.4$. Does this information tend to support or refute the claim that mean of the population is $\mu = 42.5$? **[7M]**

b) A machine produced 20 defective articles in a batch of 400. After overhauling it produced 10 defectives in a batch of 300. Has the machine being improved after overhauling? **[7M]**

OR

10 ***a)*** A die is thrown 264 times with the following results. Show that the die is biased. Given $\chi^2_{0.05} = 11.07$ for 5 $d.f.$ **[7M]**

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

b) In a big city 325 men out of 600 men were found to be smokers. Does this information support the conclusion that the majority of men in this city are smokers? **[7M]**

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R18

Code No: R18A0024

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Supplementary Examinations, February 2021

Probability & Statistics

(ME& AE)

Roll No										

Time: 2 hours 30 min **Max. Marks: 70**

Answer Any **Five** Questions
All Questions carries equal marks.

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1 Let X denote the minimum of the two numbers that appear when a pair of fair dice is thrown once. Determine the **[14M]**
(i) Discrete probability distribution (ii) Expectation (iii) Variance

2 The probability density function f(x) of a continuous random variable is given by $f(x) = c\,e^{-|x|}, \quad -\infty < x < \infty$. Show that c=1/2 and find that the mean and variance of the distribution. Also find the probability that the variance lies between 0 and 4. **[14M]**

3 (a) Assume that 50% of all engineering students are good in Mathematics. Determine the probabilities that among 18 engineering students (i) exactly 10 (ii) at least 10 (iii) at least 2 and at most 9 are good in Mathematics. **[7M]**
(b) 2% of the items of a factory are defective. The items are packed in boxes. What is the probability that there will be (i) 2 defective items (ii) at least three defective items in box of 100 items? **[7M]**

4 If the masses of 300 students are normally distributed with mean 68 kgs and standard deviation 3 kgs , how many students have masses **[14M]**
(i) Greater than 72 kgs
(ii) Less than or equal to 64 kg
(iii) Between 65 and 71 kg inclusive.

5 Find coefficient of correlation between X and Y for the following data **[14M]**

X	10	12	18	24	23	27
Y	13	18	12	25	30	10

6 Price indices of cotton and wool are given below for the 12 months of a year. Obtain the equations of lines of regression between indices. **[14M]**

Price index of cotton(X)	78	77	85	88	87	82	81	77	76	83	97	93
Price index of wool (Y)	84	82	82	85	89	90	88	92	83	89	98	99

7 If the population is 3,6,9,15 and 27 **[14M]**
(i) List all possible samples of size 3 that can be taken without replacement from the finite population.
(ii) Find mean of the population
(iii)Calculate the mean of the sampling distribution of means.
(iv) Find the standard deviation of sampling distribution of means.

8	(a)	In sample of 1000 people in Karnataka 540 are rice eaters and the rest are wheat eaters. Can we assume that both rice eaters and wheat eaters are equally popular in this state of Karnataka.	**[7M]**
	(b)	A researcher wants to know the intelligence of students in a school. He selected two groups of students. In the first group there 150 students having mean IQ of 75 with S.D of 15 in the second group there are 250 students having mean IQ of 70 with S.D of 20. Is there is significance difference between the means of 2 groups.	**[7M]**

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R18

Code No: R18A0024

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Regular/Supplementary Examinations, July 2021

Probability & Statistics

(ME& AE)

Roll No										

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

Answer Any **Five** Questions
All Questions carries equal marks.

***

1 ***a)*** A random variable X has the following probability function **[7M]**

x	0	1	2	3	4	5	6	7
$P(x)$	0	k	$2k$	$2k$	$3k$	k^2	$2k^2$	$7k^2+k$

Find $(i)k$ $(ii)P(x<5)$ (iii) mean.

b) A continuous random variable ha the probability density function **[7M]**

$$f(x)=\begin{cases} kxe^{-\lambda x}, & x\geq 0,\lambda>0 \\ 0, otherwise \end{cases}$$

Determine the value of k and mean.

2 *a)* A sample of 4 items is selected at random from a box containing 12 items of which 5 are defective. Find the expected number E of defective items. **[7M]**

$b)$ X is a continuous random variable with probability density function given by **[7M]**

$$f(x)=\begin{cases} kx(0\leq x<2), \\ 2k(2\leq x<4), \\ -kx+6k(4\leq x<6). \end{cases}$$

Find k and mean value of X.

3 ***a)*** The following data are the number of seeds germinating out of 10 on damp filter paper for 80 sets of seeds. Fit a binomial distribution to these data **[7M]**

x	0	1	2	3	4	5
f	6	20	28	12	8	6

b) Suppose 10 percent of the probabilityfor a normal distribution $n(\mu,\sigma^2)$ is below 35 and 5 percent above 90. What are the values of μ and σ? **[7M]**

4 ***a)*** A hospital switch board receives an average of 4 emergency calls in a 10 minute interval. What is the probability that (i) There are at most 2 emergency calls in a 10 minute interval? (ii) There are exactly there are exactly 3 emergency calls in a 10 minute interval. **[7M]**

b) If X is a normal variate, find the area A (i) to the left $z=-1.78$ (ii) to the right of $z=-1.45$ and (iii) corresponding to $-0.8\leq z\leq 1.53$. **[7M]**

5 Calculate Carl Person's correlation for the following paired data. **[14M]**

X	38	45	46	38	35	38	46	32	36	38
Y	28	34	38	34	36	26	28	29	25	36

What inference would you draw from estimate?

6 ***a)*** The ranks of 16 students in Mathematics and Statistics are as follows. **[7M]**

$Student$	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
$Rank$	1	10	3	4	5	7	2	6	8	11	15	9	14	12	16	13

Calculate the rank correlation coefficient for proficiencies of this group in Mathematics and Statistics.

b) A panel of two judges P and Q graded seven dramatic performances by independently awarding marks as follows **[7M]**

$Performance$	1	2	3	4	5	6	7
$Marks\ by\ P$	46	42	44	40	43	41	45
$Marks\ by\ Q$	40	38	36	35	39	37	41

The eight performances, which judge Q would not attend, were awarded 37 marks by judge P. If judge Q has also been present, how many marks would be expected to have been awarded by him to the eight performances?

7 ***a)*** A population consists of six numbers $4, 8, 12, 16, 20, 24$. Consider all samples of size two which can be drawn without replacement from this population. Find (i) The population mean (ii) The population standard deviation (iii) The mean of the sampling distribution of means. **[7M]**

b) A sample of size 10 was taken from a population S.D. of sample is 0.03. Find the maximum error with 95% confidence. **[7M]**

8 a) A sample of 400 items is taken from a population whose standard deviation is 10. The mean of the sample is 40. Test whether the sample has come from a population with mean 38. Also calculate 95% confidence interval for the population. **[7M]**

b) In an investigation on the machine performance the following results are obtained. **[7M]**

	$No.of\ units\ inspected$	$No.of\ defective$
$Machine-1$	375	17
$Machine-2$	450	22

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

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R18

Code No: R18A0024

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Regular Examinations, October/November 2020

Probability & Statistics

(ME & AE)

Roll No										

Time: 2 hours **Max. Marks: 70**

Answer Any **Four** Questions
All Questions carries equal marks.

***

1 A random variable X has the following probability function :

X	0	1	2	3	4	5	6	7
P(x)	0	K	2K	2K	3K	K^2	$2K^2$	$7K^2+K$

(i) Determine K (ii) Mean (iii) Variance (iv) Evaluate P(X<6), (v) Evaluate P(0<X<5)

2 A continuous random variable has the probability density function

$f(x)= k \times e^{-\lambda x}$ for $x \geq 0$, $\lambda>0$

$= 0$, otherwise

Determine (i) k (ii) Mean (iii) Variance

3 (a) Ten coins are thrown simultaneously. Find the probability of getting at least (i) seven heads (ii) six heads

(b) If the probability that an individual suffers a bad reaction from a certain injection is 0.001, determine the probability that out of 2000 individuals (i) exactly 3 (ii) more than 2 individuals (iii) none (iv) more than one individual suffers a bad reaction .

4 The marks obtained in mathematics by 1000 students is normally distributed with 78% and standard deviation 11%. Determine

(i) How many students got marks above 90%
(ii) What was the highest mark obtained by the lowest 10% of the students
(iii)Within what limits did the middle of 90% of the students lie.

5 Calculate the coefficient of correlation between age of cars and annual maintenance cost and comment :

Age of cars (years)	2	4	6	7	8	10	12
Annual maintenance cost (Rupees)	1600	1500	1800	1900	1700	2100	2000

6 Calculate the regression equations of Y on X from the data given below, taking deviations from actual means of X and Y.

Price (Rs)	10	12	13	12	16	15
Amount demanded	40	38	43	45	37	43

Estimate the likely demand when the price is Rs 20.

7 (a) The mean and standard deviation of a population are 11,795 and 14,054 respectively. If n=50, find 95% confidence interval for the mean.

(b) Define (i) Type I and Type II errors (ii) Null and alternative hypothesis.

8 A random sample from a company's very extensive files shows that the orders for a certain kind of machinery were filled, respectively in 10,12,19,14,15,18,11 and 13 days. Use the level of significance 0.01 to test the claim that on the average such orders are filled in 10.5 days. Choose the alternative hypothesis so that rejection of null hypothesis $\mu = 10.5$ days implies that it takes longer than indicated.

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STRENGTH OF MATERIALS

R18

Code No: R18A0309

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Supplementary Examinations, February 2022

Strength of Materials

(ME)

Roll No										

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

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

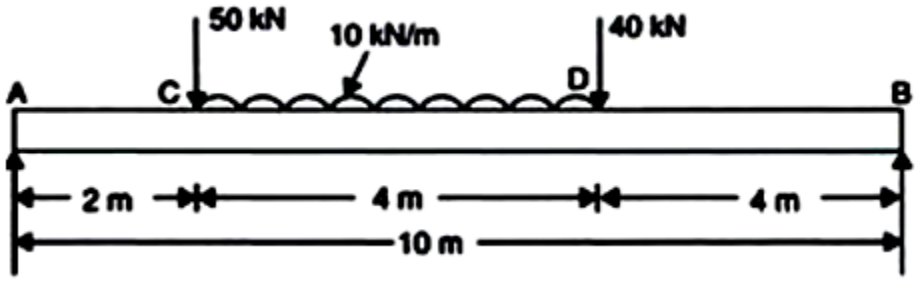
1 A steel bar 2m long, 2cm wide and 1cm thick is subjected to a pull of 2tonnes in the direction of its length. Find the changes in length, breadth and thickness. Take E=2.0x106 kgf/cm2 and Poisson's ratio=0.3. **[14M]**

OR

2 A short timber post of rectangular section has one side of section twice the other. When the post is loaded axially with 10,000N. It contracts by 0.0521 mm/meter length. Young's modulus for this timber is 15kN/mm2, Calculate the sectional dimensions of the post. **[14M]**

SECTION-II

3 A simply supported beam of length 10 m, carries uniformly distributed load and two point loads as shown in figure. Draw the S.F. and B.M. diagrams for the beam. Also calculate the maximum bending moment **[14M]**



OR

4 A simply supported beam of 9m length carries a point load of 10KN at the right end and a uniformly distributed load of 30KN/m for a distance of 3m starting from left end. The supports of the beam are 6m apart, the left end support being at the left end. Draw the shear force and bending moment diagrams indicating main values. **[14M]**

SECTION-III

5 A rectangular beam 300 mm deep is simply supported over a span of 4 m. Determine the uniformly distributed load per metre which the beam may carry, if the bending stress should not exceed 120 N/mm2. Take I = 8 x 106 mm4. **[14M]**

OR

6 A simply supported beam of 2m span carries a uniformly distributed load of 140KN/m over the whole span. The cross section of the beam is a T-section with a flange width of 120mm, web and flange thickness of 20mm and overall depth of 160mm. determine the maximum shear stress in beam and draw the shear stress distribution for the section. **[14M]**

SECTION-IV

7 Derive the relationship between slope, deflection and radius of Curvature of a simply supported beam. **[14M]**

OR

8 A 300 mm long cantilever of rectangular section 48 mm wide and 36 mm deep carries a uniformly distributed load. Calculate the value of load w if the maximum deflection in the cantilever is not to exceed 1.5 mm. Take E = 70X109 GN/m^2 **[14M]**

SECTION-V

9 A hollow shaft of internal diameter 3/8th of external diameter is required to transmit 600 KW at 200 rpm, the maximum torque being 20% greater than the mean. If the maximum shear stress is to be limited to 65 N/mm^2 and the twist in a length of 4M is not to exceed 2^o, determine the external diameter of the shaft. Take G = 0.8 x 105 N/mm^2. **[14M]**

OR

10 A vertical cylindrical gasoline storage tank made of 20mm thick mild steel plate has to withstand maximum pressure of 1.5 MN/m2. Calculate the diameter of the tank if stress 240 MN/m^2 . factor of Safety 2 and joint efficiency 70%. **[14M]**

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Code No: R18A0309 **R18**

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Regular/Supplementary Examinations, July 2021

Strength of Materials

(ME)

Roll No										

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

Answer Any **Five** Questions
All Questions carries equal marks.

****

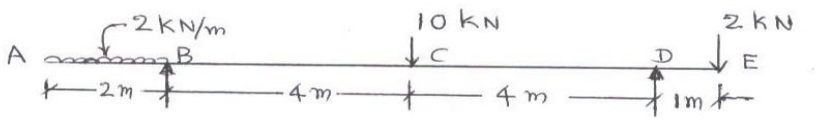
1 Derive the expression for elongation of uniformly tappered circular rod **[14M]**

2 A 15 mm diameter steel rod passes centrally through a copper tube 50 mm external diameter and 40 mm internal diameter. The tube is closed at each end by rigid washers of negligible thickness and the nuts are tightened until it is just snug. If the temperature of the assembly is raised by 60°C, calculate the stresses developed in copper tube and steel rod. **[14M]**

Take $E_s = 2.1 \times 10^5$ N/mm2; $E_c = 1.05 \times 10^5$ N/mm2

$\alpha_s = 1.2 \times 10^{-5}$/°C; $\alpha_c = 1.75 \times 10^{-5}$/°C

3 Sketch the S.F. &B.M. diagrams for an Overhanging beam ABCDE shown. Mark all the salient points with respective values. **[14M]**



4 A beam 6m long is simply supported at the ends, carries point loads of 1 KN, 2KN,3KN acting respectively from the left support at a distance of 2 mt,3mtand 4 mt. Draw the S.F and B.M diagrams and determine the maximum bending moment. **[14M]**

5 a. What is simple bending? Write assumptions for Theory of simple bending. **[4M]**

b. Derive the expression $M/I=\sigma/y=E/R$ **[10M]**

6 A beam of circular section of 150 mm diameter is subjected to a shear force of 20 kN. Calculate the value of maximum shear stress and also sketch the variation of shear stress along the depth of the beam **[14M]**

7 A simply supported beam of span 20m carries two concentrated loads 4KN at 8m and 10KN at 12m from the left side support. a) Calculate deflection under each load b) Calculate maximum deflection c) calculate slope at both supports. **[14M]**

8 A thin cylindrical shell of 120cm diameter, 1.5cm thick and 6m long is subjected to internal fluid pressure of 2.5 N/mm^2 If the value of E=2x10^5 N/mm^2 and Poisson's ratio=0.3, calculate change in diameter, length and volume. **[14M]**

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Code No: R18A0309 **R18**

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Supplementary Examinations, February 2021

Strength of Materials

(ME)

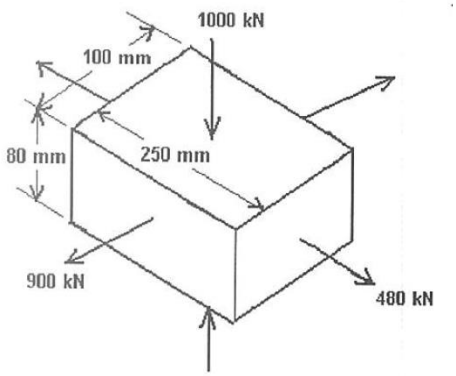
Roll No										

Time: 2 hours 30 min **Max. Marks: 70**

Answer Any **Five** Questions
All Questions carries equal marks.
*****

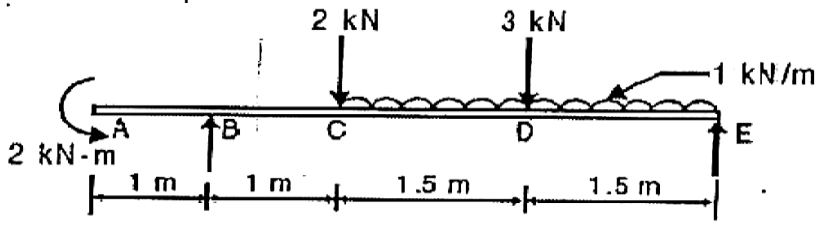
1 a) What is the procedure of finding thermal stresses in compound bar? **[4M]**
b) Derive the relations between E,G and K **[10M]**

2 A rectangular block 250mm×100mm×80mm is subjected to axial loads as shown in Fig. Assuming Poisson's ratio as 0.25, find the strains in the direction of each force. Find the modulus of rigidity, bulk modulus of the material and change in volume of the block. Take $E=2\times10^5$ N/mm^2. **[14M]**

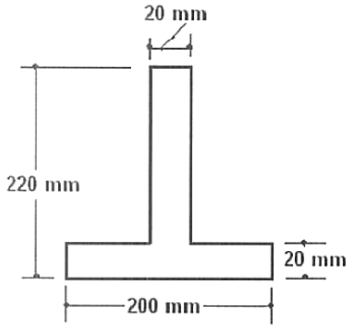


3 Draw the Shear force and Bending moment diagram for a simply supported beam of length 9m and carrying a uniformly distributed load of 10kN/m for a distance of 6m from the left end. Also calculate the maximum bending moment on the section. **[14M]**

4 Draw the Shear force and Bending moment diagram for the beam shown in Fig. and locate the point of contraflexure. **[14M]**



5 A horizontal beam of the section shown in Fig. is 4m long and is simply supported at the ends. Find the maximum uniformly distributed load it can carry if the compressive and tensile stresses must not exceed 60N/mm^2 and 35N/mm^2. Draw the diagram showing the variation of stress over the mid span section of the beam. **[14M]**



6 A beam of square section is used as beam with one diagonal horizontal. The beam is subjected to a shear force *F*, at a section. Find the maximum shear in the cross section of the beam and draw the shear distribution diagram for the section. **[14M]**

7 Find the expression for the slope and deflection of a cantilever of length L which carries a uniformly distributed load throughout the length of beam using double integration method. **[14M]**

8 a) Derive the expression for longitudinal stress in a thin cylinder with ends closed by rigid flanges and subjected to an internal fluid pressure *p*. Take the internal diameter and shell thickness of the cylinder to be *d* and *t* respectively. **[5M]**

[9M]

b) Derive the relation for a circular shat when subjected to torsion as given below.

$$\frac{T}{J} = \frac{\tau}{R} = \frac{C\theta}{L}$$

Where T=torque transmitted; J=polar moment of inertia; τ=maximum shear stress; R=radius of the shaft;C=modulus of rigidity; θ=angle of twist, and L =length of the shaft.

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R18

Code No: R18A0309

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Regular Examinations, October/November 2020

Strength of Materials

(ME)

Roll No										

Time: 2 hours **Max. Marks: 70**

Answer Any **Four** Questions
All Questions carries equal marks.

****

1 a) Explain the normal stress and shear stress with neat sketches.
b) Prove that the total extension of a uniformly tapering rod of diameters D_1 and D_2 when the rod is subjected to an axial load *P* is given by

$$\delta L = \frac{4PL}{\pi E D_1 D_2}$$ where L= Total Length of the ord.

2 a) Define the following
(i) Proportional limit
(ii) Poisson's ratio
(iii) True Strain
(iv) Allowable stress
b) A compound bar 1m long is 40mm diameter for 400mm length,30 mm diameter for the next 350mm length. Determine the diameter of the remaining length so that its elongation under an axial load of 100kN does not exceed 1mm. Take $E=2\times10^5$ N/mm^2.

3 a) What is beam? Sketch statically determinate and indeterminate beams.
b) A simply supported beam carrying a uniformly distributed load throughout its length. Find the maximum bending moment.

4 Draw the shear force and bending moment for the overhanging beam ABC of length 6m, carrying uniformly distributed load of 2kN/m over the entire length. The supported span AB is of 4m length; also locate the point of contraflexure.

5 a) What are the assumptions made in deriving the flexure formula?
b) Derive the section modulus for the following sections
(i) Rectangular section
(ii) Triangular section with base width *b* and height *h*
(iii) Hollow circular section with outer diameter *D* and inner diameter *d*

6 A timber beam is freely supported on supports 6m apart. It carries a uniformly distributed load of 12kN/m run and a concentrated load of 9kN at 2.5m from the left support. If the stress in the timber is not to exceed 8N/mm^2 design a suitable section making the depth twice the width.

7 A simply supported beam of 6m span is subjected to a concentrated load of 18kN at 4m from the left support. Calculate
(i) The position and the value of maximum deflection
(ii) Slope at mid-span
(iii) Deflection at the load point

Given E=200GPa. I=$15\times10^6 mm^4$

8 a) Find the expression for circumferential strain, longitudinal strain and volumetric strain, when the thin walled cylinder is subjected to an internal pressure *p* whose diameter is *d* thickness is *t* and length is *L*.

b) Calculate

(i) The change in diameter

(ii) The change in length and

(iii) Change in volume of a thin cylindrical shell 100 cm diameter, 1 cm in thick and 5m long when subjected to internal pressure of 3 N/mm^2. Take the value of E=2×10^5 N/mm^2 and poisons ratio=0.3.

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Code No: R15A0313

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech I Semester Regular Examinations, November 2017

Advanced Thermal Engineering

(ME)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

Steam tables and Mollier chart may be permitted

PART – A (25 Marks)

1. (a) What is the use of Mollier chart? 2M
   (b) What are the advantages of Re-heating? 3M
   (c) What are the main features of High pressure boilers? 2M
   (d) Show the effect of friction in a Nozzle or Nozzle efficiency on h-s diagram? 3M
   (e) What is meant by Stage efficiency? 2M
   (f) What are the methods to reduce the rotor speed? 3M
   (g) Draw the schematic layout of open Brayton cycle? 2M
   (h) How to increase the efficiency of the Brayton cycle? 3M
   (i) What is meant by monopropellant and bipropellant? 2M
   (j) Why after burners are used in Turbo jet engine? 3M

PART – B (50 Marks)

SECTION – I

2. a) What is regeneration? Draw schematic and T-s diagram for ideal regenerative cycle. 5M
   b) A steam power plant works between pressures of 40 bar and 0.05 bar .If the steam supplied is dry saturated and the cycle of operation is Rankine cycle, find a) Cycle efficiency and b) Specific steam consumption 5M

(OR)

3. What are the methods of improving performance of a Rankine cycle? Explain reheat cycle with help of neat sketches of layout of T-s diagrams. Derive the expression for efficiency of reheat cycle and compare with Rankine cycle. 10M

SECTION – II

4. a) Explain the construction and working of a simple vertical boiler with the help of a neat diagram. 5M
   b) What is the significance of critical pressure ratio on discharge through a nozzle? 5M

(OR)

5. a) Explain the working of stirling boiler with the help of neat sketch. What are the advantages of using bent tubes over straight tubes? 5M

b) Dry saturated steam at a pressure of 10 bar is expanded in a nozzle to a pressure of 0.7 bar. With the help of Mollier diagram find the velocity and dryness fraction of steam issuing from the nozzle, if the friction is neglected. Also find the velocity and dryness fraction of steam, if 15% of the heat drop is lost in friction. 5M

SECTION – III

6. In a De Laval turbine, steam issues from the nozzle with a velocity of 1200m/s. The nozzle angle is 20^0, the mean blade velocity is 400m/s. The inlet and outlet angle of blades are equal. The mass of steam flowing through the turbine per hour is 1200kg.Calculate, 1.Blade angles, 2.Relative velocity of steam entering blades, 3. Tangential force on the blades, 4.Power developed and 5.Blade efficiency. Take blade velocity coefficient as 0.8. 10M

(OR)

7. a) Define the following as related to steam turbines a) Speed ratio b) Blade velocity coefficient c) Diagram efficiency d) Stage efficiency e) Thermal efficiency 5M
   b) Derive an expression for optimum stage efficiency of a reaction turbine. 5M

SECTION – IV

8. a) Differentiate between closed cycle and open cycle gas turbine. 5M
   b) Explain with a neat sketch the working of a constant volume combustion turbine. 5M

(OR)

9. a) Derive the thermal efficiency of a Brayton cycle in terms of pressure ratio and polytropic index? 5M
   b) A simple closed cycle gas turbine plant receives air at 1 bar 15^0C,and compresses it to 5 bar and heats it to 800^0C in the heating chamber. The hot air expands in a turbine back to 1 bar. Calculate the power developed per kg of air supplied per second. Take C_p for the air as 1 kJ/kg K. 5M

SECTION – V

10. a) Explain about the Ram-jet engine. 5M
    b) Explain the working differences between the propeller-jet, turbo-jet, turbo-prop. 5M

(OR)

11. a) How a rocket propulsion system works and discuss about various types of rockets. 5M
    b) What are the propulsive devices used in aircrafts and missiles? 5M

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R15

Code No: R15A0313

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech I Semester Regular/supplementary Examinations, November 2018

Advanced Thermal Engineering

(ME)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

Note: Steam tables are allowed.

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PART-A (25 Marks)

1). a	Draw the line diagram of a Rankine cycle and mention the various components	**[2M]**
b	State the advantages of regenerative cycle over simple Rankine cycle.	**[3M]**
c	State the differences between fire tube and water tube boilers	**[2M]**
d	What is the function of a safety valve?	**[3M]**
e	Mention any two differences between jet and the surface condenser	**[2M]**
f	Write the advantages and disadvantages of steam turbines	**[3M]**
g	What do you mean by the term gas turbine?	**[2M]**
h	State the merits of gas turbines over IC engines.	**[3M]**
i	Draw the gas turbine power plant with inter cooling	**[2M]**
j	What is thrust augmentation	**[3M]**

PART-B (50 MARKS)

SECTION-I

2 Explain a regenerative cycle with a diagram and derive the expression for its thermal efficiency. **[10M]**

OR

3 In a Rankinne cycle the steam at inlet to turbine is saturated at a pressure of 35 bar and exhaust pressure is at 0.2 bar. Determine i) the pump work ii) the turbine work iii) Rankine efficiency iv) the condenser heat flow v) the dryness at the end of expansion. **[10M]**

SECTION-II

4 a) Explain ***any two*** of the following with neat sketches (5M) **[10M]**
i) Super heater ii) Air Preheater iii) Economizer
b) List the advantages of high pressure boilers (5M)

OR

5 a) Steam having pressure of 10.5 bar and 0.95 dryness fraction is expanded through a convergent- divergent nozzle and the pressure of steam leaving the nozzle is 0.85 bar. Find the velocity at the throat for maximum discharge **[10M]**

condition. If the index of expansion may be assumed to be 1.135, calculate the mass flow rate of steam through the nozzle. (5M)

b) Explain ***any two*** of the following with sketches

i) pressure gauge ii) water level gauge iii) feed check valve iv) high steam and low water safety valve. (5M)

SECTION-III

6 What are the compounding methods used in reducing the speed of the turbine rotor? Explain any two methods. **[10M]**

OR

7 A single stage steam turbine is supplied with steam at 5 bar, 200 ^{o}C at the rate of 50 kg/min. It expands into a condenser at a pressure of 0.2 bar. The blade speed is 400 m/s. The nozzles are inclined at an angle of 20 degree to the plane of the wheel and outlet blade angle is 30 degrees. Neglecting friction losses calculate i) power developed ii) blade efficiency and iii) stage efficiency. **[10M]**

SECTION-IV

8 a) Describe with neat sketches the working of a simple constant pressure open cycle gas turbine.(5M) **[10M]**

b) Discuss briefly the methods employed for improvement of thermal efficiency of open cycle gas turbine plant. (5M)

OR

9 A gas turbine unit has a pressure ratio of 6:1 and maximum cycle temperature of 610 ^{o}C. The isentropic efficiencies of the compressor and turbine are 0.80 and 0.82 respectively. Calculate the power output in kW of an electrical generator geared to the turbine when the air enters the compressor at 15 ^{o}C at the rate of 16 kg/sec. Take C_p as 1.005 kJ/kgK. γ=1.4 for the compression process and take C_p= 1.11 kJ/kgK and γ =1.333 for the expansion process. **[10M]**

SECTION-V

10 a) Explain the working difference between propeller -jet, turbo-jet and turbo- prop. (5M) **[10M]**

b) State the fundamental differences between jet propulsion and rocket propulsion. (5M)

OR

11(a) With a neat diagram explain the working of rocket engine **[5M]**

(b) Describe briefly about thrust augmentation method used in propulsion. **[5M]**

R15

Code No: **R15A0313**

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech I Semester supplementary Examinations, May 2018

Advanced Thermal Engineering

(ME)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.
Steam tables and Mollier chart may be permitted

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PART – A (25 Marks)

1. (a) How Rankine efficiency can be improved? (2M)
   (b) What are the advantages of Regenerative cycle? (3M)
   (c) What is the function of Fusible plug in steam boilers? (2M)
   (d) What do you understand by the term 'Critical pressure' as applied to steam nozzles? (3M)
   (e) Define Degree of reaction? (2M)
   (f) Give the difference between Impulse and Reaction Turbines? (3M)
   (g) What is meant by closed cycle gas turbine? (2M)
   (h) Why Re-heater is necessary in gas turbine? What are its effects? (3M)
   (i) What is Jet Propulsion? (2M)
   (j) Give the difference between ramjet and pulse jet engines? (3M)

PART – B (50 Marks)

SECTION – I

2. a) Show the Rankine cycle on p-v and T-s diagrams and explain the processes involved. Also draw the mechanical system to show different processes of the Rankine cycle. (5M)
   b) In an ideal reheat cycle, the steam enters the turbine at 30 bar and 500^0C.After expansion to 5 bar,the steam is reheated to 500^0C and then expanded to the condenser pressure of 0.1 bar. Determine the cycle thermal efficiency, mass flow rate of steam. Take power output as 100MW. (5M)

(OR)

3. a) What are the methods which can lead to increase in thermal efficiency of Rankine cycle? (5M)
   b) A steam power plant has boiler and condenser pressures of 60 bar and 0.1 bar, respectively. Steam coming out of the boiler is dry and saturated. The plant operates on the Rankine cycle. Calculate thermal efficiency. (5M)

SECTION – II

4. a) With the help of neat sketch, explain Cochran Boiler. What are its special features? (5M)
   b) A nozzle is to be designed to expand steam at the rate of 0.10 kg/s from 500kPa, 210^0C to 100kPa. Neglect inlet velocity of steam. For a nozzle efficiency of 0.9, determine the exit area of the nozzle. (5M)

(OR)

5. a) What are the differentiating features between a water tube and fire tube boiler? (5M)
   b) Starting from the fundamentals, show that the maximum discharge through the nozzle,the ratio of throat pressure to inlet pressure is given by $(2/n+1)^{n/n-1}$, where n is the index for isentropic expansion through the nozzle. (5M)

SECTION – III

6. a) What is compounding? Describe various methods of compounding with neat sketches of arrangement, pressure and velocity profiles. (5M)
   b) The following data refers to a single stage impulse turbine: Steam velocity = 800m/s; Blade speed = 300 m/s; Nozzle angle = 20^0; Blade outlet angle = 25^0.Neglecting the effect of friction, calculate the power developed by the turbine for the steam flow rate of 25kg/s. Also calculate the axial thrust on the bearings. (5M)

(OR)

7. a) Prove that for a 50% reaction turbines $\alpha=\varphi$ and $\theta=\beta$. (5M)
   b) In one stage of a reaction turbine, both fixed and moving blades have inlet and outlet blade tip angles of 35^0 and 20^0 respectively. The mean blade speed is 80m/s and the steam consumption is 22500 kg/hr. Determine the power developed and stage efficiency if the isentropic heat drops in both fixed and moving rows is 23.5 kJ/kg in the pair. (5M)

SECTION – IV

8. A gas turbine plant works between the temperature limits of 1152 K and 288 K. Isentropic efficiencies for Compressor and Turbine are 0.85 and 0.8 respectively. Determine the optimum pressure ratio for maximum work output and also find maximum cycle thermal efficiency. (10M)

(OR)

9. Explain with neat sketch the gas turbine cycles with intercooling and reheating and what will be the condition of maximum output. (10M)

SECTION – V

10. Why is thrust augmentation necessary? What are the methods for thrust augmentation in a turbojet engine? (10M)

(OR)

11. What are composite and homogeneous solid propellants? How do they work? State their merits and demerits. (10M)

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R15

Code No: R15A0313

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech I Semester Supplementary Examinations, May 2019

Advanced Thermal Engineering

(ME)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

PART-A (25 Marks)

1). a	State the methods of increasing the thermal efficiency of a Rankine cycle.	**[2M]**
b	Draw the PV diagram of a Rankine cycle and mention the different processes.	**[3M]**
c	Write the differences between forced circulation and free circulation boilers	**[2M]**
d	What is the function of boiler mountings? Can a boiler work without mountings?	**[3M]**
e	Define a steam condenser	**[2M]**
f	What do you understand by diagram efficiency in case of steam turbine	**[3M]**
g	How are gas turbines classified?	**[2M]**
h	State the merits of gas turbines over steam turbines.	**[3M]**
i	Mention the different operating variables that affect the efficiency of a gas turbine plant.	**[2M]**
j	What are the applications of pulse jet engines?	**[3M]**

PART-B (50 MARKS)

SECTION-I

2	a) In a steam power cycle, the steam supply is at 15 bar and dry and saturated. The condenser pressure is 0.4 bar. Calculate the Rankine and Carnot efficiencies of the cycle. Neglect the pump work.	**[5M]**
	.b) Draw the block diagram of reheat cycle by representing all the components and explain the salient features of the cycle.	**[5M]**

OR

3	A reheat Rankine cycle operates between the pressure limits of 26 bar and 0.04 bar. The steam entering the HP turbine and LP turbine has a temperature of 400 ^{o}C. The steam leaves the HP turbine as dry saturated. Compare thermal efficiency and steam rate of Rankine cycle without and with reheating. Neglect the feed pump work.	**[10M]**

SECTION-II

4	a) Steam is expanded in a set of nozzles from 10 bar and 200 ^{O}C to 5 bar. Neglecting the initial velocity, find the maximum area of the nozzle required to allow a flow of 3 kg/s under the given conditions. Assume that the expansion of	**[5M]**

the steam to be isentropic. Also name the type of nozzle.

b) Clearly explain about any one type of high pressure boiler **[5M]**

OR

5 Dry saturated steam enters a steam nozzle at a pressure of 15 bar and is discharged at a pressure of 2 bar. If the dryness fraction of discharge steam is 0.96, what will be the final velocity of steam? Neglect the initial velocity of the steam. If 10% of the heat drop is lost in friction, find the percentage reduction in the final velocity. **[10M]**

SECTION-III

6 Derive the expression for maximum blade efficiency of a single stage impulse turbine. **[10M]**

OR

7 Define the following as related to steam turbines. **[6M]**

a) i) Blade Speed ratio ii) blade velocity coefficient iii) diagram efficiency iv) stage efficiency

B) explain the difference between an impulse turbine and a reaction turbine **[4M]**

SECTION-IV

8 Describe with neat diagram a closed cycle gas turbine and explain advantages, disadvantages and applications. **[10M]**

OR

9 A gas turbine unit receives air at 1 bar and 300 K and compresses it adiabatically to 6.2 bar. The compressor efficiency is 88%. The fuel has heating value of 44186 kJ/kg and the fuel air ratio is 0.017 kJ/kg of air. The turbine internal efficiency is 90%. Calculate the work of turbine and compressor per kg of air compressed and thermal efficiency for products of combustion, C_p =1.147 kJ/kgK and γ =1.333. **[10M]**

SECTION-V

10 a) Derive the equation for thrust, thrust power of a jet propulsion. **[5M]**

b) The following data pertain to a turbojet flying at a altitude of 9500 m: speed of the turbojet is 800 km/hr, propulsive efficiency=55% overall efficiency of a turbine plant is 17%. Density of air at 9500 m altitude is 0.17kg/$m^{3.}$ Drag on the plane is 6100 N, assuming calorific value of the fuel used as 46000 kJ/kg. Calculate : i) absolute velocity of the jet ii) Volume of air compressed /min. **[5M]**

OR

11 a) With a neat sketch, explain the working of turbo jet engine. **[5M]**

b) Differentiate between solid propellant and liquid propellant rocket engines. **[5M]**

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R15

Code No: R15A0313

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech I Semester Regular/supplementary Examinations, November 2018

Advanced Thermal Engineering

(ME)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

Note: Steam tables are allowed.

******

PART-A (25 Marks)

1). a	Draw the line diagram of a Rankine cycle and mention the various components	**[2M]**
b	State the advantages of regenerative cycle over simple Rankine cycle.	**[3M]**
c	State the differences between fire tube and water tube boilers	**[2M]**
d	What is the function of a safety valve?	**[3M]**
e	Mention any two differences between jet and the surface condenser	**[2M]**
f	Write the advantages and disadvantages of steam turbines	**[3M]**
g	What do you mean by the term gas turbine?	**[2M]**
h	State the merits of gas turbines over IC engines.	**[3M]**
i	Draw the gas turbine power plant with inter cooling	**[2M]**
j	What is thrust augmentation	**[3M]**

PART-B (50 MARKS)

SECTION-I

2 Explain a regenerative cycle with a diagram and derive the expression for its thermal efficiency. **[10M]**

OR

3 In a Rankinne cycle the steam at inlet to turbine is saturated at a pressure of 35 bar and exhaust pressure is at 0.2 bar. Determine i) the pump work ii) the turbine work iii) Rankine efficiency iv) the condenser heat flow v) the dryness at the end of expansion. **[10M]**

SECTION-II

4 a) Explain ***any two*** of the following with neat sketches (5M) **[10M]**
i) Super heater ii) Air Preheater iii) Economizer
b) List the advantages of high pressure boilers (5M)

OR

5 a) Steam having pressure of 10.5 bar and 0.95 dryness fraction is expanded through a convergent- divergent nozzle and the pressure of steam leaving the nozzle is 0.85 bar. Find the velocity at the throat for maximum discharge **[10M]**

condition. If the index of expansion may be assumed to be 1.135, calculate the mass flow rate of steam through the nozzle. (5M)

b) Explain ***any two*** of the following with sketches

i) pressure gauge ii) water level gauge iii) feed check valve iv) high steam and low water safety valve. (5M)

SECTION-III

6 What are the compounding methods used in reducing the speed of the turbine rotor? Explain any two methods. **[10M]**

OR

7 A single stage steam turbine is supplied with steam at 5 bar, 200 ^{o}C at the rate of 50 kg/min. It expands into a condenser at a pressure of 0.2 bar. The blade speed is 400 m/s. The nozzles are inclined at an angle of 20 degree to the plane of the wheel and outlet blade angle is 30 degrees. Neglecting friction losses calculate i) power developed ii) blade efficiency and iii) stage efficiency. **[10M]**

SECTION-IV

8 a) Describe with neat sketches the working of a simple constant pressure open cycle gas turbine.(5M) **[10M]**

b) Discuss briefly the methods employed for improvement of thermal efficiency of open cycle gas turbine plant. (5M)

OR

9 A gas turbine unit has a pressure ratio of 6:1 and maximum cycle temperature of 610 ^{o}C. The isentropic efficiencies of the compressor and turbine are 0.80 and 0.82 respectively. Calculate the power output in kW of an electrical generator geared to the turbine when the air enters the compressor at 15 ^{o}C at the rate of 16 kg/sec. Take C_p as 1.005 kJ/kgK. γ=1.4 for the compression process and take C_p= 1.11 kJ/kgK and γ =1.333 for the expansion process. **[10M]**

SECTION-V

10 a) Explain the working difference between propeller -jet, turbo-jet and turbo- prop. (5M) **[10M]**

b) State the fundamental differences between jet propulsion and rocket propulsion. (5M)

OR

11(a) With a neat diagram explain the working of rocket engine **[5M]**

(b) Describe briefly about thrust augmentation method used in propulsion. **[5M]**

DYNAMICS OF MACHINERY

Code No: R15A0307

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester supplementary Examinations, November/December 2017

Dynamics of Machinery

(ME)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B

Part A is compulsory which carriers 25 marks and Answer all questions.

Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

PART – A (25 Marks)

1.(a) What do you mean by spin, precession and gyroscopic planes?(2)

(b) Explain in what way the gyroscopic couple affects the motion of an aircraft while taking a turn.(3)

(C). Do you recommend the uniform pressure theory or uniform wear theory for the friction torque of a bearing? Explain.(2)

(d) What is the frictional torque transmitted in case of flat pivot bearing, assuming uniform wear condition.(3)

(e) Discuss the effectiveness of a band brake under various conditions.(2)

(f) Differentiate between Brakes and dynamometer.(3)

(g)Why is balancing necessary for rotors of high speed engines?(2)

(h)What do you mean by primary and secondary unbalance in reciprocating engines?(3)

(i)What do you mean by partial balancing in a reciprocating engines?(2)

(j) Distinguish the terms sensitiveness and stability relating to governors. (3)

PART – B (50 Marks)

SECTION – I

2(a) What is the effect of the gyroscopic couple on the stability of a four wheeler while negotiating a curve? In what way does this effect along with that of the centrifugal force limit the speed of the vehicle?(5)

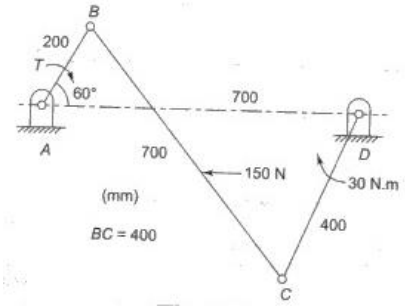
b) How do the effects of gyroscopic couple and of centrifugal force make the rider of a two-wheeler .Derive a relation for the limiting speed of the vehicle.(5)

(OR)

3. The rotor of a marine turbine has a moment of inertia of 750 kg. m2 and rotates at 3000 rpm clockwise when Viewed from aft. If the ship pitches with angular simple harmonic motion having a periodic time of 16 seconds and an amplitude of 0.1 radian, find the (i) maximum angular velocity of the rotor axis (ii) maximum value of the gyroscopic couple (iii) gyroscopic effect as the bow dips. (10)

SECTION – II

4. Determine the torque required to be applied to the link AB of a four link mechanism shown in figure to maintain static equilibrium at the given position.(10)



(OR)

5. In a four link mechanism ABCD the link AB revolves with an angular velocity of 10 rad/s and angular acceleration of 25 rad/s^2 at the instant when it makes an angle of 45^0 with AD, the fixed link. The lengths of the links are AB = CD = 800 mm, BC = 1000 mm and AD = 1500 mm. The mass of the links is 4 kg/m length. Determine the torque required to overcome the inertia forces , neglecting the gravitional effects. Assume all links to be of uniform cross-sections.(10)

SECTION – III

6. a. Explain single plate clutch with neat sketch (6)
   b. Derive the equation for a uniform wear and uniform pressure of pivot bearing (4)

(OR)

7(a). Classify dynamometers and explain function of one transmission type dynamometer. (4)

(b) A simple band brake is operated by a lever of length 500 mm. The brake drum has a diameter of 500 mm and the brake band embraces 5/8th of the circumference. One end of the band is attached to the fulcrum of the lever while the other end is attached to a pin on the lever 100 mm from the fulcrum,.If the effort applied to the end of the lever is 2 kN and the coefficient of friction is 0.25, find the maximum braking torque on the drum.(6)

SECTION – IV

8. A 2-cylinder uncoupled locomotive with cranks at 90^0 has a crank radius of 32.4cms. The distance between centers of driving wheel is 150 cms. The pitch of cylinders is 60cms. The diameter of treads of driving wheel is 180 cms. The radius of center of gravity of balance weights is 65 cms. The pressure due to dead load on each wheel is 4 tonnes. The weight of reciprocating and rotating parts per cylinder are 330 kg and 300 kg respectively. The speed of locomotive is 60 kmph. Find:

(a) The balancing weights both in magnitude and position required to be placed in the planes of driving wheels to balance whole of the revolving and 2/3 of reciprocating masses.
(b) Swaying couple.
(c) The variation of tractive force. (10)

(OR)

9.Four masses m1, m2, m3 and m4 having 100, 175, 200 and 25 kg are fixed to cranks of 20 cm radius and revolve in places 1, 2, 3 and 4. The angular position of the cranks in planes 2, 3 and 4 with respect to the crank in plane 1 are 75^0, 135^0 and 200^0 taken in the same sense. The distance of planes 2, 3 and 4 from plane 1 are 60 cm, 186 cm and 240 cm respectively. Determine the position and magnitude of the balance mass at a radius of 60 cm in plane L and M located at middle of the plane 1 and 2 and the middle of the planes 3 and 4 respectively. (10)

SECTION – V

10. A Proell governor has equal arms of length 300mm . The upper and lower ends of the arms are pivoted on the axis of the governor. The extension arms of the lower links are each of 80 mm long and parallel to the axis, when the radius of rotation of the balls are 150 mm and 200 mm. The mass of each ball is 10 Kg and the mass of the central load is 100 Kg, determine the range of the speed of the governor?

(OR)

11.A Hartnell governor operates between 290 rpm and 310 rpm with a sleeve lift of 15 mm. The two right-angled bell-crank levers are pivoted at 120 mm from the governor axis. The sleeve arms and the ball arms are 80 mm and 120 mm respectively. Mass of each ball is 2.5 kg. The ball arms are parallel to the governor axis at the lowest equilibrium speed., Determine the stiffness of the spring and the loads on the spring at the lowest and the highest equilibrium speeds.(10)

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Code No: R15A0307

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester supplementary Examinations, Nov/Dec 2018

Dynamics of Machinery

(ME)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B

Part A is compulsory which carriers 25 marks and Answer all questions.

Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

PART – A **(25 Marks)**

1. (a) What is axis of precession? 2M
   (b) Explain the Gyroscopic effects on air craft. 3M
   (c) What is the importance of free body diagram? 2M
   (d) What is boundary friction? 3M
   (e) What is the function of a Brake? 2M
   (f) Explain the terms maximum fluctuation of energy. 3M
   (g) In case of balancing of rotary masses in different planes, how many planes in which balancing masses will be kept? 2M
   (h) If a damper exerts a force of 30kN at a speed of 2m/sec movement, Determine the damping coefficient. 3M
   (i) Why too sensitivity Governors are not useful? 2M
   (j) Define isochronisms of a governor. 3M

PART – B **(50 Marks)**

SECTION – I

2. A disc with radius of gyration 60mm and a mass of 4kg is mounted centrally on a horizontal axle of 80mm length between the bearings. It spins about the axle at 800rpm counter-clockwise when viewed from the right hand side bearing. The axle precesses about a vertical axis at 50rpm in clockwise direction when viewed from above. Determine the resultant reaction at each bearing due to the mass and the gyroscopic effect. [10M]

(OR)

3. Derive the equation of gyroscopic couple $C=I\omega\omega_p$. [10M]

SECTION – II

4. In a thrust bearing, the external and internal diameters of the contacting surfaces are 320mm and 200mm respectively. The total axial load is 80kN and the intensity of pressure is 350kN/m^2. The shaft rotates at 400 rpm. Taking the coefficient of friction as 0.06, calculate the power lost in overcoming the friction. Also find the number of collars required for the bearing [10M]

(OR)

5. A conical pivot with angle of cones as 100°, supports a load of 18kN. The external radius is 2.5 times the internal radius. The shaft rotates at 150rpm. If the intensity of pressure is to be 300kN/m^2 and coefficient of friction as 0.05. What is the power lost in working against the friction? [10M]

SECTION – III

6. A cone clutch with a semi-cone angle of 15° transmits 10kW at 600rpm. The normal pressure intensity between the surfaces in contact is not to exceed 100kN/m^2. The Width of the friction surfaces is half of the mean diameter. Assume coefficient of friction as 0.25. Determine
   i) The outer and inner diameters of the plates
   ii) The axial force to engage the clutch. [10M]

(OR)

7. The turning moment curve for a two stroke `engine is represented by the equation T= 20000+9500 sin2θ-5700 cos2θ N-m, where θ is the rotation of the crank. If the resisting torque is constant.
   Find
   i. Power developed ii. Moment of Inertia of the flywheel
   iii. Angular acceleration of the flywheel at 45° of crank rotation from IDC. [10M]
   The speed of the engine is 180 rpm and the total fluctuation of speed is 1%.

SECTION – IV

8. A Twin cylinder engine has its crank at 90° apart the masses of reciprocating parts is 300kg, crank radius 0.3m. Driving wheel diameter 1.8m, the distance between the cylinder centre line is 0.65m.
   Determine:
   a) The fraction of reciprocating masses to be balanced, if the hammer blow is not be be exceed 40kN at 100 kmph.
   b) Variation in tractive effort
   c) Swaying couple. [10M]

(OR)

9. In a single degree of damped vibrating system a suspended mass of 3.75 kg makes 12 oscillation in 7 sec, when displaced from its equilibrium position. The amplitude of vibration reduces to 0.33 of its initial value in four oscillations.
   Determine: a) Stiffness of the spring
   b) Logarithmic decrement
   c) Damping factor
   d) Damping coefficient. [10M]

SECTION – V

10. A porter governor has four arms of 30cm long. The upper arm are pivoted at the axis of rotation and the lower arms are attached to the sleeve at a distance of 3.5cmfrom the axis. The mass of each ball is 54kg. Determine the equilibrium speed for the two extreme radii of 20cm and 25cm of rotation of the governor balls and the range of speed. [10M]

(OR)

11. A governor of Hartnell type has equal balls of 3kg at radius of 200mm. the length of bell cranks are 110mmvertically and 150mm horizontally. Find (i) Initial Compressive force in the spring at a radius of 200mm at 240 rpm (ii) the stiffness of the spring required to permit a sleeve movement of 4mm on a fluctuation of 7.5% in the engine speed. [10M]

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Code No: R15A0307

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester supplementary Examinations, Nov/Dec 2018

Dynamics of Machinery

(ME)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B

Part A is compulsory which carriers 25 marks and Answer all questions.

Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

PART – A **(25 Marks)**

1. (a) What is axis of precession? 2M
   (b) Explain the Gyroscopic effects on air craft. 3M
   (c) What is the importance of free body diagram? 2M
   (d) What is boundary friction? 3M
   (e) What is the function of a Brake? 2M
   (f) Explain the terms maximum fluctuation of energy. 3M
   (g) In case of balancing of rotary masses in different planes, how many planes in which balancing masses will be kept? 2M
   (h) If a damper exerts a force of 30kN at a speed of 2m/sec movement, Determine the damping coefficient. 3M
   (i) Why too sensitivity Governors are not useful? 2M
   (j) Define isochronisms of a governor. 3M

PART – B **(50 Marks)**

SECTION – I

2. A disc with radius of gyration 60mm and a mass of 4kg is mounted centrally on a horizontal axle of 80mm length between the bearings. It spins about the axle at 800rpm counter-clockwise when viewed from the right hand side bearing. The axle precesses about a vertical axis at 50rpm in clockwise direction when viewed from above. Determine the resultant reaction at each bearing due to the mass and the gyroscopic effect. [10M]

(OR)

3. Derive the equation of gyroscopic couple $C=I\omega\omega_p$. [10M]

SECTION – II

4. In a thrust bearing, the external and internal diameters of the contacting surfaces are 320mm and 200mm respectively. The total axial load is 80kN and the intensity of pressure is 350kN/m^2. The shaft rotates at 400 rpm. Taking the coefficient of friction as 0.06, calculate the power lost in overcoming the friction. Also find the number of collars required for the bearing [10M]

(OR)

5. A conical pivot with angle of cones as 100°, supports a load of 18kN. The external radius is 2.5 times the internal radius. The shaft rotates at 150rpm. If the intensity of pressure is to be 300kN/m^2 and coefficient of friction as 0.05. What is the power lost in working against the friction? [10M]

SECTION – III

6. A cone clutch with a semi-cone angle of 15° transmits 10kW at 600rpm. The normal pressure intensity between the surfaces in contact is not to exceed 100kN/m^2. The Width of the friction surfaces is half of the mean diameter. Assume coefficient of friction as 0.25. Determine
   i) The outer and inner diameters of the plates
   ii) The axial force to engage the clutch. [10M]

(OR)

7. The turning moment curve for a two stroke `engine is represented by the equation
   T= 20000+9500 sin2θ-5700 cos2θ N-m, where θ is the rotation of the crank. If the resisting torque is constant.
   Find
   i. Power developed ii. Moment of Inertia of the flywheel
   iii. Angular acceleration of the flywheel at 45° of crank rotation from IDC. [10M]
   The speed of the engine is 180 rpm and the total fluctuation of speed is 1%.

SECTION – IV

8. A Twin cylinder engine has its crank at 90° apart the masses of reciprocating parts is 300kg, crank radius 0.3m. Driving wheel diameter 1.8m, the distance between the cylinder centre line is 0.65m.
   Determine:
   a) The fraction of reciprocating masses to be balanced, if the hammer blow is not be be exceed 40kN at 100 kmph.
   b) Variation in tractive effort
   c) Swaying couple. [10M]

(OR)

9. In a single degree of damped vibrating system a suspended mass of 3.75 kg makes 12 oscillation in 7 sec, when displaced from its equilibrium position. The amplitude of vibration reduces to 0.33 of its initial value in four oscillations.
   Determine: a) Stiffness of the spring
   b) Logarithmic decrement
   c) Damping factor
   d) Damping coefficient. [10M]

SECTION – V

10. A porter governor has four arms of 30cm long. The upper arm are pivoted at the axis of rotation and the lower arms are attached to the sleeve at a distance of 3.5cmfrom the axis. The mass of each ball is 54kg. Determine the equilibrium speed for the two extreme radii of 20cm and 25cm of rotation of the governor balls and the range of speed. [10M]

(OR)

11. A governor of Hartnell type has equal balls of 3kg at radius of 200mm. the length of bell cranks are 110mmvertically and 150mm horizontally. Find (i) Initial Compressive force in the spring at a radius of 200mm at 240 rpm (ii) the stiffness of the spring required to permit a sleeve movement of 4mm on a fluctuation of 7.5% in the engine speed. [10M]

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R15

Code No: **R15A0307**

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Regular/Supplementary Examinations, April/May 2018

Dynamics of Machinery

(ME)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B

Part A is compulsory which carriers 25 marks and Answer all questions.

Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

PART – A **(25 Marks)**

1. (a) What is a Gyroscope? 2M
   (b) What are the Engineering applications of a Gyroscope? 3M
   (c) What are the Conditions for equilibrium 2M
   (d) Define D'Alembert's Principle. 3M
   (e) Differentiate Between Clutch and Brake. 2M
   (f) Why the weight of the wheel for single cylinder engines is heavier than that of same powered multi cylinder engine? 3M
   (g) What is hammer blow in locomotives? 2M
   (h) Classify vibrations. 3M
   (i) Define Sensitivity of a governor. 2M
   (j) Derive expression for height of Watt governor. 3M

PART – B **(50 Marks)**

SECTION – I

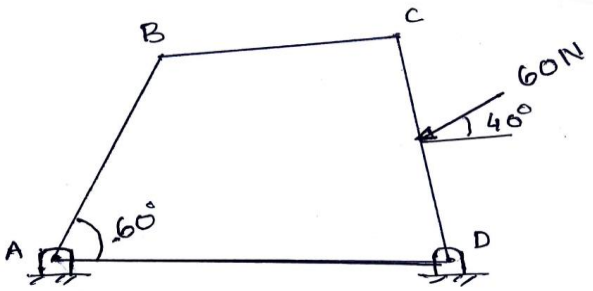
2. The turbine rotor of a ship has mass of 2.2 tonnes and rotates at 1800 rpm in clockwise when viewed from the stern. The radius of gyration of rotor is 320mm. Determine the gyroscopic couple and its effect when
   a) The ship turns right at a radius of 250m with a speed of 25km/hr 4M
   b) The ship pitches with the bow rising at an angular velocity of 0.8 rad/sec 4M
   c) The ship rolls at an angular velocity of 0.1 rad/sec 2M

(OR)

3. Find the angle of inclination with respect to the vertical for a two wheeler having the following details negotiating a turn of radius of 50m.
   Combined mass of the vehicle & rider : 25kg
   Centre of gravity with rider in vertical position:0.6.m
   Moment of Inertia of the flywheel: 0.3kg-m^2
   Moment of Inertia of the road wheel: 1kg-m^2
   Vehicle speed: 90 kmph
   Wheel diameter: 600mm
   Speed of the engine is five times that of the road wheel and in same direction. [10M]

SECTION – II

4. For the given four bar mechanism AB: 500mm, BC: 660mm, CD:560mm, AD:1000mm.Determine the torque on the input liknk AB for static equilibrium of the mechanism. Also find the forces on the bearings A,B, C, &D. [10M]



(OR)

5. a) An electric motor driven power screw moves a nut in horizontal plane against a force of 75kN at a speed of 300mm/min. The screw has a single square thread of 6mm of pitch on a major diameter of 40mm. The coefficient of friction at the screw thread is 0.1. Estimate the power of the motor.[5M]

   b) A conical pivot supports a load of 20 kN, the cone angle is 120º and the intensity of normal pressure is not to exceed 0.3 N/mm^2. The external diameter is twice the internal diameter. Find the outer and inner radii of the bearing surface. If the shaft rotates at 200 r.p.m. and the coefficient of friction is 0.1, find the power absorbed in friction. Assume uniform pressure. [5M]

SECTION – III

6. A multi-plate disc clutch transmits 55kW of power at 1800 rpm. Coefficient of friction for the friction surfaces is 0.1. Axial intensity of pressure is not to exceed 160kN/m^2. The internal radius is 0.7 times the external radius. Find the number of plates needed to transmit the required torque. [10M]

(OR)

7. The turning moment diagram for a petrol engine is drawn to the following scales Turning moment, 1 mm = 5 N-m ; crank angle, 1 mm = 1°. The turning moment diagram repeats itself at every half revolution of the engine and the areas above and below the mean turning moment line taken in order are 295, 685, 40, 340, 960, 270 mm2. The rotating parts are equivalent to a mass of 36 kg at a radius of gyration of 150 mm. Determine the coefficient of fluctuation of speed when the engine runs at 1800 r.p.m.. [10M]

SECTION – IV

8. Data of three unbalanced masses A, B and C are given below. M_a=4kg, M_b=3kg, M_c=2.5kg, R_a=75mm, R_b=85mm, R_c=50mm, θ_a=45°, θ_b=135°, θ_c=240°. The shaft length is 800mm between bearings. These three masses are completely balanced by two counter masses located 75mm from each bearing. The axial distance of 3 unbalanced masses are L_a= 150mm, L_b= 350mm, and L_c= 525mm, from the right hand side of counter mass plane. Determine the masses and angular positions of counter masses, if the radial location of counter masses are R_{b1} =75mm and R_{b2} =40mm. [10M]

(OR)

9. A shaft carries four masses A, B, C and D of magnitude 200 kg, 300 kg,400 kg and 200 kg respectively and revolving at radii 80 mm, 70 mm, 60 mm and 80 mm in planes measured from A at 300 mm, 400 mm and 700 mm. The angles between the cranks measured anticlockwise are A to B 45°, B to C 70° and C to D 120°. The balancing masses are to be placed in planes X and Y. The distance between the planes A and X is 100 mm, between X and Y is 400 mm and between Y and D is 200 mm. If the balancing masses revolve at a radius of 100 mm, find their magnitudes and angular positions. [10M]

SECTION – V

10. The arms of a proel governor are 27.5cm long and are pivoted on the axis of rotation. The extension of lower arm on which ball is carried is 10cm long and the mass of each ball is 5 kg. the central mass on the sleeve is 75kg. If the ball centers are vertical above the pin joint connecting the upper and lower arms, when the radius of radius of rotation is 18.75cm. Determine the range of speed. [10M]

(OR)

11. In a spring loaded governor, the controlling force curve is a straight line. The balls are 400mm apart, when the controlling force is 1500N and 240mm when it is 800N, the mass of each ball is 10kg. Determine the speed at which the governor runs, when the balls are 300mm apart. By how much should the initial tension be increased to make the governor isochronous? Also find the isochronous speed. [10M]

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Code No: R15A0307 **R15**

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester supplementary Examinations, April/May 2019

Dynamics of Machinery

(ME)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

PART-A (25 Marks)

1). a	What do you understand by gyroscopic couple?	**[2M]**
b	Describe the gyroscopic effect on ship with all possible ways.	**[3M]**
c	What are the conditions for equilibrium?	**[2M]**
d	Write an expressions for torque of a conical pivot assuming uniform pressure and uniform wear.	**[3M]**
e	Which of the two assumptions- uniform intensity of pressure or uniform rate of wear, would you make use of in designing friction clutch and why?	**[2M]**
f	Discuss the various types of brakes.	**[3M]**
g	How the different masses rotating in different planes are balanced.	**[2M]**
h	What are the causes and effects of vibrations	**[3M]**
i	What is the function of governor? How does it differ from that of a flywheel.	**[2M]**
j	Write short note on coefficient of insensitiveness of governors.	**[3M]**

PART-B (50 MARKS)

SECTION-I

2	A rear engine automobile is travelling along a track of 100 metres mean radius. Each of the four road wheels has a moment of inertia of 2.5 kg-m^2 and an effective diameter of 0.6 m. The rotating parts of the engine have a moment of inertia of 1.2 kg-m^2. The engine axis is parallel to the rear axle and the crankshaft rotates in the same sense as the road wheels. The ratio of engine speed to back axle speed is 3 : 1. The automobile has a mass of 1600 kg and has its centre of gravity 0.5 m above road level. The width of the track of the vehicle is 1.5 m. Determine the limiting speed of the vehicle around the curve for all four wheels to maintain contact with the road surface. Assume that the road surface is not cambered and centre of gravity of the automobile lies centrally with respect to the four wheels.	**[10M]**

OR

3	A ship propelled by a turbine rotor which has a mass of 5 tonnes and a speed of 2100 r.p.m. The rotor has a radius of gyration of 0.5 m and rotates in a clockwise direction when viewed from the stern. Find the gyroscopic effects in the following conditions: (a) The ship sails at a speed of 30 km/h and steers to the left in a curve having 60 m radius.(b) The ship pitches 6 degree above and 6 degree below the horizontal position. The bow is descending with its maximum velocity. The	**[10M]**

motion due to pitching is simple harmonic and the periodic time is 20 seconds. (c) The ship rolls and at a certain instant it has an angular velocity of 0.03 rad/s clockwise when viewed from stern. Determine also the maximum angular acceleration during pitching. Explain how the direction of motion due to gyroscopic effect is determined in each case.

SECTION-II

4 A vertical petrol engine 100 mm diameter and 120 mm stroke has a connecting rod 250 mm long. The mass of the piston is 1.1 kg. The speed is 2000 r.p.m. On the expansion stroke with a crank 20° from top dead centre, the gas pressure is 700 kN/m^2. Determine: (a) Net force on the piston, (b) Resultant load on the gudgeon pin,(c) Thrust on the cylinder walls, and (d) Speed above which, other things remaining same, the gudgeon pin load would be reversed in direction. **[10M]**

OR

5 A thrust shaft of a ship has 6 collars of 600 mm external diameter and 300 mm internal diameter. The total thrust from the propeller is 100 kN. If the coefficient of friction is 0.12 and speed of the engine 90 r.p.m., find the power absorbed in friction at the thrust block, assuming l. uniform pressure; and 2. Uniform wear. **[10M]**

SECTION-III

6 A rotor is driven by a co-axial motor through a single plate clutch, both sides of the plate being effective. The external and internal diameters of the plate are respectively 220 mm and 160 mm and the total spring load pressing the plates together is 570 N. The motor armature and shaft has a mass of 800 kg with an effective radius of gyration of 200 mm. The rotor has a mass of 1300 kg with an effective radius of gyration of 180 mm. The coefficient of friction for the clutch is 0.35. The driving motor is brought up to a speed of 1250 r.p.m. when the current is switched off and the clutch suddenly engaged. Determine (a) The final speed of motor and rotor, (b) The time to reach this speed, and (c) The kinetic energy lost during the period of slipping. How long would slipping continue if it is assumed that a constant resisting torque of 60 N-m were present? If instead of a resisting torque, it is assumed that a constant driving torque of 60 N-m is maintained on the armature shaft, what would then be slipping time? **[10M]**

OR

7 The turning moment diagram for a petrol engine is drawn to the following scales : Turning moment, 1 mm = 5 N-m ; crank angle, 1 mm = 1°. The turning moment diagram repeats itself at every half revolution of the engine and the areas above and below the mean turning moment line taken in order are 295, 685, 40, 340, 960, 270 mm2. The rotating parts are equivalent to a mass of 36 kg at a radius of gyration of 150 mm. Determine the coefficient of fluctuation of speed when the engine runs at 1800 r.p.m. **[10M]**

SECTION-IV

8 An inside cylinder locomotive has its cylinder centre lines 0.7 m apart and has a stroke of 0.6 m.The rotating masses per cylinder are equivalent to 150 kg at the crank pin, and the reciprocatingmasses per cylinder to 180 kg. The wheel centre lines are 1.5 m apart. The cranks are at rightangles. The whole of the rotating and 2/3 of the reciprocating masses are to be balanced bymasses placed at a radius of **[10M]**

0.6 m. Find the magnitude and direction of the balancing masses.Find the fluctuation in rail pressure under one wheel, variation of Tractive effort and the magnitude of swaying couple at a crank speed of 300 r.p.m

OR

9 (a) The following data are given for a vibratory system with viscous damping: Mass = 2.5 kg ; spring constant = 3 N/mm and the amplitude decreases to 0.25 of the initial value after five consecutive cycles. Determine the damping coefficient of the damper in the system. **[10M]**

(b) A shaft of 100 mm diameter and 1 metre long has one of its end fixed and the other end carries a disc of mass 500 kg at a radius of gyration of 450 mm. The modulus of rigidity for the shaft material is 80 GN/m^2. Determine the frequency of torsional vibrations.

SECTION-V

10 The following particulars refer to a Proell governor with open arms : Length of all arms = 200 mm, distance of pivot of arms from the axis of rotation = 40 mm, length of extension of lower arms to which the ball is attached = 100 mm, mass of each ball = 6 kg and mass of the central load = 150 kg. If the radius of rotation of the balls is 180 mm when the arms are inclined at 40° to the axis of rotation, find : 1. the equilibrium speed for the above configuration, 2. the coefficient of insensitiveness if the friction of the governor mechanism is equivalent to a force of 20 N at the sleeve, and 3. the range of speed between which the governor is inoperative. **[10M]**

OR

11 In a spring controlled governor, the curve of controlling force is a straight line. When balls are 400 mm apart, the controlling force is 1200 N and when 200 mm apart, the controlling force is 450 N. At what speed will the governor run when the balls are 250 mm apart? What initial tension on the spring would be required for isochronism and what would then be the speed ? The mass of each ball is 9 kg. **[10M]**

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R17

Code No: R17A0307

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Regular Examinations, April/May 2019

Dynamics of Machinery

(ME)

Roll No										

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

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1 The rotor of a turbojet engine has mass 200kg and a radius of gyration 25cm. The engine rotates at a speed of 10000 rpm in clock-wise direction when viewed from the front of the aeroplane. The plane while flying at 1000km/hr truns with radius of 2km to right. Compute the gyroscopic moment that the rotor exerts on the plane structure. Determine the nose of the plane tends to rise or fall when the plane turns. **[14M]**

OR

2 A rear engine automobile is traveling along a truck of 100 meters mean radius. Each of the four road wheels has a moment of inertia of 2 kg-m^2 and an effective diameter of 0.6m. The rotating parts of the engine have a moment of inertia of 1 kg-m^2. The engine axis is parallel to the rear axle and the crank shaft rotates in the same sense as the road wheels. The gear ratio of engine to the back wheel is 3 to 1. The vehicle has a mass of 2000kg and its centre of gravity is 0.5m above the road wheel. The width of the track of the vehicle is 1.5m. Determine the limiting speed of the vehicle around the curve for all four wheels to maintain contact with the road surface. **[14M]**

SECTION-II

3 A multiple collar thrust bearing has flat contact surfaces of30cm and 40cm internal and external diameters respectively and supports an axial thrust of 10000kg. Coefficient of friction between bearing surface is 0.05. Assuming the condition of uniform wear, determine **[07M]**

a) Number of collars required and 2.Power lost in friction, when the shaft rotates at 200 rpm. **[07M]**

b) The maximum intensity of pressure between the bearing surfaces is not to exceed 4kg/cm^2.

OR

4 A friction clutch is to transmit 10kW at 3000 rpm. It is to be of single plate type with both sides of the plate effective, the axial pressure being limited to 0.09N/mm^2. If the external diameter of the friction lining is 1.4 times the internal diameter, find the required dimensions of the friction lining. **[14M]**

SECTION-III

5 A band and block brake, having 14 blocks each of which subtends an angle of 15^o at the centre, is applied t a drum of 1m effective diameter. The drum and flywheel mounted on the same shaft weigh 2000kg and a combined radius of gyration of 50cm. The two ends of the band are attached to pins on opposite sides of the brake lever at distance of 3cm and 12cm from the fulcrum. If a **[14M]**

force of 20kg is applied at a distance of 75cm from the fulcrum, find

1. Maximum braking torque
2. Angular retardation of the drum, and
3. Time taken by the system to come to rest from the rated speed of 360rpm.

OR

6 The turning moment diagram for a multicylinder engine has been drawn to be a scale 1 mm=600 N-m vertically and 1mm=3^0 horizontally. The intercepted areas between the output torque curve and the mean resistance line, taken in order from one end , are as follows: +52,-124,+92,-140,+85,-72 and +107 mm^2, when the engine is running at a speed of 600 rpm. If the total fluctuation of speed is not to exceed ± 1.5 of the mean, find the necessary mass of the flywheel of radius 0.5m. **[14M]**

SECTION-IV

7 Data of three unbalanced masses A, B, and C are M_a=4kg, M_b=3kg, M_c=2.5kg, R_a=75mm, R_b=85mm, R_c=50mm, θ_a=45°, θ_b=135°, θ_c=240°. The shaft length is 800mm between bearings. These three masses are completely balanced by two counter masses located 75mm from each bearing. The axial distance of 3 unbalanced masses are L_a=150mm, L_b=350mm and L_c=525mm from right hand side counter mass plane. Determine the masses and angular position of the counter masses, if the radial location of counter masses are R_{b1}=75mm and R_{b2}=40mm. **[14M]**

OR

8 Ina single degree damped vibrating system a suspended mass of 3.75kg makes 12 oscillations in 7 sec when disturbed form its equilibrium position. The amplitude of vibrations reduces to 0.33 of its initial value in 4 oscillations. Determine **[14M]**

(i) The stiffness of the spring
(ii) The logarithmic decrement
(iii) The damping factor
(iv) The damping co-efficient.

SECTION-V

9 A porter governor has four arms of 30cm long. The upper arms are pivoted at the axis of rotation and the lower arms are attached to the sleeve at distance of 3.5cm from the axis. The mass of each ball is 7kg and the mass of the sleeve is 54kg. Determine the equilibrium speed for the two extreme radii of 20cm and 25cm of rotation of the governor balls and the range of speed. **[14M]**

OR

10 A governor of Hartnell type has equal balls of 3kg, initially at a radius of 200mm. The length of bell cranks are 110mm vertically and 150mm horizontally. Find (i) Initial Compression force on the spring at a radius of 200mm at 240rpm (ii) the stiffness of the spring required to permit a sleeve movement of 4mm on a fluctuation of 7.5% in the engine speed. **[14M]**

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Code No: 134BK **R16**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year II Semester Examinations, December - 2018
MANUFACTURING PROCESS
(Mechanical Engineering)

Time: 3 Hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

What points are to be considered before the selection of "casting process" for manufacturing a component? [2]
b) What are the advantages of true centrifugal casting process? [3]
c) Explain various welding positions. [2]
d) Explain the effect of polarity on penetration in DC arc welding. [3]
e) Why do properties vary widely in most welding heat affected zones? [2]
f) Describe the difference between brazing and soldering. [3]
g) Explain the effect of microstructure and strain rate on forming. [2]
h) Explain the advantages of cold working. [3]
i) Explain the role of lubricant in extrusion. [2]
j) Write short note on forging die design. [3]

PART-B

(50 Marks)

2.a) What is the significance of shrinkage in the production of castings?
b) Calculate the size of a cylindrical riser (Height and diameter equal) necessary to feed a slab casting 45 × 45 × 25 cm with a side riser, casting poured horizontally in to the mould. Use caine's equation and take constants in caine equation as a = 0.18, b = 0.05 and c = 1.0. [5+5]

OR

3.a) Why is it important to provide a means of venting gases from the mold cavity?
b) Why might directional solidification be desirable in the production of a cast product? [5+5]

4.a) With the help of a neat sketch of welding torch explain the oxy acetylene process of welding.
b) Why is cleaning of metal important for successful resistance welding? Explain. [5+5]

OR

5.a) What is meant by edge preparation? Show neat sketches of various edge preparations.
b) Explain different forge welding techniques. [5+5]

Explain the reasons and suggest remedies for the following welding defects:
(i) Distortions (ii) Cracks.

b) Describe with neat sketches the TIG welding method and give its specific applications. [5+5]

OR

7.a) With the help of a neat sketch explain induction welding process.

b) What is arc blow? What are the measures to be taken to avoid arc blow? [5+5]

8.a) Explain the changes in structure and properties during cold working, recovery and recrystallization.

b) Explain why spring back in bending depends on yield stress, elastic modules, sheet thickness and bend radius. [5+5]

OR

A coil of brass, 30m long by 0.7 m wide, is produced after a reduction from 5mm down to 4mm in a single pass on a two high mill under constant load conditions. The steel roll diameters are 0.6m, the diameters of the roll neck bearings are 0.5m and the rolls rotate at 30r.p.m.. If the constant load is 600 ton, determine the horse power developed, the energy consumed and the percentage of the total work extended in overcoming bearing friction for:

i) Roller bearings $\mu = 0.002$

ii) Bronze bearings $\mu = 0.06$

The rolls have a matt finish ground on them.

b) Why are multiple passes usually required in wiredrawing operations? Explain. [5+5]

10.a) Suggest and explain the method of manufacturing collapsible tubes.

b) Explain the various forging operations and list the forging defects. [5+5]

OR

11.a) Write a note on impact extrusion and list the advantages of impact extrusion over other extrusion processes.

b) What principles are normally considered good practice in the design of drop forgings? [5+5]

---ooOoo---

R16

Code No: 134BK

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year II Semester Examinations, April - 2018
MANUFACTURING PROCESS
(Mechanical Engineering)

Time: 3 Hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART- A **(25 Marks)**

1.a) What is the difference between pattern and casting? [2]
b) What are the advantages of casting process and mention its applications. [3]
c) What is the difference between DC and AC arc welding? [2]
d) What is filler metal? Explain its importance in welding. [3]
e) How is brazing different from welding. [2]
f) Explain the heat affected zones in welding. [3]
g) Suggest the presses used for coining operations. [2]
h) What are the specific merits of cold working over hot working? [3]
i) What are the advantages of extrusion process? [2]
j) What are the forging defects? [3]

PART-B **(50 Marks)**

2.a) Differentiate between pressurized and unpressurised gating systems with reference to the applications.
b) What do you understand by centrifugal casting? How are the centrifugal casting methods classified? [5+5]

OR

3.a) What purpose is served by the risers in sand casting? Explain the principles of design of risers.
b) What are the advantages, limitation and applications of investment casting? [5+5]

4.a) Describe the oxy-acetylene gas welding technique and give the applications.
b) Explain the resistance welding process giving the equipment, parameters controlled and its advantages. [5+5]

OR

5.a) What are the kinds of joints that are normally employed for welding processes? Give their sketches.
b) Explain submerged arc welding process and its applications. [5+5]

6.a) What are differences between TIG and MIG welding processes?
b) Write a short note on laser beam welding, detailing the applications. [5+5]

OR

7.a) What is friction welding? What are its applications?
b) Explain about welding defects and destructive and non destructive testing of welds. [5+5]

8.a) What are the main characteristics of hot working as compared with cold working process?
b) Explain about hot spinning and cold spinning applications. [5+5]

OR

9.a) Briefly explain various methods available for breakdown passes in rolling. Explain their applications.
b) Distinguish between bending and drawing in sheet-metal operations. [5+5]

10.a) Explain forward extrusion and backward extrusion with neat sketches.
b) Differentiate between roll forging and rotary forging. [5+5]

OR

11.a) Differentiate hot extrusion and cold extrusion processes.
b) Sketch and explain forging hammers. What are the advantages of cold forging? [5+5]

---ooOoo---

Code No: 134BK **R16**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year II Semester Examinations, May - 2019
MANUFACTURING PROCESS
(Mechanical Engineering)

Time: 3 Hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a)	List the advantages of metallic pattern materials.	[2]
b)	What are the applications of sweep pattern?	[3]
c)	Differentiate between Welding and soldering.	[2]
d)	Explain the basic principle of resistance welding?	[3]
e)	Discuss the parameters affecting Heat Affecting zone (HAZ) briefly.	[2]
f)	Explain the principle of seam welding.	[3]
g)	Differentaite blanking and piercing?	[2]
h)	What is hot rolling?	[3]
i)	What is swaging?	[2]
j)	What are the forging defects?	[3]

PART – B

(50 Marks)

2.	Explain the principle of investment casting with necessary sketches.	[10]
	OR	
3.	Describe the working of cupola with sketch.	[10]
4.	Sketch and explain atomic hydrogen welding.	[10]
	OR	
5.	Categorize in detail welding defects and their causes and remedies.	[10]
6.	With sketch, explain the laser beam welding process .Mention advantages and limitation of laser welding also give application**.**	[10]
	OR	
7.	Discuss magneto particle and radiographic inspection testing of weldings.	[10]
8.	Discuss recovery, recrystallisation and grain growth.	[10]
	OR	
9.	Illustrate wire drawing and Tube drawing.	[10]
10.a)	Discuss impact extrusion.	
b)	Enumerate the principles of forging.	[5+5]
	OR	
11.a)	With a neat sketch, explain hydrostatic extrusion.	
b)	Discuss smith forging and roll forging.	[5+5]

R17

Code No: R17A0311

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Regular Examinations, April/May 2019

Production Technology

(ME)

Roll No										

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

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

****

SECTION-I

1	Explain Investment casting process and mention its advantages	**[14M]**
	OR	
2	What are the types of patterns, patterns making materials and explain it	**[14M]**

SECTION-II

3	Discuss the TIG welding process and its applications.	**[14M]**
	OR	
4	Explain the importance of resistance welding in detail.	**[14M]**

SECTION-III

5	Write a note on (a) Strain hardening (b) Recrystallisation	**[14M]**
	OR	
6	Explain the concept of theory of rolling	**[14M]**

SECTION-IV

7	Mention the types of sheet metal operations and explain bending operation	**[14M]**
	OR	
8	Explain Deep drawing process and its features	**[14M]**

SECTION-V

9	Explain basic Extrusion process and its characteristics	**[14M]**
	OR	
10	Write a note on (a) Smith forging (b) Roll forging	**[14M]**

****

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
MODEL QUESTION PAPER-1

Probability and Statistics

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

Note: This question paper contains of 5 sections. Answer five questions, choosing one question from each section and each question carries 14 marks.

SECTION-I

1a) A random variable has the following probability function

x	0	1	2	3	4	5	6	7
P(x)	0	K	2K	2K	3K	K^2	$2K^2$	$7K^2+K$

Find i)k ii)P(X≤6) iii) P(X>6) iv)) find'c' if P(X≤c)>1/2 [7M]

b) A sample if 4 items is selected at random from a box containing 12 items of which 5 are defective. Find the expected number E of defective items. [7M]

OR

2) For the following bivariate (two dimensional) probability distribution of X and Y find
i) P (X≤ 2,Y=2) ii) $F_X(2)$ iii) P(Y=3) iv) P(X<3,Y≤ 4) v) $F_Y(3)$

X/Y	1	2	3	4
1	0.1	0	0.2	0.1
2	0.05	0.12	0.08	0.01
3	0.1	0.05	0.1	0.09

[14M]

SECTION-II

3) The average number of phone calls /minute coming into a switch board between 2pm and 4pm is 2.5.Determine the probability the probability that one particular minute there will be i) 4 or fewer ii) more than 6 calls [14M]

OR

4) Suppose the weights of 800 male students are normally distributed with 28.8kg and SD of 2.06 kg. Find the number of students whose weights are
i) Between 28.4 kg and 30.4kg ii) more than 31.3 kg [14M]

SECTION-III

5a) Find the Karl-Pearson's coefficient of correlation for the paired data:

wages	100	101	102	100	99	97	98	96	95	102
Cost of living	98	99	99	95	92	95	94	90	91	97

[7M]

b) If θ is the angle between two regression lines and S.D of Y is twice the S.D of X and r =1.25, find $\tan\theta$. [7M]

OR

6) The heights of mothers and daughters are given in the following table. From the two tables of regression estimate average height of daughter when the height of the mother is 64.5 inches

Height of mother	62	63	64	64	65	66	68	70
Height of daughter	64	65	61	69	67	68	71	65

[14M]

SECTION-IV

7a) A sample of size 64 and mean70 were taken from a population whose standard deviation is 10.Construct 95% confidence interval for the mean. [7M]

b) Write about (i) Null hypothesis (ii) Type I and Type II errors

(iii) Alternative hypothesis. [7M]

OR

8a) In a study of automobile insurance a random sample of 80 body repair costs had a mean of Rs.472.36 and S.D of Rs.62.35. If x is used as point estimate to the true average repair costs, with what confidence we can assert that the maximum error doesn't exceed Rs.10 [7M]

b) Explain the procedure for Testing of Hypothesis. [7M]

SECTION-V

9) A survey of 320 families with 4children each revealed the following distribution. [14M]

No# of boys	5	4	3	2	1	0
No# of girls	0	1	2	3	4	5
No# of families	14	56	110	88	40	12

Is this result consistent with the hypothesis that male and female births are equally popular?

OR

10) The following are the average weekly losses of worker hours due to accidents in 10 industrial plants before and after a certain safety programme was put into operation:

Before	45	73	46	124	33	57	83	34	26	17
After	36	60	44	119	35	51	77	29	24	11

Test whether the safety programme is effective in reducing the number of accidents at 5%LOS. [14M]

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous Institution - UGC, Govt. of India)

MODEL QUESTION PAPER-2

Probability and Statistics

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

NOTE: This question paper contains of 5 sections. Answer five questions, choosing one question from each section and each question carries 14 marks

SECTION-I

1 a) If the p.d.f of a r.v x is given by $f(x) = \begin{cases} k(1-x^2), & 0 < x < 1 \\ 0, & otherwise \end{cases}$

find i) k and ii) the cumulative distribution function of x. [7M]

b)Write the definitions of (i)Random variable (ii)Discrete random variable (iii) Continuous random variable and (iv)Probability Distribution function. [7M]

OR

2) A random sample with replacement of size 2 is taken from S = {1,2,3}. Let the random variable X denote the sum of the two numbers taken: (i) Write the probability distribution of X

(ii) Find the mean

(iii) Find the variance. [14M]

SECTION-II

3. A sales tax officer has reported that the average sales of the 500 businesses that he has to deal with during a year is Rs.36,000 with a standard deviation of Rs.10,000. Assuming that the sales in these businesses are normally distributed ,find :

i) The number of business as the sales of which are greater than Rs.40,000

ii) The percentage of business sales of which are likely to range between Rs.30,000 and Rs.40,000[14M]

OR

4. If 2% of light bulbs are defective, find

(i) atleast one is defective

(ii) exactly 7 are defective

(iii) p(1<x<8) in a sample of 100

(iv) atmost one is defective [14M]

SECTION-III

5 a) Fit a straight line Y=a_0+a_1X for the following data and estimate the value of Y when X = *25*

X	0	5	10	15	20
Y	7	11	16	20	26

[7M]

b) Show that the maximum value of rank correlation coefficient is 1 [7M]

OR

6a) The marks obtained by 10 students in mathematics and statistics are given below. Find the rank correlation coefficient between the two subjects

Marks in mathematics	25	28	30	32	35	36	38	42	45	39
Marks in Statistics	20	26	29	30	25	18	26	35	46	35

[7M]

b) Find the Correlation coefficient if b_{xy} = 0.85 , b_{yx} = 0.89. [7M]

SECTION-IV

7.a) Samples of size 2 are taken from the population 1,2,3,4,5,6 with replacement. Find
(i) The mean of the population
(ii) Standard deviation of population
(iii) The mean of the sampling distribution of means
(iv) The standard deviation of the sampling distribution of means [12M]
b) What is a statistic? Give an example [2M]

OR

8. a) Write about null hypothesis and testing of null hypothesis. [4M]
b) 20 people were attacked by a disease and only 18 survived. Will you reject the hypothesis that the survival rate if attacked by this disease is 85% in favour of the hypothesis that is more at 5% level. [10M]

SECTION-V

9. In an investigation on the machine performance the following results are obtained:

	No# of units inspected	No# of defectives
Machine 1	375	17
Machine 2	450	22

Test whether there is any significant performance of two machines at 5%LOS [14M]

OR

10. The following is the distribution of the daily number power failures reported in a city

No# of power failures	0	1	2	3	4	5	6	7	8	9
No# 0f days	9	43	64	62	42	36	22	14	6	2

Test the goodness of fit of Poisson distribution at 5% LOS [14M]

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
MODEL QUESTION PAPER-3
Probability and Statistics

Time: 3 hours **Max Marks: 70**
Note: This question paper contains of 5 sections. Answer five questions, choosing one question from each section and each question carries 14 marks.

SECTION-I

1 a) If F(x) is the distribution function of x is given by $F(X) = \begin{cases} 0 & if\ x \le 1 \\ k(x-1)^4 & if\ 1 < x \le 3 \\ 1 & if\ x > 3 \end{cases}$

Determine i) f(x) ii) k iii)mean [10M]

b)Define (i) Probability mass function (ii) Probability density function . [4M]

OR

2 a) Two random variables x and y have the joint density function

$$f_{xy}(x,y) = \begin{cases} x^2 + \frac{xy}{3}, & 0 \le x \le 1, 0 \le y \le 2 \\ 0, & otherwise \end{cases}$$

Show that x and y are not independent . Find the conditional density function . check whether it is valid or not. [7M]

b) The joint density function of w and z is given by

$$f_{wz}(wz) = \begin{cases} bwz, & 1 \le w \le 3, 2 \le z \le 4 \\ 0, & otherwise \end{cases}$$

Find b and marginal density function. [7M]

SECTION-II

3a) Average number of accidents on any day on a national highway is 1.8 .Determine the probability that the number of accidents are i) atleast one ii) atmost one iii) exactly one. [7M]

b) Fit a binomial distribution to the following data [7M]

x	0	1	2	3	4	5
f	38	144	342	287	164	25

OR

4) In a normal distribution,7% of the items are under 35 and 89% are under 63.Determine the mean and variance of the distribution. [14M]

SECTION-III

5) Obtain the rank correlation coefficient for the following data [14M]

X	68	64	75	50	64	80	75	40	55	64
Y	62	58	68	44	81	60	68	48	50	70

OR

6) A panel of two judges P and Q graded seven dramatic performances by independently awarding marks as follows:

Performance	1	2	3	4	5	6	7
Marks by P	46	42	44	40	43	41	45
Marks by Q	40	38	36	35	39	37	41

The eight performance, which judge Q would not attend, was awarded 37 marks by judge P. If judge Q had also been present, how many marks would be expected to have been awarded by him to the eighth performance. [14M]

SECTION-IV

7a) A population consists of 5,10,14,18,13,24.Consider all possible samples of size 2 which can be drawn without replacement from the population. Find

i)The mean of the population

ii) Standard deviation of the population

iii) The mean of the sampling distribution of means

iv) Standard deviation of the sampling distribution of means [10M]

b) Write short notes on Type I and Type II error. [4M]

OR

8 a) A random sample of size 16 values from a normal population showed a mean of 53 and a sum of squares of deviations from the mean equals to 150. Can this sample be regarded as taken from the population having 56 as mean ? Obtain 95% confidence limits of the mean of the population .[10M]

b) Write step procedure for difference of means of two independent samples. [4M]

SECTION-V

9 a) Explain χ^2 test for independence of attributes. [4M]

b) The measurements of the output of two units have given the following results. Assuming that both Samples have been obtained from the normal distribution at 10% LOS. Test whether the two Populations have the same variance. [10M]

Unit –A	14.1	10.1	14.7	13.7	14.0
Unit -B	14.0	14.5	13.7	12.7	14.1

OR

10) The heights of 10 males of a given locality are found to be 70,67,62,68,61,68,70,64,64,66 inches . Is it reasonable to believe that the average height is greater than 64 inches .Test at 5% LOS. [14M]

ASSIGNMENT – 1 (UNIT I & UNIT II)

1.If the p.d.f of a r.v xis given by $f(x) = \begin{cases} k(1-x^2), & 0 < x < 1 \\ 0, & otherwise \end{cases}$

find i) k

2.If F(x) is the distribution function of x is given by$F(X) = \begin{cases} 0 & if\ x \leq 1 \\ k(x-1)^4 & if\ 1 < x \leq 3 \\ 1 & if\ x > 3 \end{cases}$

Determine i) f(x) ii) k iii)mean

3. If X is a continuous r.v and Y=kX+c prove that E(Y)=kE(X)+y and V(Y)=$k^2V(X)$,where V stands for Variance

4. A sales tax officer has reported that the average sales of the 500 business that he has to deal with during a year is Rs.36,000 with a standard deviation of Rs.10,000. Assuming that the sales in these business are normally distributed ,find :

i) The number of business as the sales of which are greater than Rs.40,000

ii) The percentage of business the sales of which are likely to range between Rs.30,000 and Rs.40,000

5. If the variance of a Poisson variate is 3 . Find the probability that

i) P(x=0) ii)P(1≤x≤4) iii) P(x>2)

6. Find the mean and SD of a normal distribution in which 7% of items are under 35 and 89% are under 63

7. Suppose 2% of the people on the average are P.H .Find i) the probability of finding 3 or more P.H ii) the probability of finding ≤ 1 P.H

8.A random variable x has the following probability function:

x	-3	-2	-1	0	1	2	3
P(x)	k	0.1	k	0.2	2k	0.4	2k

Find i) k ii) mean iii) variance

9. The marks obtained by 10 students in mathematics and statistics are given below. Find the coefficient of correlation between the two subjects and the two lines of regression

Marks in mathematics	25	28	30	32	35	36	38	42	45	39
Marks in Statistics	20	26	29	30	25	18	26	35	46	35

10. Fit a straight line Y=a_0+a_1X for the following data and estimate the value of Y when X=25

X	0	5	10	15	20
Y	7	11	16	20	26

11. Find the rank correlation for the following indices of supply and price of an article:

PRICE	80	100	102	91	100	111	109	100	99	104	111	102	98	111
INDEX	124	100	105	112	102	93	99	115	123	104	99	113	121	103

12. For the following bivariate(two dimensional) probability distribution of x and y find

(i) $p(x \leq 2, y = 2)$ $(ii)\ F_x(2)$ $(iii)p(y = 3)$ $(iv)p(x < 3, y \leq 4)$ $(v)F_y(3)$

X/Y	1	2	3	4
1	0.1	0	0.2	0.1
2	0.05	0.12	0.08	0.01
3	0.1	0.05	0.1	0.09

13.Fit a curve of the form Y= a +bX by the method of least squares for the following data:

X	1	2	3	4	5
Y	5	2	4.5	8	12.5

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ASSIGNMENT – II (UNIT III ,UNIT IV & UNIT V)

1. A sample of size 64 and mean 70 was taken from a population whose standard deviation is 10. Construct 95% confidence interval for the mean.
2. The average income of 100 people of a city is Rs 210 with a standard deviation of Rs 10.For
3. another sample of 150 people the average income is Rs 220 with a standard deviation of Rs 12.Test the significant difference between two mean at 5% LOS.

4. 20 people were attacked by a disease and only 18 survived .will you reject the hypothesis that the survival rate of the attack by this disease is 85% in favor of the hypothesis that is more at 5% LOS
5. A random sample of 500 apples was taken from a large consignment and 60 were found to be bad. Obtain 95% confidence interval for the percentage number of bad apples in the consignment.
6. A sample of 500 products are examined from a factory and 5% found to be defective. Another sample of 400 similar products are examined and 3% found to be defective. Test the significance between the difference of two proportions at 5% LOS.

7. A sample of size 64 and mean 70 was taken from a population whose standard deviation is 10. Construct 95% confidence interval for the mean
8. Ten specimens of copper wires drawn from a large lot have the following breaking strength(in kg) 518,572,570,568,572,578,572,569,548.Test whether the mean breaking strengths of the lot may be taken to be 518 kg weight
9. A bank has one drive in counter . It is estimated that cars arrive according to Poisson distribution at the rate of 2 every 5minutes and that there is enough space to accommodate a line of 10 cars , other arriving cars can wait outside this space if necessary . It takes 1.5 minutes on an average to serve a customer, but the service time actually varies according to an exponential distribution .Find
   i) the proportion of time the facility remains idle ii)the expected number of customers waiting but currently not being served at a particular point of time iii)the expected time a customer spends in the system iv)the probability that the waiting line will exceed the capacity of the space leading to the drive in counter.

10. Customers arrive at one window drive-in bank with mean 5 minutes. The car space in front of the window including that for the serviced can accommodate a maximum of 3 cars can wait outside the space ,then
    a. (i)What is the probability that an arriving customer can drive directly to space in front
        i. of the window
    b. (ii) How long is an arriving customer expected to wait before starting service

11. A training process is considered as a two state markov chain. If it rains , it is considered to be in state 0,if it does not rain, the chain is in the state of 1. The transition probability of the markov chain is defined by $P=\begin{bmatrix}0.6 & 0.4\\ 0.2 & 0.8\end{bmatrix}$.Find the probability of state 0 or 1 as 0.4 and 0.6 respectively.
12. The transition probability matrix of a markov chain is given by $\begin{bmatrix}0.3 & 0.7 & 0\\ 0.1 & 0.4 & 0.5\\ 0 & 0.2 & 0.8\end{bmatrix}$.Is the matrix irreducible?

13. Suppose that the probability of a dry day (state 0) follows a rain day (state 1) is 1/3, and probability of a rain day follows a rain day is 1/2,then find the transition probability matrix

14.Consider a self service store with one cashier .Assume Poisson arrival and exponential service times .Suppose 9 customers arrive on the average 5 minutes and the cashier can serve 10 in 5 minutes. Find

i)Average number of customers queuing for service

ii)Probability of having more than 10 customers in the system

iii)Average waiting time of the customers

15.In a colour T.V manufacturing plant, a loading unit takes exactly 10 min to load 2 T.V sets into a wagon and again comes back to the position to load another set of T.V. If the arrival rate is 2 T. V sets per 20 min. Calculate the average time of T.V sets in a stationary state.

16.The transition probability matrix of a markov chain is given by $\begin{bmatrix} 0.3 & 0.7 & 0 \\ 0.1 & 0.4 & 0.5 \\ 0 & 0.2 & 0.8 \end{bmatrix}$.Isthe matrix irreducible?

17.A professor has three pet questions , one of which occurs on every test he gives
He never uses the same question twice in successive examinations. If he used .
the question no#1, he tosses a coin and uses the question no# 2,if head appears. If he uses the question no# 2, he tosses two coins and use the question no#3,if both are heads. If he uses the question no#3,he tosses three coins and use the question no#1, if all are heads. In long run which question does he use most often and with how much frequency is it used.

Code No: **R17A0305** **R17**

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, May 2019

Strength of Materials

(ME)

Roll No										

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

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

****

SECTION-I

1 a) Draw stress-strain curve for a mild steel rod subjected to tension and explain about the salient points on it. **[7M]**

b) A vertical tie, fixed rigidly at the top end consist of a steel rod 2.5 m long and 20 mm diameter encased throughout in a brass tube 20 mm internal diameter and 30 mm external diameter. The rod and the casing are fixed together at both ends. The compound rod is loaded in tension by a force of 10 kN. Calculate the maximum stress in steel and brass. Take $E_s=2x10^5 N/mm^2$ and $E_b=1x10^5 N/mm^2$. **[7M]**

OR

2 A steel tube 50mm in external diamerter and 3mm thick encloses centrally a solid copper bar of 35mm diameter. The bar and the tube are rigidly connected together at the ends at a temperature of 20 ^{0}C. Find the stress in each metal when heated to 170^{0}C. Also find the increase in length, if the original length of the assembly is 350mm. Take $\alpha_s=1.08 \times 10^{-5}$ per ^{0}C and $\alpha_c=1.7 \times 10^{-5}$ per ^{0}C . Take $E_s = 2X10^5$ N/mm^2 , $E_c = 1X10^5$ N/mm^2. **[14M]**

SECTION-II

3 A 30m long horizontal beam carries a uniformly distributed load of 1 kN/ m on the whole length along with a point load of 3 kN at the right end. The beam is freely supported at the left end. Determine the position of the second support so that the maximum bending moment on the beam is as small as possible. Also draw the shear force and bending moment diagrams indicating main values. **[14M]**

OR

4 A Beam A B C, 5m long has one support at the end A and other support at B, 8m from A. It carries a point load of 4kN at the middle point of AB and a point load of 3kN at C Draw SFD and BMD. **[14M]**

SECTION-III

5 a) A simply supported symmetric I-section has flanges of size 200 mmX 15 mm and its overall depth is 520 mm. Thickness of web is 10mm. It is strengthened with a plate of size 250 mm X 12mm on compression side. Find the moment of resistance of the section if permissible stress is 160 M Pa. How much uniformly distributed load it can carry if it is used as a cantilever of span 3.6m. **[7M]**

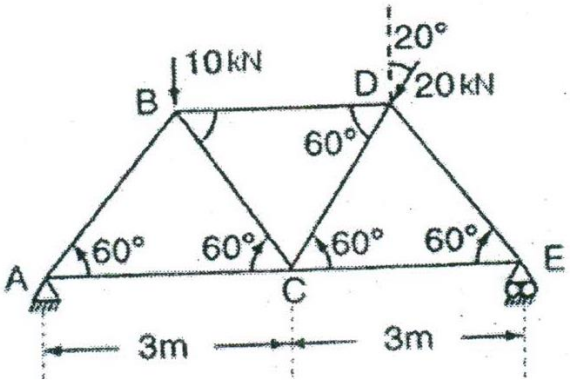
b) A simply supported beam of 2m span carries a U.D.L. of 140 kN/m over the whole span. The cross section of the beam is T-section with a flange width of 120mm, web and flange thickness of 20mm and overall depth of 160mm. Determine the maximum shear stress in the beam and draw the shear stress distribution for the section. **[7M]**

OR

6 A steel beam of I – section, 200mm deep and 160mm wide has 16 mm thick flanges and 10mm thick web. The beam is subjected to a shear force of 200 KN. Determine the shear stress distribution over the beam section if the web of the beam is kept horizontal. **[14M]**

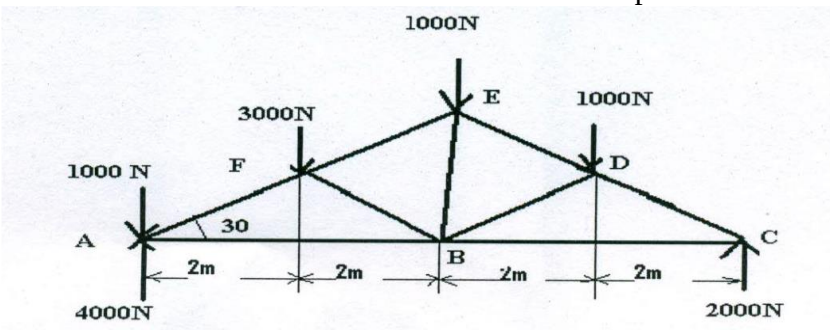
SECTION-IV

7 Find the forces in all the members of the truss as shown in the figure using method of joints. **[14M]**



OR

8 a) Determine the force in member EB of the roof truss shown in the figure. Indicate whether the member is in tension or compression. **[14M]**



SECTION-V

9 **a)** A solid shaft of 200mm diameter gas the same cross sectional area as a hollow shaft of the same material with inside diameter of 150mm. Find the ratio of powers transmitted by both the shafts at the same angular velocity. **[10M]**

b) Derive the expression for circumferential stress for a thin cylinder. . **[4M]**

OR

10 A shell 3.25m long and 1m diameter is subjected to an internal pressure of 1.2 N/mm^2. If the thickness to the shell is 10mm, find the circumferential and longitudinal stresses. Find also the maximum shear stress and changes in dimensions of the shell. Take E = 200 kN/mm^2, poissons ratio=0.3. **[14M]**

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Code No: R15A0305 **R15**

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester supplementary Examinations, May 2019

Strength of Materials

(ME)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

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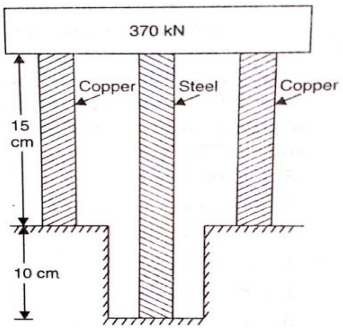
PART-A (25 Marks)

1). a	Define the following terms i) Possions ratio ii) Strain energy iii) resilience iv) Proof Resilience	**[2M]**
b	Determine the change in length breadth and thickness of steel bar which is 5m long, 40 mm wide 30 mm thick and is subjected to axial pull of 35KN in the direction of its length. ($E=2\times10^5 N/mm^2$ Poisson's ratio=0.32)	**[3M]**
c	What are the types of beams and types of loads?	**[2M]**
d	A cantilever beam of length 4m carries point loads 1KN, 2KN and 3KN at 1m, 2 m and 4m respectively from fixed end. Draw the shear force and bending moment diagrams for the beam.	**[3M]**
e	Derive an expression to find out the section modulus for 'I' section	**[2M]**
f	A rectangular beam of 100mm wide is subjected to maximum shear force 100KN. Find the depth of beam if the shear stress is $6N/mm^2$	**[3M]**
g	Explain the procedure to do the analysis of frames by using tension coefficient method.	**[2M]**
h	Explain with neat sketches, what is Beam, Frame, Truss?	**[3M]**
i	Explain the torsional moment of resistance of the shafts.	**[2M]**
j	Derive the equation to find out hoop stress and longitudinal stress in thin cylinder subjected to internal pressure.	**[3M]**

PART-B (50 MARKS)

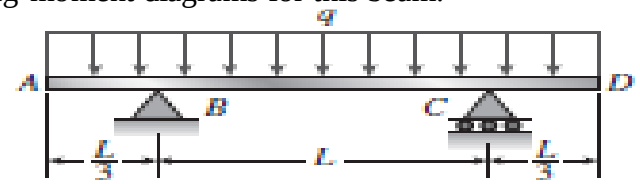
SECTION-I

2	a) Determine the young's modulus and Possion's ratio of a metallic bar of length 25cm breadth 3cm depth 2cm when the beam is subjected to an axial compressive load 240KN. The decrease in length is given by 0.05cm and increase in breadth 0.002 b) Write the differences among Gradual, Sudden, Impact and Shock loadings with the help of expressions	**[(6+4)M]**
	OR	
3	A steel rod and two copper rods together support a load of 370 kN as shown in fig. The cross sectional area of steel road is 2500 mm^2 and of each copper road is 1600 mm^2. Find the stresses in the roads. Take E for steel is $2x10^5$ N/mm^2 and for copper is $1x10^5$ N/mm^2	**[10M]**



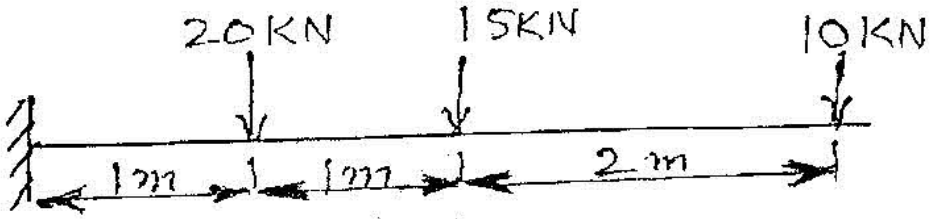
SECTION-II

4 Beam ABCD is simply supported at B and C and has overhangs at each end. The beam length between A and B is 'L' and each overhang has length L/ 3. A uniform load of intensity **q** acts on entire length of the beam. Draw the shear-force and bending-moment diagrams for this beam. **[10M]**



OR

5 Draw SF and BM diagrams for the cantilever shown in Fig **[10M]**



SECTION-III

6 Derive and Prove the following relation $\frac{M}{I} = \frac{\sigma}{y} = \frac{E}{R}$, Where M is moment applied on the beam, I is moment of Inertia, σ is bending stress, y is the distance between neutral axis and extreme fiber, E is young's modules, R is Radius if curvature. **[10M]**

OR

7 A rectangular beam of 100mm wide and 150mm deep is subjected to Shear force of 30KN, Determine ratio of Maximum shear stress to Average shear stress. Derive the equation which is used to find out the shear stress. **[10M]**

SECTION-IV

8 A simply supported beam span 14m, carrying concentrated loads of 12KN and 8KN at two points 3mts and 4.5m from the two ends respectively. Moment of Inertia I for the beam is 160 $x10^3$ mm^4 and E = 210KN/mm^2. Calculate deflection of the beam at points under the two loads by macaulay's method. **[10M]**

OR

9 A Cantilever beam AB 6 mts long is subjected to u.d.l of w KN/m spread over the entire length. Assume rectangular cross-section with depth equal to twice the breadth. Determine the minimum dimension of the beam so that the vertical deflection at free end does not exceed 1.5 cm and the maximum stress due to bending does not exceed 10 KN/cm^2. E = 2 X 10^7 N/ cm^2. **[10M]**

SECTION-V

10 A shaft is to be transmitted 100KW at 240 rpm. If the allowable shear stresses of the material is 60MPa. The shaft is not to twist more than 1^0 in a length of 3.5 mts. Find the diameter of the shaft based on strength and stiffness criteria. The modulus of rigidity of the material (N) is 80 X 10^3N/mm^2. **[10M]**

OR

11 A cylindrical vessel 3m long and 500mm in diameter with 10mm thick plates is subjected to an internal pressure of 3MPa.Calculate the change in volume of the vessel .Take E=210GPa and Poisson's ratio=0.3 for the vessel material **[10M]**

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Code No: R15A0305

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Regular/Supplementary Examinations, November 2017

Strength of Materials

(ME)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B

Part A is compulsory which carriers 25 marks and Answer all questions.

Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

PART – A (25 Marks)

1.

(a) Explain various types of fundamental stresses.[2M]

(b) Define and explain Hooke's law. [3M]

(c) Distinguish the terms beam and bar.[2M]

(d) Explain types of supports used in case of beams [3M].

(e) Write the relation between load, shear force and bending moment.[2M]

(f) Write down the equation of bending moment and explain the terms?[3M]

(g) Explain briefly the second moment area theorem applicable to beams.[2M]

(h) Write down the different methods for finding the deflection and slopes of the beams[3M]

(i) Define the term polar section modulus for a shaft transmitting torque. [2M]

(j) Develop the relationship for longitudinal stress in thin cylinder carrying a fluid under Pressure 'p', internal diameter 'D' and the thickness of cylinder is 't' [3M]

PART – B (50 Marks)

SECTION – I

2. Draw stress strain diagram for ductile materials and indicate all salient features on it. Explain the various mechanical properties can be estimated from that diagram.

(OR)

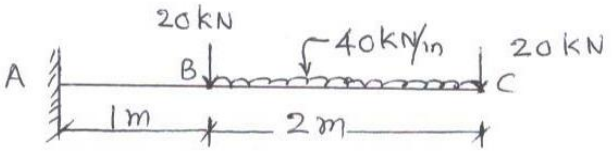
3. A specimen of diameter 13 mm and gauge length 50 mm was tested under tension. At 20 kN load, the extension was observed to be 0.0315 mm. Yielding occurred at a load of 35 kN and the ultimate load was 60 kN. The final gauge length at fracture was 70 mm. Calculate young's modulus, yield stress, ultimate strength and percentage elongation.

SECTION – II

4. An overhanging beam ABC of length 7 m is simply supported at A and B over a span of 5 m and portion BC overhangs by 2 m. Draw the shearing force and bending moment diagrams abd determine the point of contra-flexure if it is subjected to uniformly distributed loads of 3 KN/m over the portion AB and a concentrated load of 8 kN at C.

(OR)

5. Sketch SFD and BMD for the cantilever beam shown in figure.



SECTION – III

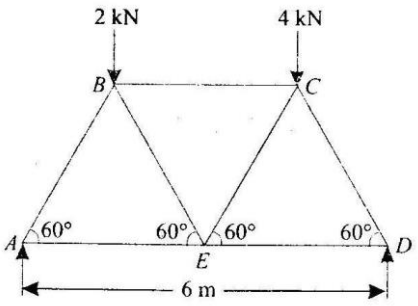
6. A rectangular beam 300 mm deep is simply supported over a span of 4m. Determine the uniformly distributed load per meter which the beam may carry, if the bending stress should not exceed 120 N/mm^2. Take I = 8x10^6 mm^4.

(OR)

7. Derive the equation of bending moment and write down the assumptions for theory of simple bending.

SECTION – IV

8. Figure shows a Warren girder, each member having 3 m length supported freely at its end Points. The girder is loaded at B and C as shown. Find the forces in all members of the girder by using Method of joints.



(OR)

9. A simply supported beam of span 6m carries two point loads of 60KN and 50KN at 1m and 3m respectively from the left end. Find the position and magnitude of max. deflection. Take E= as 200 GPa and I =8500cm^4. Also determine the value of deflection at the same point if one more load of 60KN is placed over the left support.

SECTION – V

10. A hallow shaft of outside diameter 80 mm and inside diameter 50 mm is made of aluminium having shear modulus G = 27GPa. When the shaft is subjected to a torque T = 4.8 kN-m, what is the maximum shear strain and maximum normal strain in the bar?

(OR)

11. A thin cylindrical shell is 3m long and 1m in internal diameter. It is subjected to internal pressure of 1.2 MPa. If the thickness of the sheet is 12mm, find the circumferential stress, longitudinal stress, changes in diameter, length and volume. Take E=200 GPa and μ= 0.3.

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R15

Code No: R15A0305

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester supplementary Examinations, November 2018

Strength of Materials

(ME)

Roll No										

Time: 3 hours Max. Marks: 75

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

PART-A (25 Marks)

1). a	What is composite bar, how will you find the stress in composite bar due to external loading.	**[2M]**
b	A rod 200 cm long and of diameter 3.0 cm is subjected to axial pull of 30KN if the young's modulus of the material is 2×10^5N/mm^2 then determine i) stress ii) Elongation iii) strain	**[3M]**
c	Define and explain the following terms i) Bending stress ii) Section modulus	**[2M]**
d	Define and explain the following terms i) Shear force ii) Bending moment iii) Bending moment diagram	**[3M]**
e	Derive an expression to find out section modulus for Hallow rectangular section	**[2M]**
f	Write torsional equation and explain the terms.	**[3M]**
g	What are the different types of Frames, Explain with the help of figures.	**[2M]**
h	Explain the procedure to do the analysis of frames by using method of joints and method of sections.	**[3M]**
i	Explain about polar section modulus.	**[2M]**
j	Derive the equation to find out volumetric strain in thin cylinder subjected to internal pressure.	**[3M]**

PART-B (50 MARKS)

SECTION-I

2	Prove that the total extension (dL) of uniformly taper rod of diameter D_1 and D_2, when the rod is subjected to axial load **P** with the help of diagram. $dL = \frac{4PL}{\pi E D_1 D_2}$	**[10M]**

OR

3	a) Derive the equation to show the relation between E,K & G.	**[(7+3)M]**

b) A steel bar 320 mm long and 40 mm wide 30 mm thickness is subjected to a pull of 250KN in the direction of its length. Determine the change in volume.

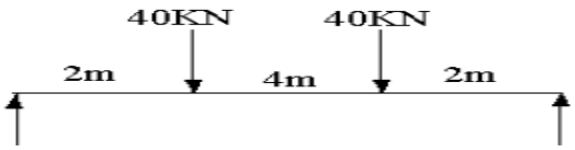
SECTION-II

4 a) Derive the relation between shear force, bending moment and loading for beam carrying U.d.l **[(3+7)M]**

b) A simply supported beam of length 6m is loaded with gradually varying load of 0KN/m from left support 750KN/m to right support. Draw the shear force and bending moment diagrams for the beam.

OR

5 Draw the B. M. D and S. F.D **[10M]**



SECTION-III

6 A T-section beam having flange 2cm x 10cm, web 10cm x 2cm is simply supported over a span of 6m. It carries a U.D.L of 3kN/m including its own weight over its entire span, together with a load of 2.5kN at mid span. Find the maximum tensile and compressive stresses occurring in beam section. **[10M]**

OR

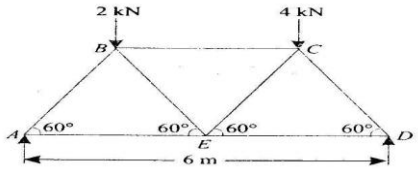
7 Define simple bending and what are the assumption made in simple bending theory and derive the bending moment eqation. **[10M]**

SECTION-IV

8 A beam section is 10m long and is simply supported at ends. It carries concentrated loads of100kN and 60kN at a distance of 2m and 5m respectively from the left end. Calculate the deflection under the each load find also the maximum deflection. Take I = 18 X 10^8mm^4 and E = 200kN/mm^2. **[10M]**

OR

9 Figure shows a Warren girder, each member having 3 m length supported freely at its end Points. The girder is loaded at B and C as shown. Find the forces in all members of the girder by using Method of joints. **[10M]**



SECTION-V

10 A shaft is to be transmitted 200KW at 300rpm. The max. shear stress should not exceed 30 MPa and twist should not be more than 1º in a shaft length of 2.5 mts. If the modulus of rigidity of the material is 10^5 MPa, Find the required diameter of the shaft to transmit above given power. **[10M]**

OR

11 A thin cylindrical shell is 3m long and 1m in internal diameter. It is subjected to internal pressure of 1.2 MPa. If the thickness of the sheet is 12mm, find the circumferential stress, longitudinal stress, changes in diameter, length and volume. Take E=200 GPa and μ= 0.3. **[10M]**

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R17

Code No: R17A0305

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B. Tech I Semester Regular Examinations, November 2018

Strength of Materials

(ME)

Roll No										

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

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

*****

SECTION-I

1 Derive the relation between E, G, K. **[14M]**

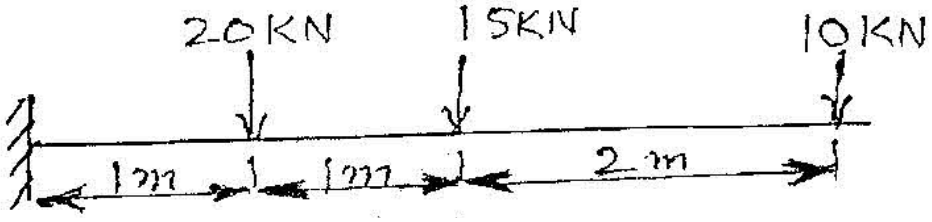
OR

2 a) What is proof resilience and modulous of resilience? (7M) **[14M]**

b)A steel tube of 30 mm external diameter and 25 mm internal diameter encloses a gun metal rod of 20 mm diameter to which it is rigidly joined at each end. The temperature of the whole assembly is raised to 140^0C and the nuts on the rod are then screwed lightly home on the ends of the tube. Find the intensity of stress in the rod when the common temperature has fallen to 30^0C. The value of E for steel and gun metal are $2.1x10^5$N/mm^2 and $1x10^5$N/mm^2 respectively. The linear co efficient of expansion for steel and gun metal are 12 x 10^{-6} per ^{0}C and 20 x 10^{-6} per ^{0}C. (7 M)

SECTION-II

3 Draw SF and BM diagrams for the cantilever shown in Fig **[14M]**



OR

4 A horizontal beam AB of length 4m in hinged at A and supported on rollers at B. the beam carries inclined loads of 100N, 200N and 300N incised towards the roller support at 60^0; 45^0 and 30^0 Respectively to the horizontal, at 1m, 2m and 3m respectively from A. draw the SF and BM diagrams. **[14M]**

SECTION-III

5 a) Explain theory of simple bending, and the assumptions made. Draw stress distribution diagram for a beam with rectangular section.(7M) **[14M]**

b) A timber beam of rectangle section is simply supported at the ends and carries a point load at the center of the beam. The maximum bending stress is 12 N/mm^2 and maximum shearing stress is 1 N/mm^2. Find the ratio of the span to the depth.

OR

6 A simply supported beam carries a U.D.L. of intensity 2.5 kN/m over entire span of 5 meters. The cross-section of the beam is a T-section having the dimensions **[14M]**

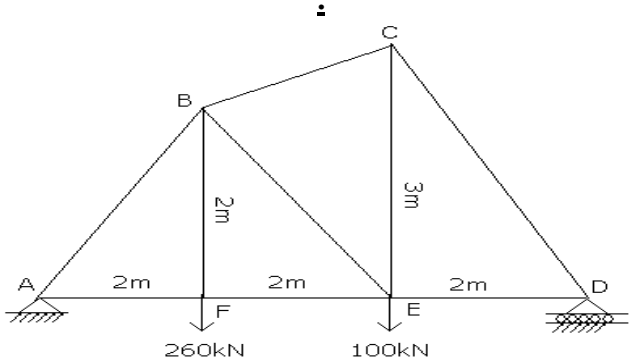
Flange : 125 mm X 25 mm

Web: 175 mm X25 mm

Calculate the maximum shear stress for the section of the beam

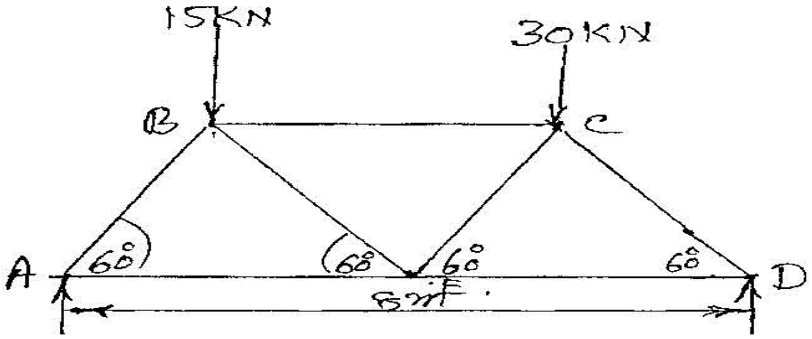
SECTION-IV

7 Analyse the frame shown in Fig **[14M]**



OR

8 Find the magnitude and nature of forces in all the members of the truss shown in Fig **[14M]**



SECTION-V

9 a) A solid steel shaft has to transmit 100 kW at 160 rpm. Taking allowable shear stress as 70 M Pa, find the suitable diameter of the shaft. The maximum torque transmitted in each revolution exceeds the mean by 20 %.(7M) **[14M]**

b) A cylindrical thin drum 800mm in diameter and 4m long is made of 10mm thick plates. If the drum is subjected to an internal pressure of 2.5MPa, determine its changes in diameter and length. Take E as 200GPa and poisons ratio as 0.25.(7M)

OR

10 a) Find the angle of twist per metre length of a hollow circular shaft of 100 mm external and 60 mm internal diameter, if the shear stress is not to exceed 35 M Pa. Take C = 85 G Pa. (7M) **[14M]**

b) A cylindrical vessel 2m long and 500mm in diameter with 10mm thick plates is subjected to an internal pressure of 3MPa.Calculate the change in volume of the vessel .Take E=200GPa and poissons ratio=0.3 for the vessel material.(7M)

****

R15

Code No: **R15A0305**

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B. Tech I Semester Supplementary Examinations, May 2018

Strength of Materials

(ME)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B

Part A is compulsory which carriers 25 marks and Answer all questions.

Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

******

PART – A **(25 Marks)**

1. (a) Distinguish clearly the properties elasticity and plasticity[2M]
   (b) Define poisson's ratio. Mention its significance in material selection.[3M]
   (c) List different types of beams.[2M]
   (d) What is meant by the term point of contraflexure. Explain.[3M]
   (e) Find out section modulus for a rectangular beam having width 'b' and depth 'd'[2M]
   (f) Draw shear stress distribution across the rectangular cross section of the beam if the beam is carrying a concentrated load P at mid point.[3M]
   (g) Explain moment area theorm-I applicable for beams.[2M]
   (h) What is the condition to be satisfied for a perfect truss? Explain.[3M]
   (i) A solid shaft is to be transmitted 25 kw by running at 800 rpm. Find the torque induced in the shaft material.[2M]
   (j) Develop the relationship between circumferential and longitudinal stress in case thin cylinder subjected to internal fluid pressure.[3M]

PART – B **(50 Marks)**

SECTION – I

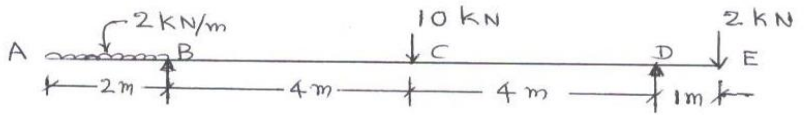
2. Derive the relationship between Elatic Moduli E, G and K from fundamentals of solid mechanics. [10M]

(OR)

3. Derive the formula for elongation of uniformly tapered circular cross section bar under axial load. Also deduce the relation for strain energy stored in the bar. [10M]

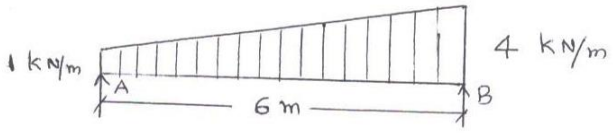
SECTION – II

4. Sketch the S.F. &B.M. diagrams for an Overhanging beam ABCDE shown. Mark all the salient points with respective values. [10M]



(OR)

5. Draw SF& BM diagrams for the simply supported beam marking all the salient values. [10M]



SECTION – III

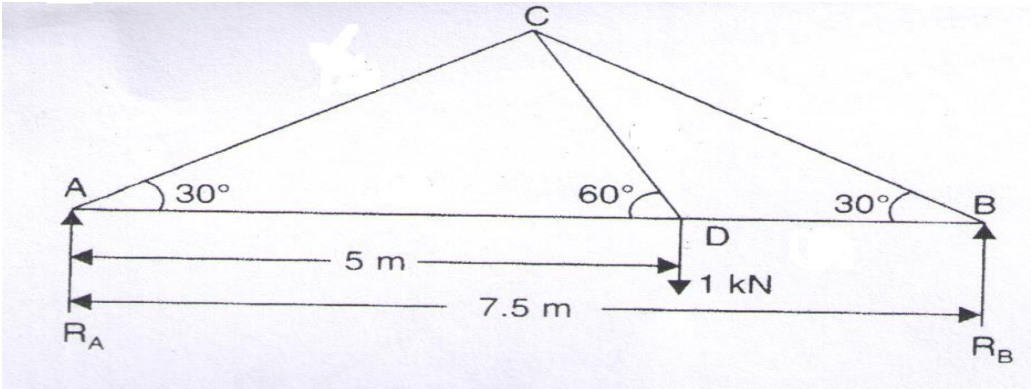
6. An I – beam of 200mm depth is simply supported over an effective span of 8m. Find what max. intensity of udl it can carry over entire length if the allowable bending stresses in tension and compression are 30 and 45 N/mm^2 respectively. Take I_{NA} = 5935.5×10^4 mm^4. Distance of bottom fibre from NA is 87.38mm. [10M]

(OR)

7. A simply supported beam having span 4 m is subjected to a UDL of 30 kN/m over whole span. The cross-section of beam is T section. The dimensions of flange are 120mmx10mm and that of web are 200mmx15mm. Draw shear stress distribution across the depth of cross-section marking the values at salient points. [10M]

SECTION – IV

8. A truss of span 7.5 m carries a point load of 1 kN at joint 'D' as shown in figure. Find the reactions and forces in the members of the truss. [10M]



(OR)

9. A simply supported beam of 8m carries a partial u d l of intensity 5KN/m and length 2m, sarting from 2m from the left end. Find slope at left support and central deflection. Take E= 200Gpa and I=8×10^{8}mm^4 [10M]

SECTION – V

10. A solid circular bar of steel (G=80GPa) with length L= 3.5 m and diameter d=120 mm is subjected to pure torsion by a torque T. How much strain energy is stored in the bar when the maximum shear stress is 60 MPa? [10M]

(OR)

11. Derive torsion equation with assumptions. [10M]

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R15

Code No: **R15A0305**

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B. Tech I Semester Supplementary Examinations, May 2018

Strength of Materials

(ME)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B

Part A is compulsory which carriers 25 marks and Answer all questions.

Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

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PART – A **(25 Marks)**

1. (a) Distinguish clearly the properties elasticity and plasticity[2M]
   (b) Define poisson's ratio. Mention its significance in material selection.[3M]
   (c) List different types of beams.[2M]
   (d) What is meant by the term point of contraflexure. Explain.[3M]
   (e) Find out section modulus for a rectangular beam having width 'b' and depth 'd'[2M]
   (f) Draw shear stress distribution across the rectangular cross section of the beam if the beam is carrying a concentrated load P at mid point.[3M]
   (g) Explain moment area theorm-I applicable for beams.[2M]
   (h) What is the condition to be satisfied for a perfect truss? Explain.[3M]
   (i) A solid shaft is to be transmitted 25 kw by running at 800 rpm. Find the torque induced in the shaft material.[2M]
   (j) Develop the relationship between circumferential and longitudinal stress in case thin cylinder subjected to internal fluid pressure.[3M]

PART – B **(50 Marks)**

SECTION – I

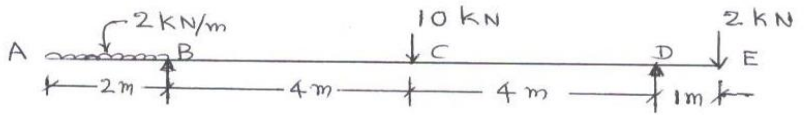
2. Derive the relationship between Elatic Moduli E, G and K from fundamentals of solid mechanics. [10M]

(OR)

3. Derive the formula for elongation of uniformly tapered circular cross section bar under axial load. Also deduce the relation for strain energy stored in the bar. [10M]

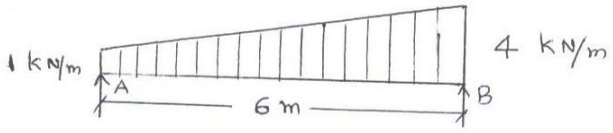
SECTION – II

4. Sketch the S.F. &B.M. diagrams for an Overhanging beam ABCDE shown. Mark all the salient points with respective values. [10M]



(OR)

5. Draw SF& BM diagrams for the simply supported beam marking all the salient values. [10M]



SECTION – III

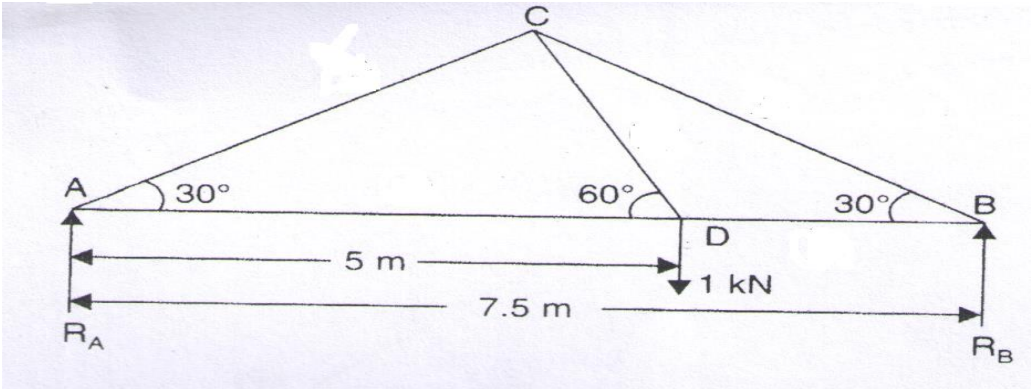
6. An I – beam of 200mm depth is simply supported over an effective span of 8m. Find what max. intensity of udl it can carry over entire length if the allowable bending stresses in tension and compression are 30 and 45 N/mm^2 respectively. Take I_{NA} = 5935.5×10^4 mm^4. Distance of bottom fibre from NA is 87.38mm. [10M]

(OR)

7. A simply supported beam having span 4 m is subjected to a UDL of 30 kN/m over whole span. The cross-section of beam is T section. The dimensions of flange are 120mmx10mm and that of web are 200mmx15mm. Draw shear stress distribution across the depth of cross-section marking the values at salient points. [10M]

SECTION – IV

8. A truss of span 7.5 m carries a point load of 1 kN at joint 'D' as shown in figure. Find the reactions and forces in the members of the truss. [10M]



(OR)

9. A simply supported beam of 8m carries a partial u d l of intensity 5KN/m and length 2m, sarting from 2m from the left end. Find slope at left support and central deflection. Take E= 200Gpa and I=8×10^{8}mm^4 [10M]

SECTION – V

10. A solid circular bar of steel (G=80GPa) with length L= 3.5 m and diameter d=120 mm is subjected to pure torsion by a torque T. How much strain energy is stored in the bar when the maximum shear stress is 60 MPa? [10M]

(OR)

11. Derive torsion equation with assumptions. [10M]

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