

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.

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APPLIED THERMODYNAMICS



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										
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Time: 3 hours**Max. Marks: 75****Note:** This question paper contains two parts A and B.

Part A is compulsory which carries 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° , 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°C , and compresses it to 5 bar and heats it to 800°C 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

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)

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Part A is compulsory which carries 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 Rankine 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 [10M] 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

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 °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 °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 °C at the rate of 16 kg/sec. Take C_p as 1.005 kJ/kgK. $\gamma=1.4$ for the compression process and take $C_p=1.11$ kJ/kgK and $\gamma =1.333$ 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]

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)

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Time: 3 hours

Max. Marks: 75

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Part A is compulsory which carries 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)**

- (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**

- 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°C. After expansion to 5 bar, the steam is reheated to 500°C 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)

- 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°C 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°; Blade outlet angle = 25°. 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 $\alpha=\phi$ 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° and 20° 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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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

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III B.Tech I Semester Supplementary Examinations, May 2019**Advanced Thermal Engineering****(ME)**

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Time: 3 hours**Max. Marks: 75****Note:** This question paper contains two parts A and B

Part A is compulsory which carries 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 °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 °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 $\gamma = 1.333$. [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 an 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 0.17 kg/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]

Code No: R15A0313

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

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III B.Tech I Semester Regular/supplementary Examinations, November 2018**Advanced Thermal Engineering**

(ME)

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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]

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- 3 In a Rankine 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
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- 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 °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 °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 °C at the rate of 16 kg/sec. Take C_p as 1.005 kJ/kgK. $\gamma=1.4$ for the compression process and take $C_p=1.11$ kJ/kgK and $\gamma =1.333$ 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



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									
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Time: 3 hours**Max. Marks: 75****Note:** This question paper contains two parts A and B

Part A is compulsory which carries 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)

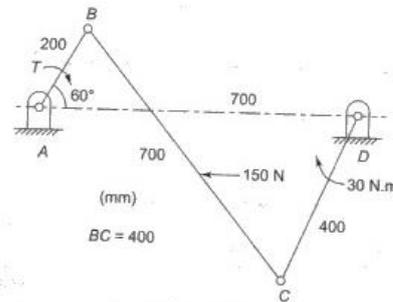
b) How do the effects of gyroscopic couple and of centrifugal force make the rider of a two-wheeler .Derive a relation for the limiting speed of the vehicle.(5)

(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° with AD, the fixed link. The lengths of the links are $AB = CD = 800 \text{ mm}$, $BC = 1000 \text{ mm}$ and $AD = 1500 \text{ mm}$. The mass of the links is 4 kg/m length. Determine the torque required to overcome the inertia forces, neglecting the gravitational 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 $5/8$ th 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° has a crank radius of 32.4 cms. The distance between centers of driving wheel is 150 cms. The pitch of cylinders is 60 cms. 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 $\frac{2}{3}$ of reciprocating masses.
- (b) Swaying couple.
- (c) The variation of tractive force. (10)

(OR)

9. Four masses m_1 , m_2 , m_3 and m_4 having 100, 175, 200 and 25 kg are fixed to cranks of 20 cm radius and revolve in planes 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° , 135° and 200° 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)

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)

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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/m². 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/m² 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 $T = 20000 + 9500 \sin 2\theta - 5700 \cos 2\theta$ 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 to 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 arms are pivoted at the axis of rotation and the lower arms are attached to the sleeve at a distance of 3.5cm from 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 110mm vertically 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]

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									
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Time: 3 hours**Max. Marks: 75****Note:** This question paper contains two parts A and B

Part A is compulsory which carries 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/m². 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/m² 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 $T = 20000 + 9500 \sin 2\theta - 5700 \cos 2\theta$ 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 to 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 arms are pivoted at the axis of rotation and the lower arms are attached to the sleeve at a distance of 3.5cm from 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 110mm vertically 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]

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									
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Time: 3 hours**Max. Marks: 75****Note:** This question paper contains two parts A and B

Part A is compulsory which carries 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:0.6m

Moment of Inertia of the flywheel: 0.3kg-m²Moment of Inertia of the road wheel: 1kg-m²

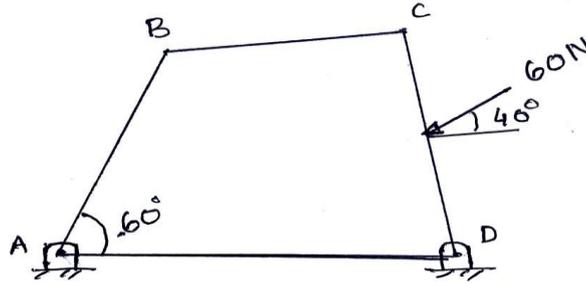
Vehicle speed: 90 kmph

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 link 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 120° 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 160 kN/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, $1 \text{ mm} = 5 \text{ N-m}$; crank angle, $1 \text{ mm} = 1^\circ$. 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 mm^2 . 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. $M_a=4\text{kg}$, $M_b=3\text{kg}$, $M_c=2.5\text{kg}$, $R_a=75\text{mm}$, $R_b=85\text{mm}$, $R_c=50\text{mm}$, $\theta_a=45^\circ$, $\theta_b=135^\circ$, $\theta_c=240^\circ$. 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 $L_a= 150\text{mm}$, $L_b= 350\text{mm}$, and $L_c= 525\text{mm}$, 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 $R_{b1}=75\text{mm}$ and $R_{b2}=40\text{mm}$. [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]

Code No: **R15A0307****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									
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Time: 3 hours**Max. Marks: 75****Note:** This question paper contains two parts A and B

Part A is compulsory which carries 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. [10M]
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.

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 1. 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 reciprocating masses per cylinder to 180 kg. The wheel centre lines are 1.5 m apart. The cranks are at right angles. The whole of the rotating and $\frac{2}{3}$ of the reciprocating masses are to be balanced by masses 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: [10M]
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.
(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/m². 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 : [10M]
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.

OR

- 11 In a spring controlled governor, the curve of controlling force is a straight line. [10M]
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.

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									
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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 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 turns 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-m² and an effective diameter of 0.6m. The rotating parts of the engine have a moment of inertia of 1 kg-m². 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 of 30cm 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/cm².

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/mm². 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° at the centre, is applied to 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° 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 mm², 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 $M_a=4\text{kg}$, $M_b=3\text{kg}$, $M_c=2.5\text{kg}$, $R_a=75\text{mm}$, $R_b=85\text{mm}$, $R_c=50\text{mm}$, $\theta_a=45^\circ$, $\theta_b=135^\circ$, $\theta_c=240^\circ$. 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 $L_a=150\text{mm}$, $L_b=350\text{mm}$ and $L_c=525\text{mm}$ 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 $R_{b1}=75\text{mm}$ and $R_{b2}=40\text{mm}$. [14M]

OR

- 8 In a single degree damped vibrating system a suspended mass of 3.75kg makes 12 oscillations in 7 sec when disturbed from 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]



MANUFACTURING PROCESS



R16

Code No: 134BK

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 $45 \times 45 \times 25$ cm with a side riser, casting poured horizontally in to the mould. Use Chapeau's equation and take constants in Chapeau 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 modulus, 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 wire drawing 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]

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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]
- g) What is the difference between DC and AC arc welding? [2]
- g) 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]
- 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]
- 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? [5+5]
b) Write a short note on laser beam welding, detailing the applications.

7.a) What is friction welding? What are its applications? OR

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]

9.a) Briefly explain various methods available for breakdown passes in rolling. Explain their applications. OR

b) Distinguish between bending and drawing in sheet-metal operations. [5+5]

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

R16

Code No: 134BK

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) Differentiate 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]

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										
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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]



PROBABILITY & STATISTICS



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 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]

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 mean 70 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 \bar{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 4 children 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 $f(x) = \begin{cases} k(1 - x^2), & 0 < x < 1 \\ 0, & \text{otherwise} \end{cases}$
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) atleast one is defective [14M]

SECTION-III

- 5 a) Fit a straight line $Y = a_0 + a_1 X$ 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# Of 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 $F(X) = \begin{cases} 0 & \text{if } x \leq 1 \\ k(x-1)^4 & \text{if } 1 < x \leq 3 \\ 1 & \text{if } x > 3 \end{cases}$

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

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

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

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

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.

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

[10M]

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 x is given by $f(x) = \begin{cases} k(1 - x^2), & 0 < x < 1 \\ 0, & \text{otherwise} \end{cases}$

find i) k

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

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

3. If X is a continuous r.v and $Y = kX + c$ prove that $E(Y) = kE(X) + c$ 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) $P(1 \leq x \leq 4)$ 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

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 5 minutes 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
$$\begin{bmatrix} 0.3 & 0.7 & 0 \\ 0.1 & 0.4 & 0.5 \\ 0 & 0.2 & 0.8 \end{bmatrix}$$
. Is the 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 uses the question no#3, if both are heads. If he uses the question no#3, he tosses three coins and uses 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.



STRENGTH OF MATERIALS



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									
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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 $E_s=2 \times 10^5 \text{ N/mm}^2$ and $E_b=1 \times 10^5 \text{ N/mm}^2$. [7M]

OR

- 2 A steel tube 50mm in external diameter 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 °C. Find the stress in each metal when heated to 170°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 °C and $\alpha_c=1.7 \times 10^{-5}$ per °C . Take $E_s=2 \times 10^5 \text{ N/mm}^2$, $E_c=1 \times 10^5 \text{ N/mm}^2$. [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

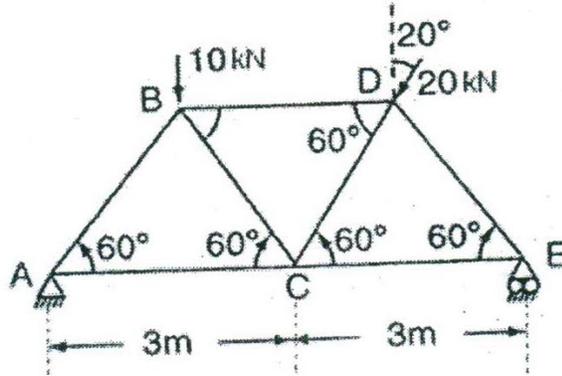
- 5 a) A simply supported symmetric I-section has flanges of size 200 mmX 15 mm and its overall depth is 520 mm. Thickness of web is 10mm. It is strengthened with a plate of size 250 mm X 12mm on compression side. Find the moment of resistance of the section if permissible stress is 160 M Pa. How much 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]

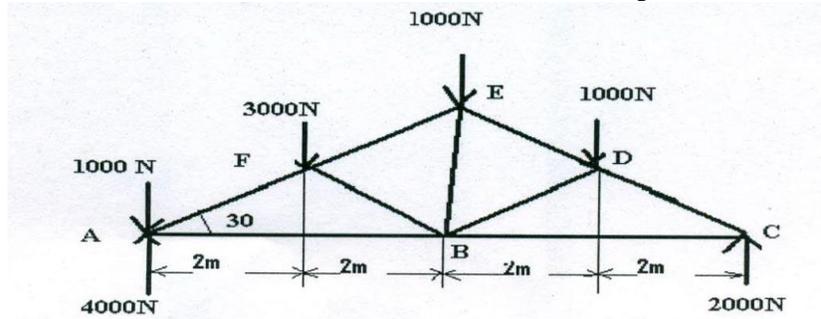
SECTION-IV

- 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 has 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 $E = 200 \text{ kN/mm}^2$, poisson's ratio=0.3. [14M]

Code No: **R15A0305****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									
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Time: 3 hours**Max. Marks: 75****Note:** This question paper contains two parts A and B

Part A is compulsory which carries 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)

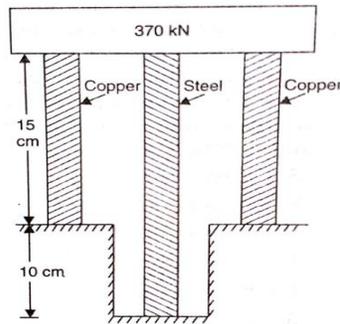
- 1). a Define the following terms [2M]
 - i) Poissons ratio
 - ii) Strain energy
 - iii) resilience
 - iv) Proof Resilience
- b Determine the change in length breadth and thickness of steel bar which is 5m long, 40 mm wide 30 mm thick and is subjected to axial pull of 35KN in the direction of its length. ($E=2 \times 10^5 \text{N/mm}^2$ 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 Poisson'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 [(6+4)M]
 - b) Write the differences among Gradual, Sudden, Impact and Shock loadings with the help of expressions

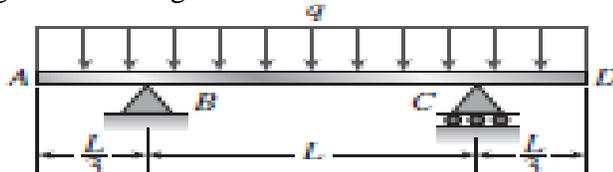
OR

- 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 rod is 2500 mm^2 and of each copper rod is 1600 mm^2 . Find the stresses in the rods. Take E for steel is $2 \times 10^5 \text{ N/mm}^2$ and for copper is $1 \times 10^5 \text{ N/mm}^2$ [10M]



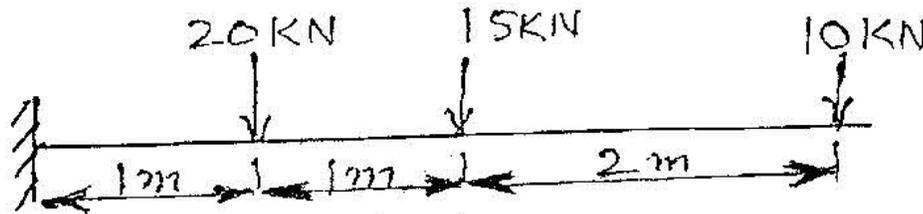
SECTION-II

- 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 modulus, R is Radius of 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 $160 \times 10^3 \text{ mm}^4$ and $E = 210 \text{ KN/mm}^2$. 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 . $E = 2 \times 10^7 \text{ N/cm}^2$. [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° 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 $80 \times 10^3 \text{N/mm}^2$. **[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 $E=210\text{GPa}$ and Poisson's ratio=0.3 for the vessel material **[10M]**

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									
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Time: 3 hours**Max. Marks: 75****Note:** This question paper contains two parts A and B

Part A is compulsory which carries 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.

- Explain various types of fundamental stresses.[2M]
- Define and explain Hooke's law. [3M]
- Distinguish the terms beam and bar.[2M]
- Explain types of supports used in case of beams [3M].
- Write the relation between load, shear force and bending moment.[2M]
- Write down the equation of bending moment and explain the terms?[3M]
- Explain briefly the second moment area theorem applicable to beams.[2M]
- Write down the different methods for finding the deflection and slopes of the beams[3M]
- Define the term polar section modulus for a shaft transmitting torque. [2M]
- 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**

- 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)

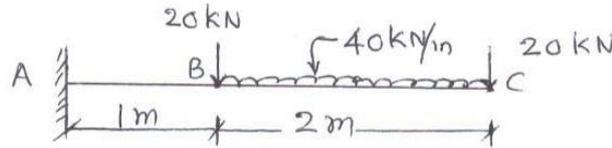
- A specimen of diameter 13 mm and gauge length 50 mm was tested under tension. At 20 kN load, the extension was observed to be 0.0315 mm. Yielding occurred at a load of 35 kN and the ultimate load was 60 kN. The final gauge length at fracture was 70 mm. Calculate young's modulus, yield stress, ultimate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

SECTION – II

- 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 and 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

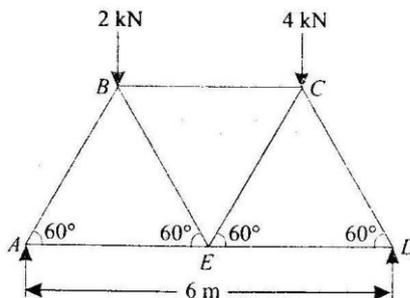
6. A rectangular beam 300 mm deep is simply supported over a span of 4m. Determine the uniformly distributed load per meter which the beam may carry, if the bending stress should not exceed 120 N/mm^2 . Take $I = 8 \times 10^6 \text{ mm}^4$.

(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 $E = 200 \text{ GPa}$ and $I = 8500 \text{ cm}^4$. 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 hollow shaft of outside diameter 80 mm and inside diameter 50 mm is made of aluminium having shear modulus $G = 27 \text{ GPa}$. When the shaft is subjected to a torque $T = 4.8 \text{ kN-m}$, 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 $E = 200 \text{ GPa}$ and $\mu = 0.3$.

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									
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Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B

Part A is compulsory which carries 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 $2 \times 10^5 \text{N/mm}^2$ then determine i) stress ii) Elongation iii) strain [3M]
- c Define and explain the following terms [2M]
 - i) Bending stress ii) Section modulus
- d Define and explain the following terms [3M]
 - i) Shear force ii) Bending moment iii) Bending moment diagram
- e Derive an expression to find out section modulus for Hollow 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. [10M]

$$dL = \frac{4PL}{\pi E D_1 D_2}$$

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.

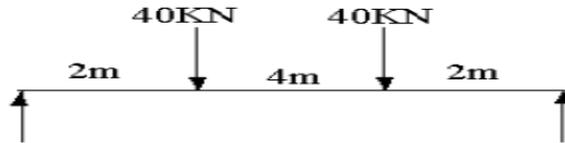
SECTION-II

- 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

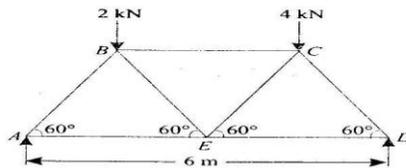
- 7 Define simple bending and what are the assumption made in simple bending theory and derive the bending moment equation. [10M]

SECTION-IV

- 8 A beam section is 10m long and is simply supported at ends. It carries concentrated loads of 100kN 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 $I = 18 \times 10^8 \text{mm}^4$ and $E = 200 \text{kN/mm}^2$. [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 1° in a shaft length of 2.5 mts. If the modulus of rigidity of the material is 10^5MPa , 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 $E=200 \text{GPa}$ and $\mu=0.3$. [10M]

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									
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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

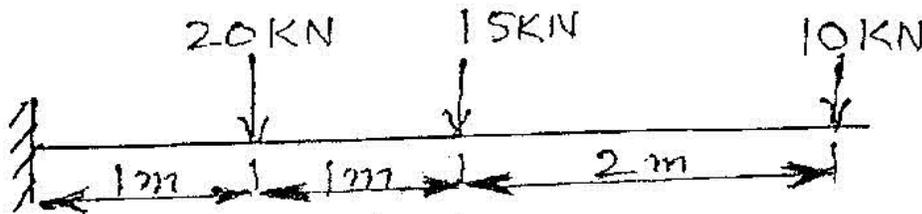
- 1 Derive the relation between E, G, K. [14M]

OR

- 2 a) What is proof resilience and modulus 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°C 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°C. The value of E for steel and gun metal are $2.1 \times 10^5 \text{ N/mm}^2$ and $1 \times 10^5 \text{ N/mm}^2$ respectively. The linear coefficient of expansion for steel and gun metal are 12×10^{-6} per °C and 20×10^{-6} per °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 is hinged at A and supported on rollers at B. the beam carries inclined loads of 100N, 200N and 300N inclined towards the roller support at 60°, 45° and 30° 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
 Flange : 125 mm X 25 mm [14M]

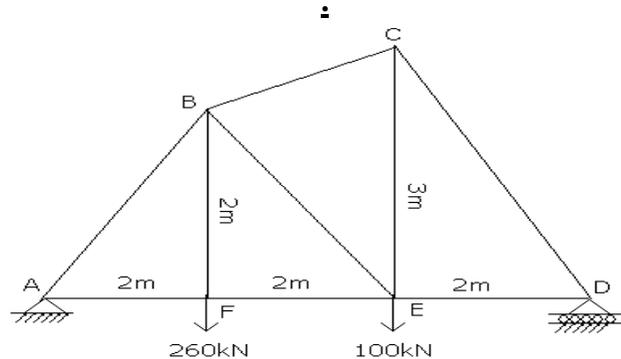
Web: 175 mm X25 mm

Calculate the maximum shear stress for the section of the beam

SECTION-IV

- 7 Analyse the frame shown in Fig

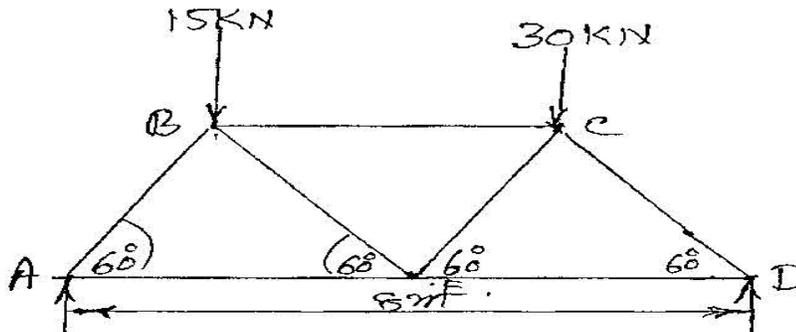
[14M]



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 MPa, 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 MPa. Take $C = 85 \text{ GPa}$. (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 $E=200\text{GPa}$ and poissons ratio=0.3 for the vessel material.(7M)

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 carries 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)**

- (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 theorem-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**

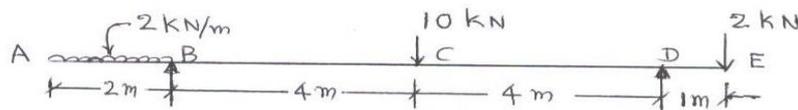
- Derive the relationship between Elastic Moduli E, G and K from fundamentals of solid mechanics. [10M]

(OR)

- 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]

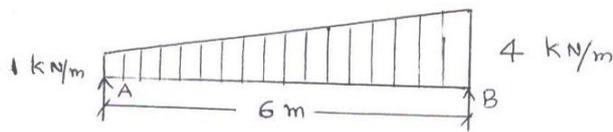
SECTION – II

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



(OR)

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



SECTION – III

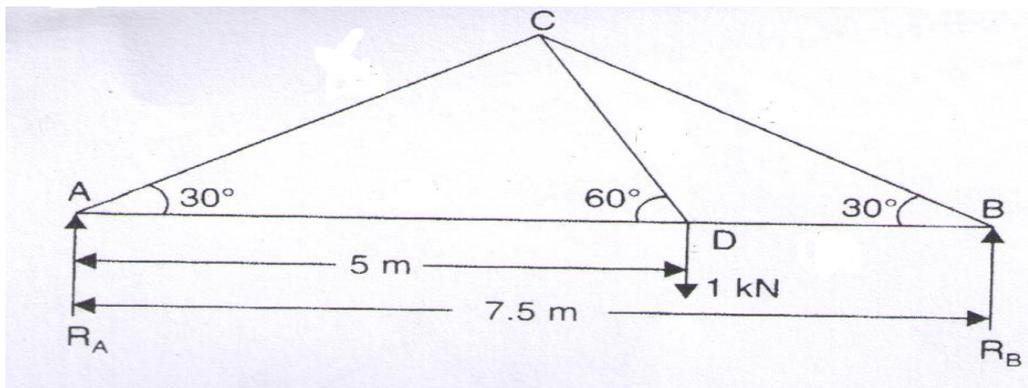
6. An I – beam of 200mm depth is simply supported over an effective span of 8m. Find what max. intensity of udl it can carry over entire length if the allowable bending stresses in tension and compression are 30 and 45 N/mm² respectively. Take $I_{NA} = 5935.5 \times 10^4 \text{ mm}^4$. Distance of bottom 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, starting from 2m from the left end. Find slope at left support and central deflection. Take $E = 200 \text{ Gpa}$ and $I = 8 \times 10^8 \text{ mm}^4$ [10M]

SECTION – V

10. A solid circular bar of steel ($G = 80 \text{ GPa}$) with length $L = 3.5 \text{ m}$ and diameter $d = 120 \text{ mm}$ 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]

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 carries 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)**

- (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 theorem-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**

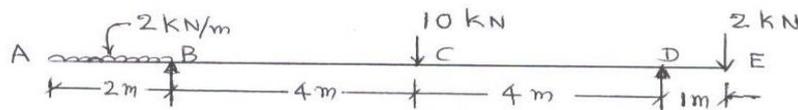
- Derive the relationship between Elastic Moduli E, G and K from fundamentals of solid mechanics. [10M]

(OR)

- 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]

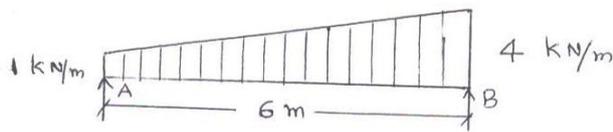
SECTION – II

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



(OR)

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



SECTION – III

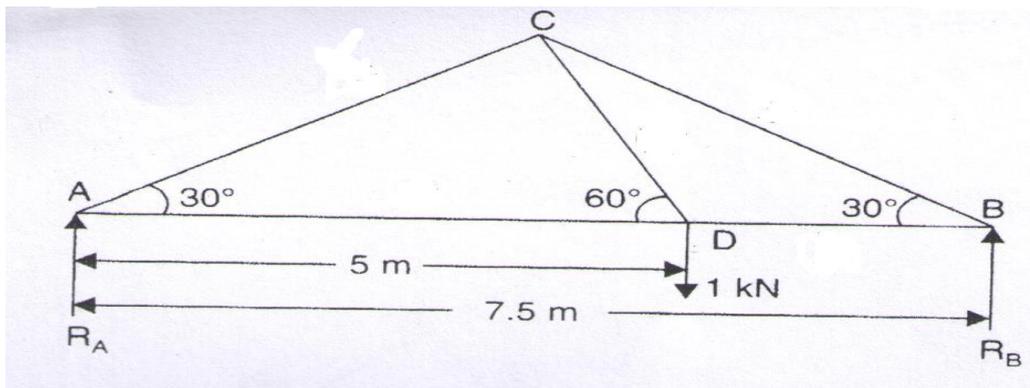
6. An I – beam of 200mm depth is simply supported over an effective span of 8m. Find what max. intensity of udl it can carry over entire length if the allowable bending stresses in tension and compression are 30 and 45 N/mm² respectively. Take $I_{NA} = 5935.5 \times 10^4 \text{ mm}^4$. Distance of bottom 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, starting from 2m from the left end. Find slope at left support and central deflection. Take $E = 200 \text{ Gpa}$ and $I = 8 \times 10^8 \text{ mm}^4$ [10M]

SECTION – V

10. A solid circular bar of steel ($G = 80 \text{ GPa}$) with length $L = 3.5 \text{ m}$ and diameter $d = 120 \text{ mm}$ 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]
