

**B.TECH.(ME) – 3<sup>rd</sup> SEMESTER EXAMINATIONS; DECEMBER - 2017**  
**(SUB:- ENGINEERING MECHANICS; PAPER CODE:-13030304)**

TIME: 03:00 Hrs.

Max Marks:50

**Instructions:-**

1. Write your Roll No. on the Question Paper.
2. Candidates should ensure that they have been provided with correct question paper. Complaints in this regard, if any should be made within 15 minutes of the commencement of the exam. No complaint(s) will be entertained thereafter.
3. Attempt five (05) questions in all, Q1. is compulsory. Students are required to attempt (04) questions, selecting (01) question from each unit. Marks are indicated against each question.
4. Draw the diagram wherever required.

Q.1. Write short notes on the following:-

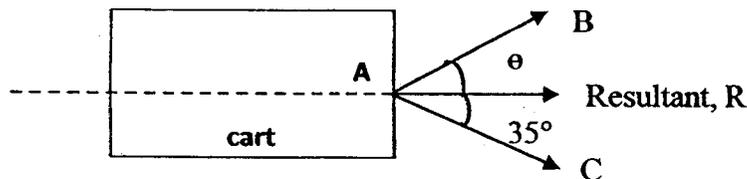
(5X2=10)

- a) Define Truss, Frame and Centre of Gravity.
- b) State and Prove Varignon's Theorem.
- c) Define Perpendicular axis theorem.
- d) Define D'Alembert's Principle.

**UNIT-I**

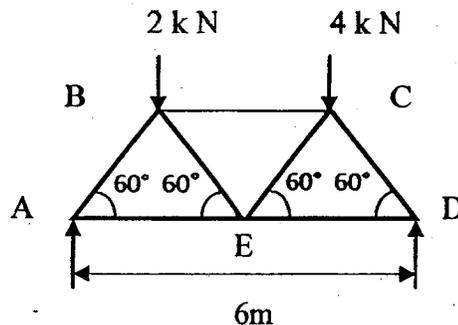
Q.2. The resultant of two ropes pulling a cart, as shown in fig., acts along the axis of the cart and has a magnitude of 6 k N. what would be the tension in the ropes when  $\theta = 30^\circ$ ? Proceed to work out value of  $\theta$  so that the tension in the rope AB is minimum tension

(10)

**OR**

Q.3. Fig. shows a Warren girder consisting of seven members each of 3m length freely supported at its ends. The girder is load at B & C as shown. Find the forces in all member of the girder by method of joints.

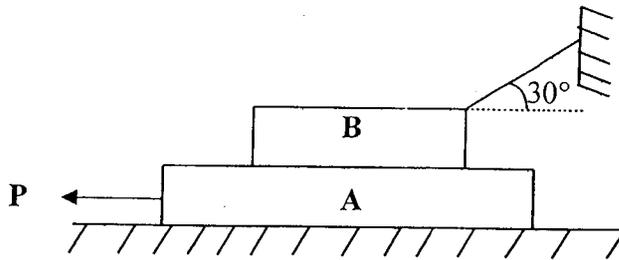
(10)

**UNIT-II**

Q.4. Two blocks A and B of weight 4 kN and 2kN respectively are in equilibrium position as shown in fig. presuming that coefficient of friction between the two blocks as well as between block and floor is 0.25, make calculation for the force P required to move the block A.

(10)

P.T.O.

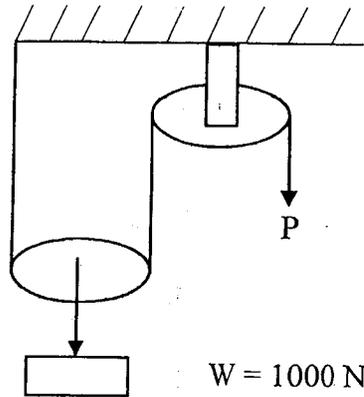


OR

Q.5. Explain the principle of virtual work.

(10)

A weight of 1000 N is to be raised by a system of pulleys as shown in figure. Using the principle of virtual work, find the value of force P which can hold the system in equilibrium.



UNIT-III

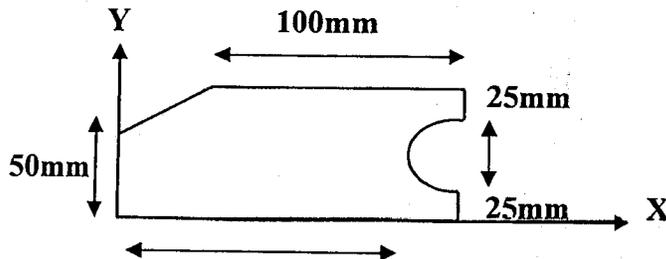
Q.6. Determine the area moment of inertia of a semicircle about its centroidal axis. Let the base of the semicircle be aligned along the x-axis, symmetrical about y-axis.

(10)

OR

Q.7. Locate the position of the centroid of the plane area depicted in fig given below.

(10)



UNIT-IV

Q.8. Two adjacent guns having the muzzle velocity of 400 m/s fire simultaneously at an angle of  $\alpha_1$  and  $\alpha_2$  for the same target at a range 4800 m. Calculate the time difference between the hits. Assume gravitational acceleration  $g = 9.80 \text{ m/s}^2$ .

(10)

OR

Q.9. A particle moves along a straight line with an acceleration prescribed by the relation  $a = (4t^2 - 3t + 2)$  where a is in  $\text{m/s}^2$  and t is in sec. The particle has a velocity of 10 m/s at  $t = 3$  seconds, and it is located 12 m to the right of origin at  $t = 2$  seconds. Determine the position and velocity of the particle after 5 seconds.

(10)

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**B.TECH. (ME) – 3<sup>rd</sup> SEMESTER EXAMINATION, DECEMBER.-2017**  
(SUBJECT- MATERIALS ENGINEERING AND TECHNOLOGY PAPER CODE- 13030305)

Time : 03:00 Hours

Maximum Marks – 50

**Instruction :**

1. Write your Roll No. on the question paper.
2. Candidate should ensure that they have been provided with correct question paper. Complaints in this regard, if any, should be reported to the invigilator on duty in the examination hall within 15 minutes of the commencement of the exams. No complaints shall be entertained thereafter.
3. Attempt five (05) questions in all Q.No.1. is compulsory. Students are required to attempt four questions selecting one from each unit in addition to Q.No.1. Marks are indicated against each
4. Draw diagram whenever required.

**Q1 . Answer all the followings: (5x2=10)**

- a) Effect of Slip and Twinning
- b) Gihh's Phase rule
- c) Effect of Alloying Elements in steel
- d) Flame and Induction Hardening
- e) Fiber Reinforced Plastic

**UNIT-I**

**Q2 . What do you mean by Miller Indices? Explain the procedure for finding Miller Indices. (10)**

OR

Prove that for a Simple Cubic System.

$$d_{100} : d_{110} : d_{111} = \sqrt{6} : \sqrt{3} : \sqrt{2}, \text{ where 'd' stands for inter planer distance}$$

**UNIT-II**

**Q3 . Draw Iron-carbon equilibrium diagram and explain the features? (10)**

OR

What is TTT diagram? Explain briefly with neat sketch stating its importance. (10)

**UNIT-III**

**Q4 . Define the term Heat Treatment? Brief on types of carburizing and need for post carburizing heat treatments? (10)**

OR

Brief on hardening and tempering of steel with respect to rate of cooling and tempering temperature respectively? (10)

**UNIT-IV**

**Q5 . What is Fatigue failure? How is the fatigue test carried out? (10)**

OR

Write Short notes on: (10)

- a) Metal Matrix Composites
- b) Glasses
- c) RBSN
- d) Ferromagnetism

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Sr. No 100398

Roll No. \_\_\_\_\_

**B.TECH. (ME) – 3<sup>rd</sup> SEMESTER EXAMINATION, DECEMBER.-2017**  
**(SUBJECT- ENGINEERING THERMODYNAMICS) (PAPER CODE- 13030306)**

**Time : 03:00 Hours**

**Maximum Marks – 50**

**Instruction :**

1. Write your Roll No. on the question paper.
2. Candidate should ensure that they have been provided with correct question paper. Complaints in this regard, if any, should be reported to the invigilator on duty in the examination hall within 15 minutes of the commencement of the exams. No complaints shall be entertained thereafter.
3. Attempt five (05) questions in all Q.No.1. is compulsory. Students are required to attempt four questions selecting one from each unit in addition to Q.No.1. Marks are indicated against each
4. Draw diagram whenever required.

**Q1 . Write the short note on the following:-**

**(5x2=10)**

- a) State how zeroth law of thermodynamics is used for temperature measurement.
- b) Enlist the similarities between the work and heat.
- c) What are the causes of irreversibility?
- d) Define molar mass.
- e) Define sensible heat factor.

**UNIT-I**

**Q2 . Differentiate between absolute pressure and gauge pressure.**

A forced draught fan supplies air to the furnace of a boiler at draught of 40 mm of water. If the barometer reads 760 mm of mercury, make calculations for the absolute pressure of air supply in kPa.

**(10)**

**OR**

**Q3 . A nozzle is a device for increasing the velocity of a steadily flowing stream. At inlet to a certain nozzle, the fluid parameters are:**

Enthalpy = 2850 kJ/Kg; Velocity = 50 m/s; area = 0.1 m<sup>2</sup> and specific volume - .018m<sup>3</sup>/Kg. At the discharge end the enthalpy is 2650 KJ/Kg and the specific volume is 0.49 m<sup>3</sup>/Kg. Make calculations for the velocity of fluid at exit from the nozzle, mass flow rate of fluid, and the exit area of the nozzle. The nozzle is horizontal and there is a negligible heat loss from it.

**(10)**

**UNIT-II**

**Q4 . Define second law of thermodynamics. State and prove Carnot theorem.**

**(10)**

**OR**

**Q5 . Write short note on availability and irreversibility.**

Calculate the availability and unavailability of a system that absorbs 15000 kJ of heat form a heat source at 500 k temperature while the environment is at 290 k temperature.

**(10)**

**UNIT-III**

**Q6 . Explain the Otto cycle.**

Define compression ratio. How does it affect the air standard efficiency of an Otto cycle?

**(10)**

**OR**

- Q7 . A four stroke engine working on Diesel cycle has a piston diameter of 25cm, a stroke of 40 cm. And a clearance volume of 1200 cc. The fuel injection takes place for 5% of stroke. If the induction pressure corresponds to 1 bar and engine turns 5 rev/sec, find the air standard efficiency, mean effective pressure and power developed. (10)

UNIT-IV

- Q8 . Discuss the following: (4x2.5=10)

- a) Vander Waals equation
- b) Compressibility factor
- c) Dalton's law of partial pressures
- d) Amagat's law

OR

- Q9 . Define calorific value of fuel. Explain Bomb calorimeter. (10)

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**B.TECH. (ME) – 3<sup>rd</sup> SEMESTER EXAMINATION, DECEMBER.-2017**  
**(SUBJECT- FUNDAMENTALS OF MANUFACTURING PROCESSES)**  
**(PAPER CODE- 13030307)**

Time : 03:00 Hours

Maximum Marks – 50

**Instruction :**

1. Write your Roll No. on the question paper.
2. Candidate should ensure that they have been provided with correct question paper. Complaints in this regard, if any, should be reported to the invigilator on duty in the examination hall within 15 minutes of the commencement of the exams. No complaints shall be entertained thereafter.
3. Attempt five (05) questions in all Q.No.1. is compulsory. Students are required to attempt four questions selecting one from each unit in addition to Q.No.1. Marks are indicated against each
4. Draw diagram whenever required.

**Q1 . Write the short note on the following:-**

(4x2.5=10)

- a) Manufacturing Process
- b) Cost of Production
- c) Forging Process
- d) Forming and Shaping Process

**UNIT-I**

**Q2 . Explain Die casting in detail; also explain its merits & demerits and defects with neat sketch.**

(10)

**Q3 . Explain sand casting process in detail with neat sketches and its merits and demerits.**

(10)

**UNIT-II**

**Q4 . Explain arc welding process in detail with neat sketches and its merits and demerits.**

(10)

**Q5 . Explain submerged arc welding process with suitable diagrams and its merits and demerits.**

(10)

**UNIT-III**

**Q6 . Explain extrusion process with its types and defects with suitable diagram.**

(10)

**Q7 . Explain Electro hydraulic forming process in detail with neat sketches and its uses.**

(10)

**UNIT-IV**

**Q8 . Define Power metallurgy. Explain sintering & finishing of glass with its merits and demerits.**

(10)

**Q9. Explain injection molding process. Explain types of plastics.**

(10)

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