

AR16

CODE: 16ME1002

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

I B.Tech II Semester Regular Examinations, June-2017

ENGINEERING MECHANICS

(For CE, CSE & IT Branches)

Time: 3 Hours

Max Marks: 70M

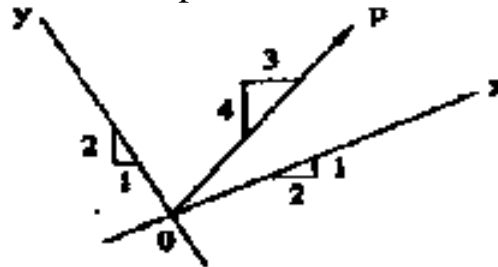
Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered at one place

UNIT-I

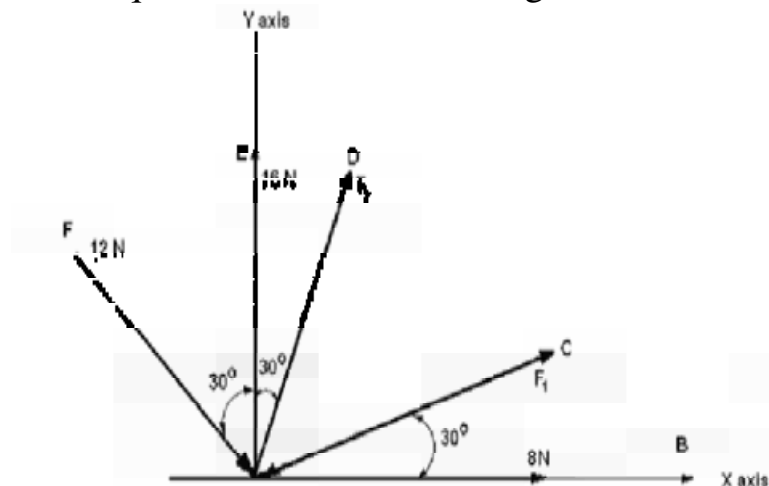
1. a If the X component of P (as shown in Figure) is 893 N, **9M**
determine P and its Y component.



- b Explain about resultant of system of forces in space **5M**

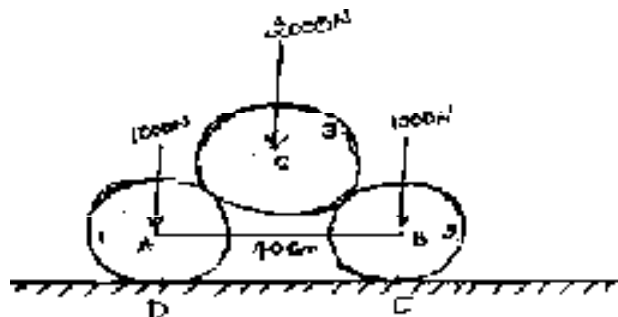
(OR)

2. a State and explain Parallellogram law with relevant figures and **6M**
equations
b Determine the magnitudes of F_1 and F_2 for the following **8M**
system of forces
which are in equilibrium as shown in figure



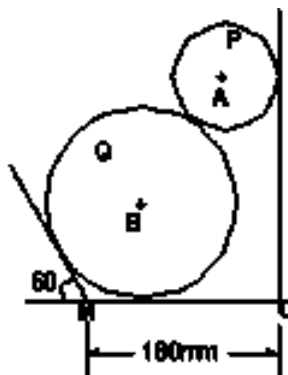
UNIT-II

3. a State and prove Varignon's theorem **6M**
 b Two smooth circular cylinders, each of weight $W = 1000\text{N}$ and radius 15cm , are connected at their centres by a string AB of length 40cm and rest upon a horizontal plane. Supporting above them a third cylinder of weight 2000N and radius 15cm as shown in figure. Find the force 'S' in the string AB and the pressure produced on the floor at the points of contacts D and E.



(OR)

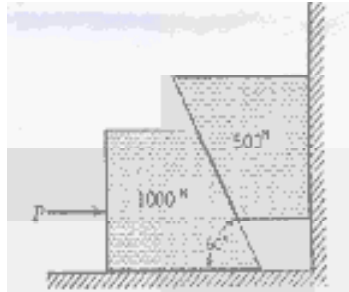
4. Two cylinders P and Q rest in a channel as shown in the figure **14M**
 The cylinder P has a diameter of 100 mm and weighs 200 N where as the cylinder Q has diameter of 180 mm and weighs 500 Newtons . If the bottom width of the box is 180mm , with one side vertical and the other inclined at 60° , determine the reactions at all the four points of contact.



UNIT-III

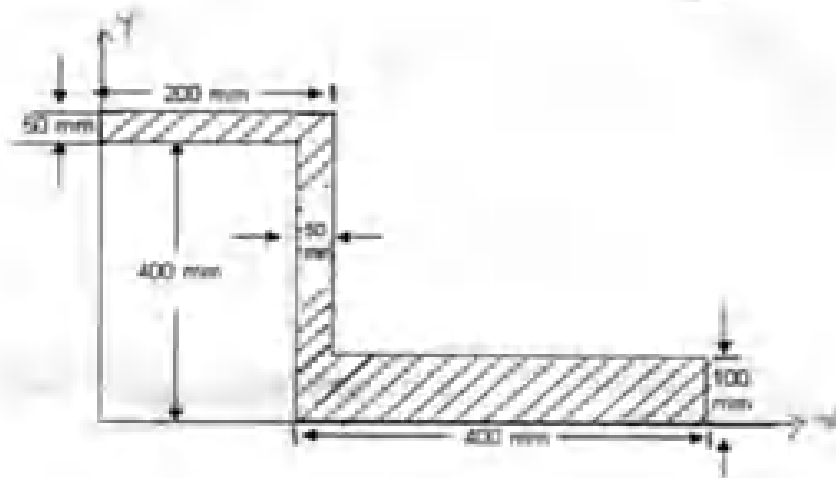
5. a Define the following: **5M**
 i) Friction ii) Angle of friction

- b Referring to Figure the coefficient of the friction are as 9M
 follows: 0.25 at the floor, 0.30 at the wall, and 0.20 between
 blocks. Find the minimum value of a horizontal force P
 applied to the lower block that will hold the system in
 equilibrium



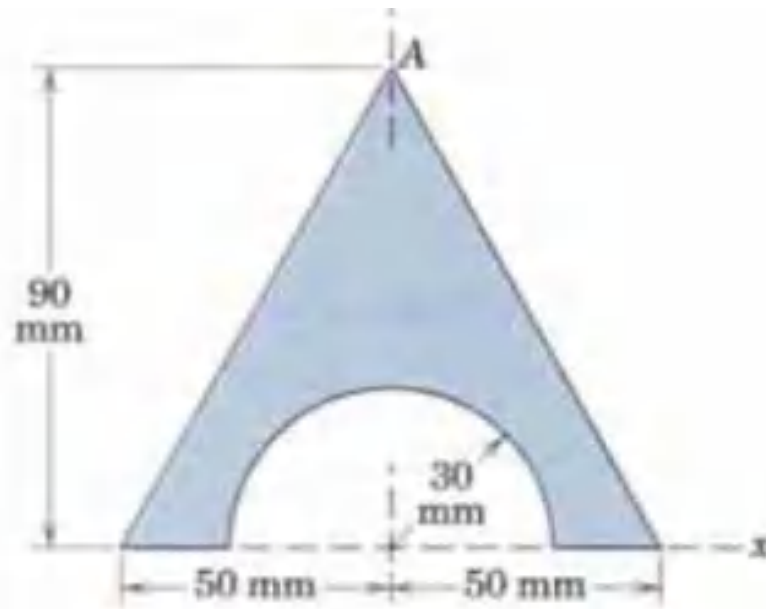
(OR)

6. a Define: Centre of gravity and Centroid 5M
 b Find the centroid of the shaded area shown in Figure 9M



UNIT-IV

7. a Define radius of gyration. 3M
 b Calculate the moment of inertia of the shaded area about its
 centroidal axis in the x-direction 11M



(OR)

8. Derive an equation for mass moment of inertia of circular plate of radius 'R' and thickness 't' about its diameter. **14M**

UNIT-V

9. A small steel ball is shot vertically upwards from the top of a building 25m above the ground with an initial velocity of 18 m/sec. **14M**
- In what time; it will reach the maximum height?
 - How high above the building will the ball rise?
 - Compute the velocity with which it will strike the ground and the total time it is in motion

(OR)

10. a Define D'Alembert's principle **4M**
 b Derive the kinetic energy of a body in fixed axis rotation **10M**

SWITCHING THEORY AND LOGIC DESIGN
(Electrical and Electronics Engineering)**Time: 3 Hours****Max Marks: 70**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered at one place

UNIT-I

1. a) Convert the following numbers **6M**
 - i) $(26153.256)_8$ to binary
 - ii) $(254.23)_{10}$ to octal
 - iii) $(A34C)_{16}$ to Decimal
 - b) The following decimal numbers are shown in sign magnitude form:- +9826 and +801. Convert them to signed 10's complement form and perform the following operations **8M**
 - i) $(+9826) + (+801)$
 - ii) $(-9826) + (+801)$
- (OR)**
2. a) Explain the procedure to convert binary number to gray code number with suitable example **7M**
 - b) Encode data bits 1101 into the 7-bit even parity hamming code. **7M**

UNIT-II

3. a) Show That **8M**
 - i) $AB+ABC+BC = AC+BC$.
 - ii) $ABC+B+BD+ABD+AC = B+C$
 - b) Explain De Morgan's theorem and solve $AB+A+B$ using De Morgan's theorem. **6M**
- (OR)**
4. a) Explain about standard SOP & standard POS forms with suitable examples. **7M**
 - b) Write the expression for EX-OR operation and obtain **7M**
 - (i) The truth table
 - (ii) Realize this operation using AND, OR, NOT gates.
 - (iii) Realize this operation using only NOR gates.

UNIT-III

5. Simplify using kmap $F(a,b,c,d)=\sum(1,3,8,10,15)+d(0,2,9)$ and implement the minimized function by using NAND gates. **14M**

(OR)

6. Simplify the given function using tabular method and draw the logic diagram using AOI logic. **14M**
 $F(A, B, C, D) = \sum (0, 2, 3, 6, 7) + d (5, 8, 10, 11, 15)$

UNIT-IV

7. a) Design Carry look-a-head adder circuit **7M**
b) Design Half Adder by using only NAND gates. **7M**

(OR)

8. a) Implement the following logic function using an 8X1 MUX: **7M**
 $F(A,B,C,D)=AB+BD+BCD$
b) With the help of logic diagram explain a 4-input priority encoder **7M**

UNIT-V

9. a) Draw the schematic circuit of a positive edge triggered SR flip-flop using NAND gates and explain its operation with the help of truth table. **7M**
b) Convert a S-R Flip flop into T-flip-flop **7M**
- (OR)**
10. a) Discuss the applications of shift registers. **4M**
b) With the help of logic diagram and timing diagram, explain the operation of 4-bit Johnson Counter. **10M**

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SET-2

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

**I B.Tech II Semester Regular Examinations, June-2017
ENGINEERING MECHANICS (DYNAMICS)
(Mechanical Engineering)**

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered at one place

UNIT-I

1. a) Determine the Centre of Gravity of a hemi sphere whose radius is 'r'. 8M
b) A steel ball of diameter 150 mm rests centrally over a concrete cube of size 150 mm. Determine the centre of gravity of the system. Taking weight of the concrete = 25000 N/m³ and that of steel 8000 N/m³. 6M
(OR)
2. a) State parallel axes and perpendicular axes theorems. 4M
b) Derive the expression for mass moment of inertia of a right circular cone about axis of a cone. 10M

UNIT-II

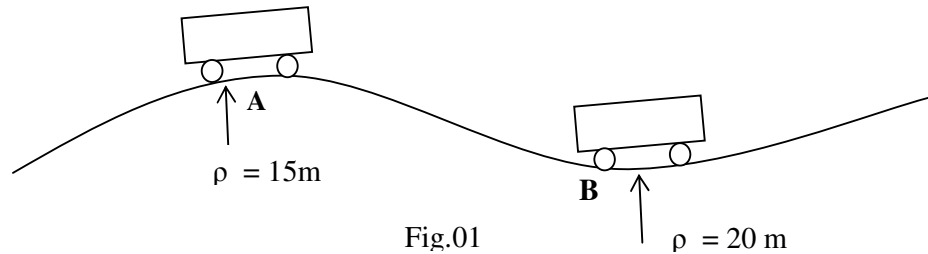
3. a) A particle under a constant deceleration is moving in a straight line and covers a distance of 20m in first two seconds and 40m in the next 5 seconds .Calculate the distance it covers in the subsequent 3 seconds and the total distance covered, before it come to rest. 7M
b) A stone dropped into a well with no initial velocity and is heard to strike the water after 4.2 seconds. Find the depth of the well, if the velocity of sound is 330 m/sec. 7M
(OR)
4. a) A motorist is travelling on a curved portion of highway of radius 200m at a speed of 70 kmph.The brakes are suddenly applied, causing the speed decrease at a rate of 2m/sec².Calculate the acceleration of the motor (i) immediately after brakes have been applied (ii) 3 sec later 7M
b) An aero plane is flying horizontally with a constant speed of 60 m/s, at an altitude of 900 m. If the pilot drops a package with same horizontal speed of 60 m/s, determine the velocity when the package hits the ground and its angle with horizontal. 7M

UNIT-III

5. a) Explain the concept of D'Alemberts principle. 4M
b) An elevator being lowered into mine shaft starts from rest attains a speed of 10 m/sec within a distance of 15 m .The elevator alone has a mass of 500 kg and its carries a box of mass 600kg in it. Find the total tension in the cables supporting the elevator, acceleration during this accelerated motion. Also find the total force between the box and floor of the elevator. 10M

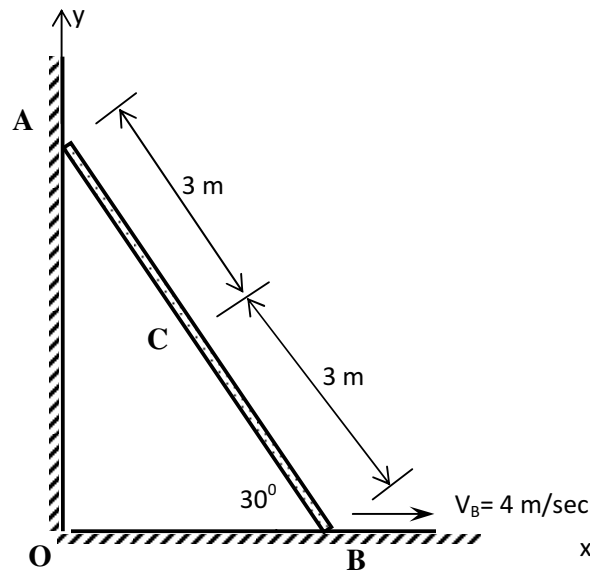
(OR)

6. a) What is conservation of momentum? Explain. 4M
 b) A van of mass 1000kg travels at constant speed along a vertical curve as shown in Fig.01. Find the maximum speed at which the van may travel so that it would remain in constant with the road at all time. At this speed, find the reaction from the ground when the van reaches point B. 10M



UNIT-IV

7. a) Define general plane motion and instantaneous centre 4M
 b) A ladder AB = 6m resting against a vertical wall at A and horizontal ground at B as shown in Fig.02. If the end B of the ladder is pulled towards right with a constant velocity $v_B = 4$ m/sec. Find 10M
 (i) Instantaneous centre of rotation of ladder,
 (ii) Angular velocity of the ladder at the instant
 (iii) Velocity components v_{cx} , v_{cy} of mid point C of the ladder.



(OR)

8. a) Explain the principle of work and energy? Explain 4M
 b) A cylindrical roller, 50cm in diameter is in constant with two conveyor belts at its top and bottom as shown in fig03 .If the belts run at uniform speed of 5 m/sec and 3 m/sec,find linear velocity and angular velocity of roller . 10M

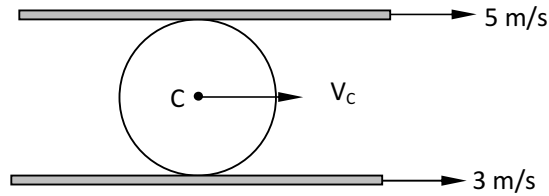


Fig.03

UNIT-V

9. a) A body of mass 50kg moving with a velocity of 6m/sec, collides directly with a stationary body of mass 30kg.if the two bodies become coupled so that they move together after the impact what is the common velocity ? 6M
 b) A golf ball dropped from rest onto a cement sidewalk rebounds eight-tenth of the height through it fell. Neglecting air resistance, determine the coefficient of restitution. 8M

(OR)

10. a) A rotor of an electric motor is uniformly accelerated to a speed of 1800 rpm from rest for 5 seconds and then immediately power is switched off and the rotor decelerate uniformly. If the total time elapsed from start to stop is 12.5 sec ,determine the number of revolutions made while (i) acceleration ,(ii) deceleration .Also determine the value of deceleration. 6M
 b) The composite pulley shown in fig.04.weighs 800N and has radius of gyration of 0.6m. The 2000N and 4000N blocks are attached to pulley by inextensible strings. Using work energy principle, determine the resulting velocity when distance moved by 4000 block is 2m and hence determine the resulting acceleration.

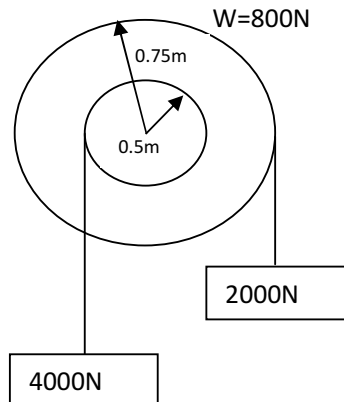


Fig.04

AR16

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SET-2

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

I B.Tech II Semester Regular Examinations, June-2017

ELECTRONIC DEVICES

(Electronics & Communication Engineering)

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered at one place

UNIT-I

- | | | |
|----|---|----|
| 1. | How do CRO Works? Explain using Block diagram? Explain the Measurement of voltage, current, time and phase using CRO. | 14 |
| | (OR) | |
| 2. | Explain the Motion of Charged Particles in Electric and Magnetic Fields with suitable equations. | 14 |

UNIT-II

- | | | | |
|----|---|--|---|
| 3. | a | Explain briefly about Hall effect and its applications | 7 |
| | b | Difference between conductors, insulators and semiconductors on the basis of energy band theory? | 4 |
| | c | What is Fermi Dirac function? | 3 |
| | | (OR) | |
| 4. | a | What is mass action law and law of electrical neutrality? | 7 |
| | b | What is drift velocity? | 3 |
| | c | What are Intrinsic and Extrinsic semi conductors? | 4 |

UNIT-III

- | | | | |
|----|---|---|---|
| 5. | a | What do you understand by depletion region at p-n junction? What is the effect of forward and reverse biasing of p-n junction on the depletion region? Explain with necessary diagrams. | 8 |
| | b | Explain Zener and avalanche breakdown mechanisms in detail. | 6 |
| | | (OR) | |
| 6. | a | Explain about various current components in a forward biased p-n junction diode. | 7 |
| | b | The voltage across a silicon diode at room temperature of 300 ⁰ K is 0.7V when 2mA current flows through it. if the voltage increases to 0.75V, Calculate the diode current. | 7 |

UNIT-IV

7. a Draw the circuit diagram of NPN transistor in Common Emitter(CE) configuration. With neat sketches and necessary equations, describe its static input-output characteristics and clearly indicate the cut-off, saturation & active regions on the output characteristics? 8
- b Calculate the values of I_C and I_E for a transistor with $\alpha_{dc} = 0.99$ and $I_{CBO} = 5\mu A$, if I_B is measured as $20\mu A$. 6
- (OR)**
8. a Explain different current components in a transistor. 5
- b Write short notes on Early effect. 4
- c Draw input and output characteristics of a transistor in common Base configurations. 5

UNIT-V

9. a Explain the construction & operation of an N-channel enhancement and depletion MOSFET with the help of static drain characteristics and transfer characteristics. 10
- b Define pinch-off voltage and trans conductance in field effect transistors. 4
- (OR)**
10. a Give the construction details of UJT & explain its operation with the help of equivalent circuits. 6
- b Explain the construction & operation of a P-channel MOSFET in enhancement and depletion modes with the help of static drain characteristics and transfer characteristics? 8