Code No. 11007/BL

FACULTY OF ENGINEERING

B.E. I - Year (Backlog) Examination, May / June 2019

Subject : Engineering Mechanics

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

Note: Answer all questions from Part-A & any five questions from Part-B.

PART – A (25 Marks)

1	Explain equilibrium of a force system.	2
2	Differentiate between applied forces and non-applied forces.	3
3	Write the equilibrium equations of the most general force system in three-dimensional space.	3
4	Differentiate between coefficient of static friction and coefficient of kinetic friction.	2
5	The centroid of a sector of a circle is ----------.	2
6	Define polar moment of inertia and product of inertia.	3
7	Explain the concept of general plane motion.	3
8	State D' Alembert's principle.	2
9	A valve is operated by applying a torque of 50 Nm on the wheel. If the wheel is rotated through two revolutions, find the work done.	3
10	Define coefficient of restitution.	2

PART- B (50 Marks)

11 (a) Determine the resultant of forces system as shown in Fig. 1 5

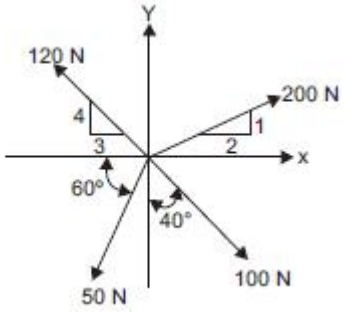

Fig. 1

(b) Cylinder A weighs 4000 N and cylinder B weighs 2000 N rest on smooth inclines and connected by a bar of negligible weight as shown in Fig. 2. Find the force P for equilibrium of the system. 5

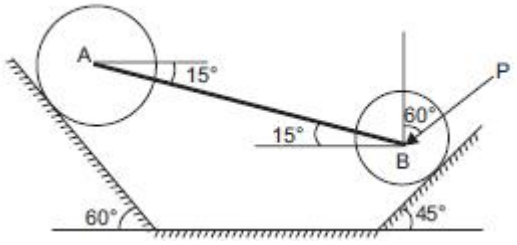

Fig. 2

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12 (a) The lines of action of three forces concurrent at origin passes respectively through points A (-1, 2, 4), B (3, 0, -3) and C (2, -2, 4). The magnitude of three forces is 40 N, 10N and 30 N respectively. Find the magnitude and direction of their resultant. 5

(b) Determine the value of P that will cause the 70 kg block to move. The coefficient of static friction between the block and the horizontal surface is 0.25. Refer Fig. 3. 5

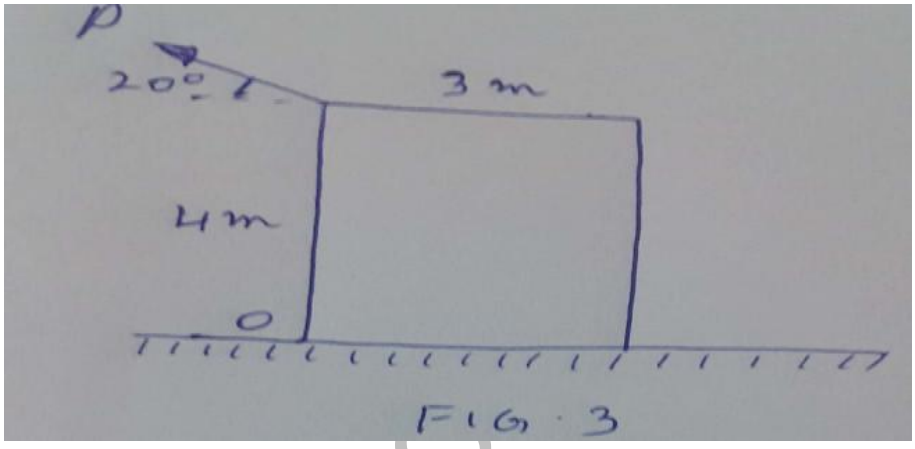

FIG. 3

13 (a) Find the centroid of the figure composed of lines as shown in Fig. 4 5

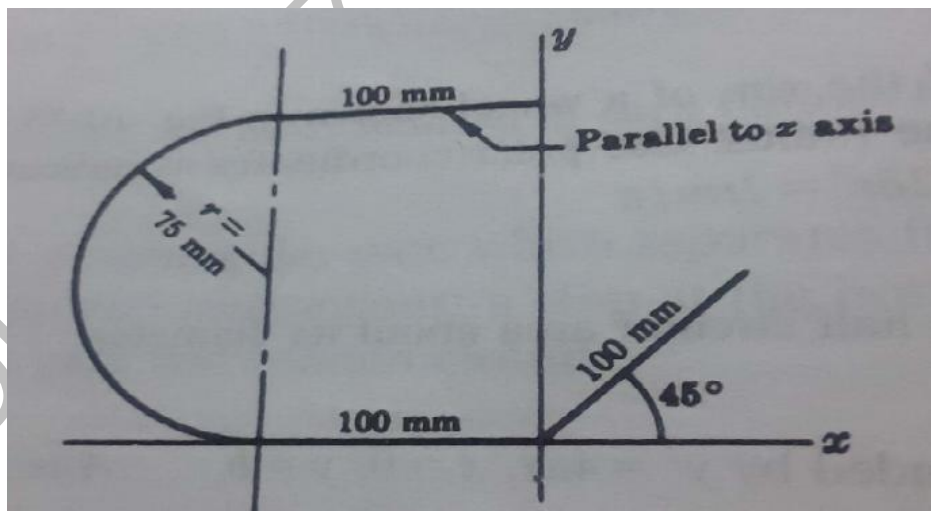

Fig.4

(b) Determine the product of inertia of right angled triangle with respect to centroidal axes parallel to x and y axes. 5

14 (a) A fly wheel 400 mm in diameter is brought uniformly from rest up to a speed of 300 rpm in 20 seconds. Find the velocity and acceleration of a point on the rim 2 seconds after starting from rest. 5

(b) The 10 kg drum of a washing machine has radius of gyration of 200 mm as shown in Fig. 5. If the drum is subjected to a moment of 4θ N-m, where θ is in radian, determine its angular velocity when it undergoes two revolutions. Also compute the reactions which the fixed pin A exerts on the drum during the motion. 5

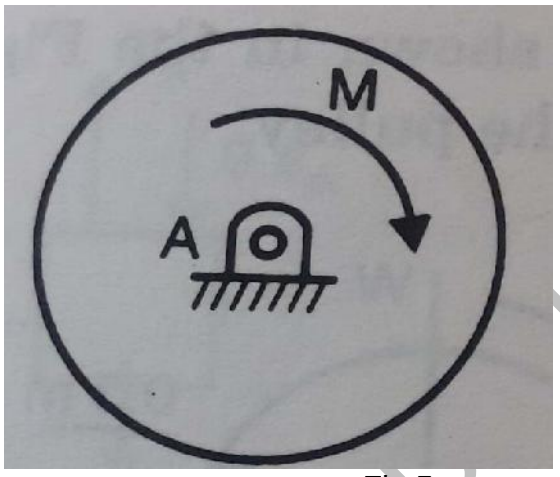

Fig.5

15 (a) A block weighing 2500 N rests on a horizontal plane for which coefficient of friction is 0.20. This block is pulled by a force of 1000 N acting at an angle of 30° to the horizontal as shown in Fig. 6. Find the velocity of the block after it moves 30 m starting from rest. If the force of 1000 N is then removed, how much further will it move? 5

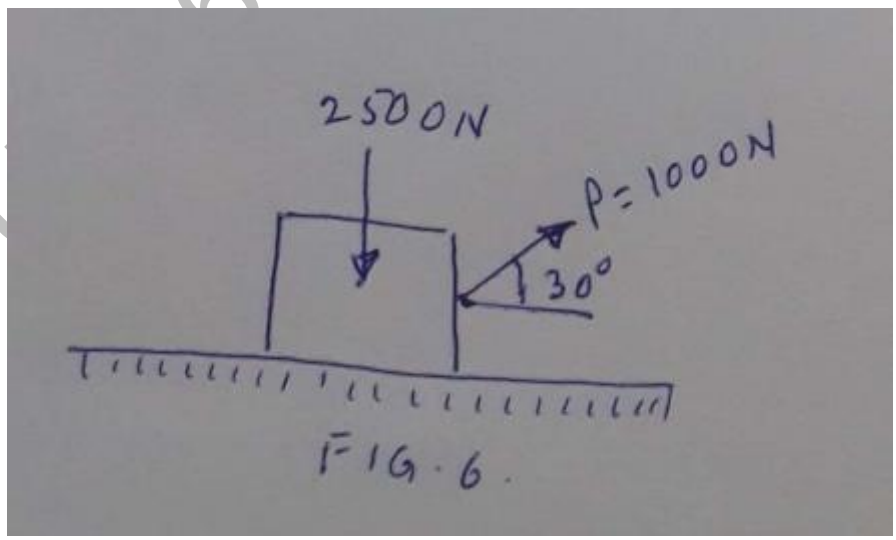

FIG. 6.

(b) A 18 kN car is moving at a speed of 75 kmph when the brakes are fully applied causing all four wheels to skid. Determine the time required to stop the car a) on concrete road for which $\mu = 0.75$, b) on ice for which $\mu = 0.08$. 5

16 (a) Two identical rollers, each of weighing 100 N are supported as shown in Fig. 7. Find the reactions at all contact points assuming smooth surfaces. 5

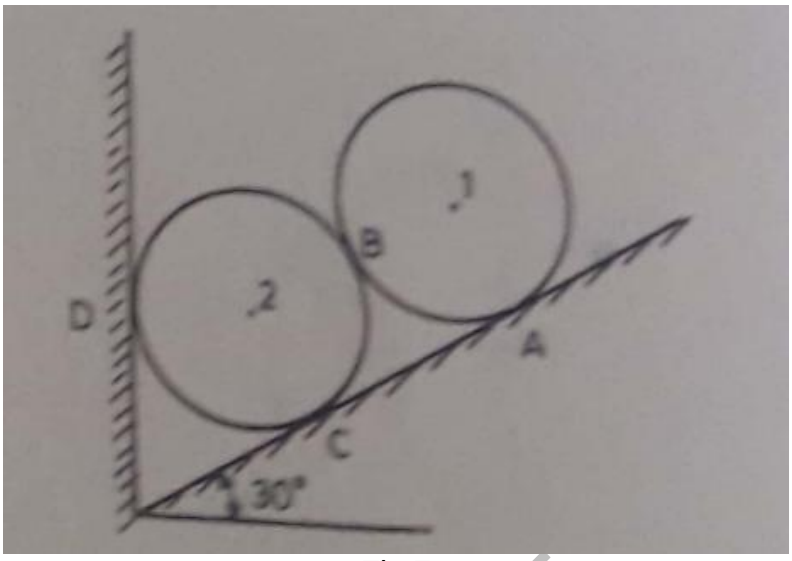

Fig.7

(b) The 80 kg mass is supported by three wires concurrent at D as shown in Fig. 8 . Determine the tension in the wire attached to C. 5

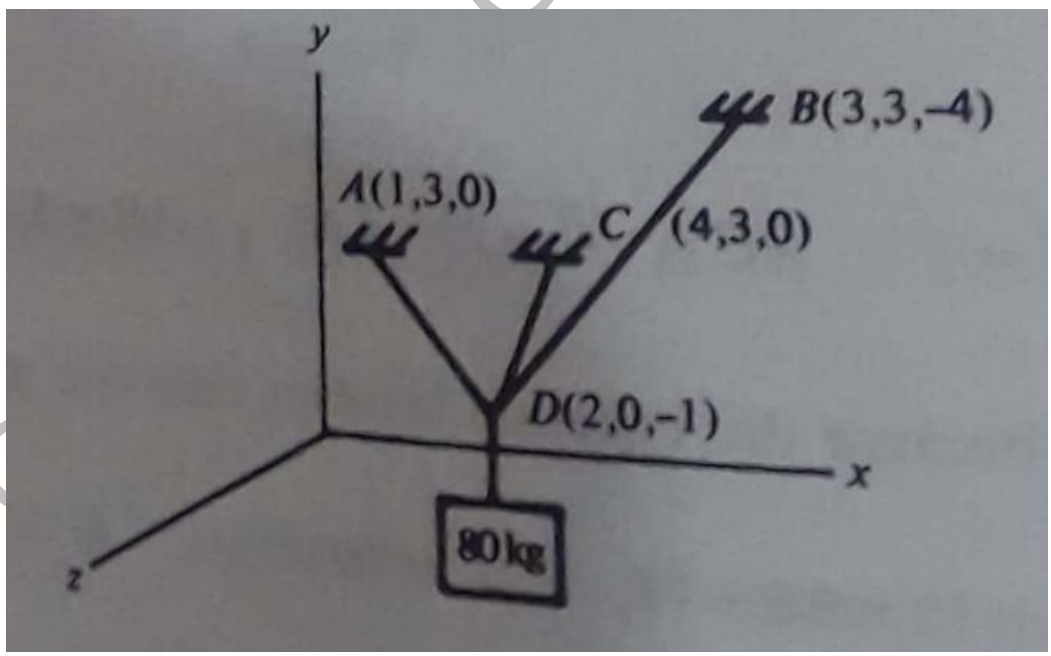

Fig. 8

17 (a) Determine the moment of inertia about a diameter for a homogeneous thin circular disk of radius *r* and density°. 5

(b) A particle moves in rectilinear motion with speed increase from zero to 30 m/s in 3 seconds and then decreases to zero in 2 seconds.

(i) What is the acceleration during the first 3 seconds and during the next 2 seconds?

(ii) What is the distance travelled in the 5 seconds. 5

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Code No. 11389 / CBCS/S

FACULTY OF ENGINEERING

B.E. III – Semester (CBCS) (Except I.T.) (Suppl.) Examination, May/June 2019

Subject: Engineering Mathematics – III

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

Note: Answer all questions from Part A and any five questions from Part B.

PART – A (20 Marks)

1 Show that $\lim_{z\to 0} \frac{Re(z)}{|z|}$ does not exist. 2

2 State Cauchy's integral theorem for multiply connected regions. 2

3 Expand f(z) = sin z in Taylor series about z = ®. 2

4 Determine the points where the function f(z) = sec z is not conformal. 2

5 Find the sum of the Fourier series of f(x) = $\begin{cases} -®, & 0 \le x \le 1 \\ ®, & 1 < x \le 2 \end{cases}$ at x = 1. 2

6 If f(x) = x = $\sum_{n=1}^{\infty} b_n$ sin nx, 0 < x < ®, then find b_n. 2

7 Eliminate the arbitrary constants a and b in z = a e^{-by} sin ax to obtain a partial differential equation. 2

8 Transform the partial differential equation z^2 = pqxy to F(p, q, z) = 0 form. 2

9 Classify the partial differential equation $x^2u_{xx} + y^2u_{yy} = xu_n - yu_y$. 2

10 Solve $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} = 3u$, u(0,y) = e^{-5y} by the method of separation of variables. 2

PART – B (5x10 = 50 Marks)

11 a) Show that the function u(x, y) = 4xy – 3x+2 is harmonic and find its conjugate harmonic function v(x, y). 5

b) Apply Cauchy's integral formula to evaluate $\oint_C \frac{z-1}{(z+1)^2(z-2)} dz$, where C is |z-i| = 2. 5

12 a) Expand f(z) = $\frac{z^2 - 1}{(z+2)(z+3)}$ in the regions (i) |z| < 2 and (ii) 2 < |z| < 3. 5

b) Evaluate $\int_0^{2®} \frac{1+2\cos^-}{5+4\cos^-} d^-$. 5

..2

13 a) Find the Fourier series expression of $f(x) = x + x^2$, $-® \le x \le ®$.

Deduce that $1+\frac{1}{2^2}+\frac{1}{3^2}+\frac{1}{4^2}+.....\frac{\pi^2}{6}$. 7

b) Obtain the half range Fourier sine series for $f(x) = 2x - 1$, $0 < x < 1$. 3

14 a) Obtain the general solution of $2xzp + 2yzq + x^2 + y^2 - z^2 = 0$. 5

b) Solve $p + q = pq$ by Charpit's method. 5

15 Solve the Laplace equation $\frac{\partial^2 u}{\partial x^2}+\frac{\partial^2 u}{\partial y^2}= 0$ for a rectangular plate subject to the following conditions. 10

$U(x, 0) = u(x, 1) = 0$, $u(0, y) = y$ and $\frac{\partial u}{\partial x}(1, y) = -5$

16 a) Find the analytic function $f(z)$ such that $Re[f'(z)] = 3x^2 - 4y - 3y^2$ and $f(1+i) = 0$. 5

b) Find the bilinear transformation which maps the points $z = 1, i, -1$ into $w = i, 0, -i$ and hence find the image of $|z| < 1$. 5

17 a) Solve $[2D^2 - 5DD' + 3(D')^2 + D - D'] z = e^{x+y}$. 5

b) Show that $|x| = 1 - \frac{8}{®^2}\left[\frac{\cos\left(\frac{®}{2}x\right)}{1^2} + \frac{\cos\left(\frac{3®}{2}\right)x}{3^2}+\frac{\cos\left(\frac{\sqrt{®}}{2}\right)x}{5^2}+ ....\right]$, $-2 < x < 2$. 5

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Code No. 11422 / CBCS / S

FACULTY OF ENGINEERING

B.E. (I.T) III – Semester (CBCS) (Suppl.) Examination, May / June 2019

Subject: Micro Electronics

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

Note: Answer all questions from Part – A and any five questions from Part – B.

PART – A (20 Marks)

1 Write any two differences between trivalent and pentavalent impurities. (2)

2 Analyze properties of ideal diode under forward and reverse bias condition. (2)

3 Interpret the modes of operation of transistor. (3)

4 What is early effect? (3)

5 Define Barkhausen Criterion. (3)

6 Draw the symbolic diagram of Op-amp. (2)

7 Explain Virtual ground concept of op-amp. (2)

8 What is PUN and PDN? (3)

PART – B (5x10 =50 Marks)

9 i) What is rectifier ? Explain the operation of full wave rectifier. (5)

ii) Explain positive and negative clamper.

10 i) Evaluate the input and output characteristics of BJT with neat sketch. (7)

ii) Derive the relation between α and β. (3)

11 Analyze any two topologies of feedback amplifier. (10)

12 i) Define inverting amplifier. Explain the operation of Op-amp as inverting amplifier. (5)

ii) Derive the expression for op-amp as differentiator. (5)

13 Design the following 2-input logic gates using CMOS.

i) NAND (5)

ii) NOR (5)

14 Explain input and output characteristics of common base transistor. (10)

15 Write short notes on:

i) Hartley oscillator (5)

ii) Zener diode (5)

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