

# CBCS SCHEME

15ME662



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## Sixth Semester B.E. Degree Examination, Dec.2019/Jan.2020 Industrial Safety

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

### Module-1

- 1 a. Identify various types of work place hazard in a process industry. (08 Marks)  
b. Distinguish between unsafe act and unsafe condition with suitable example. (08 Marks)

OR

- 2 a. Identify the need for Lockout and Tagout system. Illustrate with suitable examples. (08 Marks)  
b. List the information described in MSDS and explain its significance in hazard control. (08 Marks)

### Module-2

- 3 a. Apply the concept of fire triangle to discuss fire extinguishing process. (08 Marks)  
b. Explain the various types of fire detection and Alarm system and justify its requirement in fire protection and loss prevention. (08 Marks)

OR

- 4 a. Develop the matrix on classification fire and recommend which type of fire extinguishing system is suitable for each class is fire. (08 Marks)  
b. Explain with neat sketch of Carbon dioxide extinguisher. (08 Marks)

### Module-3

- 5 a. Explain the safety measure for lathe and milling machine. (08 Marks)  
b. Identify the general personal protective Equipment and explain any three. (08 Marks)

OR

- 6 a. Explain the general safety measure for machine shop. (08 Marks)  
b. What are the basic safety procedure concerning corrosives. (08 Marks)

### Module-4

- 7 a. List the various hazards of Electricity. (04 Marks)  
b. Explain the effect of electric current on heart and lung. (06 Marks)  
c. State the root causes of accident at construction site. (06 Marks)

OR

- 8 a. Explain the principle of unsafe acts and unsafe conditions behind electrical accident. Give an example. (08 Marks)  
b. Identify ten preventive measures to prevent shocks in a substation. (08 Marks)

### Module-5

- 9 a. Explain Acid hoods and handling of acids. (04 Marks)  
b. Explain the safety precautions using CNC and LPG. (06 Marks)  
c. Write a short note on safety Audit and risk assessment. (06 Marks)

OR

- 10 a. Explain eye washer's and shower. (04 Marks)  
b. Write briefly safety thinking and accident investigation. (06 Marks)  
c. Explain the safety policy of the company. (06 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.





**First Semester B.E. Degree Examination, Dec.2019/Jan.2020**  
**Calculus and Linear Algebra**

Time: 3 hrs.

Max. Marks: 100

*Note: Answer any FIVE full questions, choosing ONE full question from each module.*

**Module-1**

- 1 a. With usual notations prove that  $\tan \phi = r \left( \frac{d\theta}{dr} \right)$ . (06 Marks)
- b. Find the angle between the curves  $r = \sin\theta + \cos\theta$  and  $r = 2 \sin\theta$  (06 Marks)
- c. Show that the radius of curvature for the catenary of uniform strength  $y = a \log \sec \left( \frac{x}{a} \right)$  is  $a \sec \left( \frac{x}{a} \right)$ . (08 Marks)

OR

- 2 a. Show that the pairs of curves  $r = a(1 + \cos\theta)$  and  $r = b(1 - \cos\theta)$  intersect each other Orthogonally. (06 Marks)
- b. Find the pedal equation of the curve  $r^n = a^n \cos n\theta$ . (06 Marks)
- c. Show that the evolute of  $y^2 = 4ax$  is  $27ay^2 = 4(x + a)^3$ . (08 Marks)

**Module-2**

- 3 a. Find the Maclaurin's series for  $\tan x$  upto the term  $x^4$ . (06 Marks)
- b. Evaluate  $\lim_{x \rightarrow 0} \left[ \frac{a^x + b^x + c^x}{3} \right]^{1/x}$  (07 Marks)
- c. If  $U = f(x-y, y-z, z-x)$ , prove that  $\frac{\partial U}{\partial x} + \frac{\partial U}{\partial y} + \frac{\partial U}{\partial z} = 0$  (07 Marks)

OR

- 4 a. Expand  $\log (\sec x)$  upto the term containing  $x^4$  using Maclaurin's series. (06 Marks)
- b. Find the extreme values of the function  $f(x, y) = x^3 + y^3 - 3x - 12y + 20$ . (07 Marks)
- c. Find  $\frac{\partial(u, v, w)}{\partial(x, y, z)}$  where  $u = x^2 + y^2 + z^2$ ,  $v = xy + yz + zx$ ,  $w = x + y + z$ . (07 Marks)

**Module-3**

- 5 a. Evaluate  $\int_0^1 \int_0^{\sqrt{1-x^2}} \int_0^{\sqrt{1-x^2-y^2}} xyz \, dzdydx$  (06 Marks)
- b. Evaluate  $\int_{-2}^2 \int_0^{\sqrt{4-x^2}} (2-x)dydx$  by changing the order of integration. (07 Marks)
- c. Prove that  $\beta(m, n) = \frac{\Gamma(m) \cdot \Gamma(n)}{\Gamma(m+n)}$  (07 Marks)

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OR

- 6 a. Evaluate  $\iint y \, dx \, dy$  over the region bounded by the first quadrant of the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ . (06 Marks)
- b. Find by double integration the area enclosed by the curve  $r = a(1 + \cos\theta)$  between  $\theta = 0$  and  $\theta = \pi$ . (07 Marks)
- c. Show that  $\int_0^{\pi/2} \frac{d\theta}{\sqrt{\sin\theta}} \times \int_0^{\pi/2} \sqrt{\sin\theta} \, d\theta = \pi$ . (07 Marks)

Module-4

- 7 a. Solve  $\frac{dy}{dx} + \frac{y \cos x + \sin y + y}{\sin x + x \cos y + x} = 0$  (06 Marks)
- b. Solve  $r \sin\theta - \cos\theta \frac{dr}{d\theta} = r^2$  (07 Marks)
- c. A series circuit with resistance R, inductance L and electromotive force E is governed by the differential equation  $L \frac{di}{dt} + Ri = E$ , where L and R are constants and initially the current i is zero. Find the current at any time t. (07 Marks)

OR

- 8 a. Solve  $(4xy + 3y^2 - x)dx + x(x + 2y)dy = 0$ . (06 Marks)
- b. Find the orthogonal trajectories of the family of parabolas  $y^2 = 4ax$ . (07 Marks)
- c. Solve  $p^2 + 2py \cot x = y^2$ . (07 Marks)

Module-5

- 9 a. Find the rank of  $\begin{bmatrix} 1 & 2 & 3 & 2 \\ 2 & 3 & 5 & 1 \\ 1 & 3 & 4 & 5 \end{bmatrix}$  by elementary row transformations. (06 Marks)
- b. Apply Gauss-Jordan method to solve the system of equations  
 $2x_1 + x_2 + 3x_3 = 1$ ,  
 $4x_1 + 4x_2 + 7x_3 = 1$ ,  
 $2x_1 + 5x_2 + 9x_3 = 3$ . (07 Marks)
- c. Find the largest Eigen value and the corresponding Eigen vector of the matrix  
 $A = \begin{bmatrix} 2 & 0 & 1 \\ 0 & 2 & 0 \\ 1 & 0 & 2 \end{bmatrix}$  by power method. Using initial vector  $(100)^T$ . (07 Marks)

OR

- 10 a. Solve by Gauss elimination method  
 $x - 2y + 3z = 2$ ,  
 $3x - y + 4z = 4$ ,  
 $2x + y - 2z = 5$  (06 Marks)
- b. Solve the system of equations by Gauss-Seidal method  
 $20x + y - 2z = 17$ ,  
 $3x + 20y - z = -18$ ,  
 $2x - 3y + 20z = 25$  (07 Marks)
- c. Reduce the matrix  $A = \begin{bmatrix} -1 & 3 \\ -2 & 4 \end{bmatrix}$  to the diagonal form. (07 Marks)

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