Total Printed Pages : 3

Roll No. .....

E-944

B. E. IVth Semester (Main & RE-Exam) Examination, May – 2019

INDUSTRIAL MANAGEMENT

Branch : ME

Time : Three Hours]

[Maximum Marks : 75

[Minimum Marks : 30

Note : Attempt *all* questions in **Section – A**, any *four* questions from **Section – B** and *three* questions from **Section – C**.

SECTION – A

1. In what order do managers typically perform the managerial functions ?
   (a) organising, planning, controlling, leading
   (b) organising, leading, planning, controlling
   (c) planning, organising, leading, controlling
   (d) planning, organising, controlling, leading

2. At what level of an organisation does a corporate manager operate ?
   (a) Operational
   (b) Functional
   (c) Middle level
   (d) Top level

3. Work study is also recognized as :
   (a) Time Study
   (b) Motion study
   (c) Hours study
   (d) None of the above

4. When we classify managers according to their level in the organization they are described as ..... .
   (a) Functional, staff and line managers
   (b) Top managers, middle managers and supervisors
   (c) High level and lower level managers
   (d) General managers and administrative managers

P. T. O.

5. ..... is an important element in the communication process. It recognizes that successful communications are more likely to be achieved if the source and the receiver understand each other.

(a) The realm of understanding

(b) Personal selling

(c) Noise

(d) Feedback

6. When a manager monitors the work performance of workers in his department to determine if the quality of their work is 'up to standard', this manager is engaging in which function ?

(a) Planning

(b) Controlling

(c) Organising

(d) Leading

7. Which term describes the process of gathering, analyzing and synthesizing information about the jobs that are being done and any new jobs that are envisaged ?

(a) job description

(b) job analysis

(c) job specification

(d) human resource inventory

8. A formal, systematic appraisal of the qualitative and quantitative aspects of an employee's performance is called :

(a) performance evaluation

(b) performance appraisal

(c) performance analysis

(d) orientation

9. The development and application of employees' skills and energies to accomplish the goals and objectives of the organization is called :

(a) human resource management

(b) human resource planning

(c) selection

(d) recruiting

10. Which of the following is a written statement of the skills, knowledge, abilities, and other characteristics needed to perform a job effectively ?

(a) job design.

(b) job specification.

(c) job analysis

(d) job description

SECTION – B

1. Describe the concept and importance of Industrial Management.
2. Describe the process of Planning.
3. What is the difference between authority and responsibility ?
4. Define Maslow's need hierarchy theory.
5. Describe the different types of control.
6. What are the major skills required for industrial managers ?

SECTION – C

1. What are principles of Management also discuss the fourteen principles of Henery Fayol ?
2. Define Management, its various functions and the different levels.
3. Discuss different structures of organization.
4. Discuss different forms of layouts. Also explain which type of layout is best suited for an automobile unit.
5. What are various inventory control methods ?

Total Printed Pages : 4

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E-945

B. E. IV Semester (Mechanical Engg.) (Main & Re-Exam) Examination, May – 2019

KINEMATIC & MECHANISM

Time : Three Hours] *[Maximum Marks : 60*

Note : Attempt *all* questions.

SECTION – A [Marks : 10 × 1 = 10

1. (i) Consider the following statements :

(1) The degree of freedom for lower kinematic pairs is always equal to one.

(2) A ball and rocket joint has three degree of freedom and is a higher kinematic pairs.

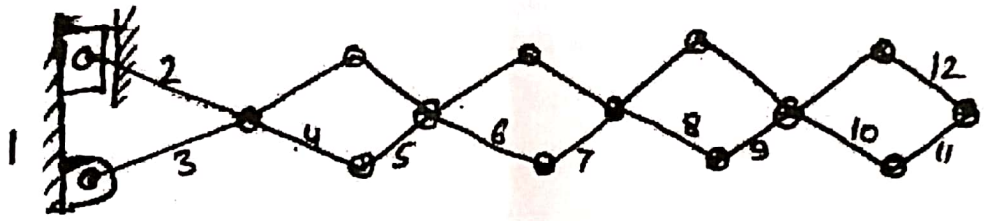
(3) Oldhams coupling mechanism has two prismatic pairs and two revolute pairs.

Which of the statement given above is/are correct ?

(a) 1, 2 and 3 (b) 1 only

(c) 2 and 3 (d) 3 only

(ii) Find the number of degree of freedom :



(a) 1 (b) 3

(c) 2 (d) 0

(iii) There are two kinematic chains, one with 5 links and other with 6 links. The ratio of instantaneous centres for these is :

(a) 5 : 6 (b) 6 : 5

(c) 2 : 3 (d) 3 : 2

P. T. O.

(iv) The coriolis component of acceleration arises when a part slides along its path which :

(a) also rotates
(b) has linear displacement
(c) has tangential acceleration
(d) has radial acceleration

(v) Pantograph has :

(a) Four sliding pairs
(b) Four turning pairs
(c) Both sliding & turning pairs
(d) 3 turning pairs and 1 sliding pair

(vi) Fundamental equation of correct steering is :

(a) $\cos\phi - \cos\theta = \frac{w}{l}$
(b) $\cot\phi - \cot\theta = \frac{w}{l}$
(c) $\cot\phi - \cot\theta = \frac{l}{w}$
(d) $\cos\phi - \cos\theta = \frac{l}{w}$

where θ and ϕ are angle turn by sub axles.

w – distance between the pivots of front axle.

l – wheel base

(vii) Cam size depends upon :

(a) base circle
(b) prime circle
(c) pitch circle
(d) cam speed

(viii) For static balancing of a shaft :

(a) The net dynamic force acting on the shaft is equal to zero
(b) The net couple due to the dynamic forces acting on the shaft is equal to zero
(c) Both (a) and (b)
(d) None of the above

(ix) The primary unbalanced force is maximum when the angle of inclination of the crank with the line of stroke is :

(a) 0°
(b) 90°
(c) 120°
(d) 270°

(x) A flywheel of moment of inertia 9.8 kg – m^2 fluctuates by 30 rpm for a fluctuation in energy of 1936 joules. The mean speed of the flywheel in rpm is :

(a) 600
(b) 900
(c) 698
(d) 2940

SECTION – B

[Marks : 6 × 4 = 24

Note : Attempt any *four* questions.

1. Define Grashhof's law. State how is it helpful in classifying the four-link mechanism into different types.

2. What is the coriolis acceleration components in which case does it occur ?

3. How are the cam classified ? Describe in details.

4. In a crank and slotted lever mechanism, the crank radius is 12 cm. The distance between the centre of oscillation of the slotted lever and centre of rotation of crank is 30 cm. What is the ratio of the time of cutting to the time of return stroke ?

5. State and prove Kennedy's theorem.

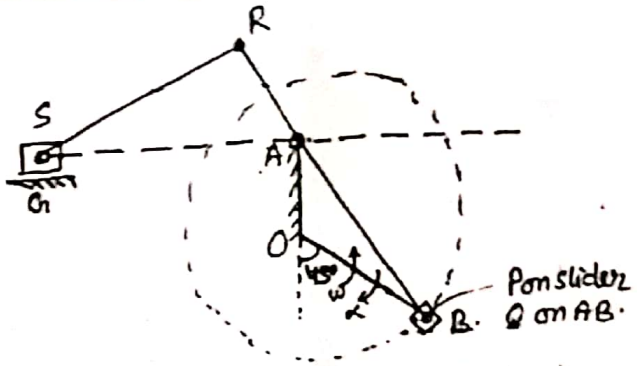
6. Derive the expression for an uncoupled two cylinder locomotive engine, swaying couple and hammer blow.

SECTION – C

[Marks : 12 × 3 = 36

Note : Attempt any *three* questions.

1. A withworth quick return mechanism (see figure) crank OP = 240 mm, link OA = 150 mm, link AR = 165 mm, link RS = 430 mm. The crank OP has an angular velocity of 2.5 rad/sec and an angular deceleration of 20 rad/ sec^2 at the instant. Determine the : (a) acceleration of slider S (b) angular acceleration of link AR and RS.



(with worth quick return mechanism)

2. With the data given below a Cam follower moves with uniform acceleration/ retardation during ascent and with SHM during descent. Draw the Cam profile far offset case.

   Vast radius of Cam = 30 mm

P. T. O.

Angle of ascent = 60°

Angle of dwell b/w ascent & descent = 60°

Angle of descent = 120°

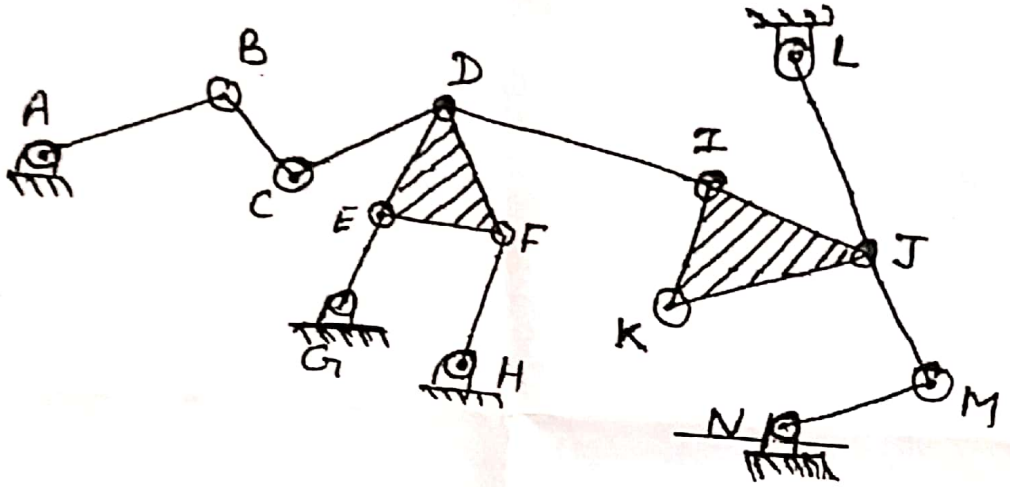
Roller diameter = 20 mm

Lift of the follower = 40 mm

Offset of the follower = 15 mm

If the cam rotates at 300 rpm. Determine the maximum velocity and acceleration of the follower during ascent and descent.

3. Find the degree of freedom for the mechanism.



4. A single cylinder reciprocating engine has a reciprocating mass of 60 kg. The crank rotates at 60 rpm and stroke is 320 mm. The mass of the revolving parts at 160 mm radius is 40 kg. If two third of the reciprocating parts and the whole of the revolving parts are to be balanced.

Determine the :

(i) Balance mass required at a radius of 350 mm

(ii) Unbalanced force when the crank has turned 50° from the top dead centre

5. Prove that the maximum fluctuation of energy in flywheel $\Delta E = E \times 2C_S$.

E – mean kinetic energy of flywheel

C_S – coefficient of fluctuation of speed

Total Printed Pages : 4

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E-946

B. E. IV Semester (Main & Re-Exam) Examination, May – 2019

BASIC FLUID MECHANICS AND RATE PROCESS

BRANCH : MECHANICAL ENGINEERING

Time : Three Hours]

[Maximum Marks : 75
[Minimum Marks : 30

Note : Attempt ***all*** questions from ***Section-A***, ***four*** questions from ***Section-B*** and ***three*** questions from ***Section-C***.

SECTION – A

[Marks : 10 × 1.5 = 15

(Objective Type Questions)

1. One poise is equal to :

(a) $10\ Ns/m^2$ (b) $0.1\ Nm/s^2$

(c) $0.1\ Ns/m^2$ (d) $10\ Ns/m^2$

2. 3 litres of liquid weighs 23.7N. The specific volume of liquid will be (in m^3/kg) :

(a) 0.0124 (b) 0.124

(c) 0.00124 (d) 1.24

3. Hydrostatic force on a plane submerged in a static liquid is given by [where, w=specific weight of liquid, h= depth of centre of gravity of the area below the free surface, A= area of immersed plane] :

(a) wAh (b) wh/A

(c) wh^2/A (d) wAh^2

P. T. O.

4. A line tangent to the velocity vector at every point in flow field at a given instant is known as :

(a) Timeline
(b) Streamline
(c) Pathline
(d) Streakline

5. Linear momentum equation is based on :

(a) Newton's first law of motion
(b) Newton's second law of motion
(c) Newton's third law of motion
(d) Newton's law of cooling

6. Stream function (ψ) is defined as :

(a) $u = \frac{\partial \psi}{\partial y}, v = -\frac{\partial \psi}{\partial x}$
(b) $\psi = \frac{\partial u}{\partial y}, \psi = -\frac{\partial v}{\partial x}$
(c) $u = \frac{\partial \psi}{\partial x}, v = \frac{\partial \psi}{\partial y}$
(d) $u = \frac{\partial \psi}{\partial x}, v = -\frac{\partial \psi}{\partial y}$

7. Froude number is the defined as :

(a) Inertia force/viscous force
(b) Viscous force/inertia force
(c) Inertia force/gravity force
(d) Elastic force/Inertia force

8. Blausius solution for laminar boundary layer is [Re = Reynolds number] :

(a) $\frac{\delta}{x} = \frac{1}{\sqrt{Re}}$
(b) $\frac{\delta}{x} = \frac{5}{Re}$
(c) $\frac{\delta}{x} = \frac{5}{\sqrt{Re}}$
(d) $\frac{\delta}{x} = \frac{0.664}{\sqrt{Re}}$

9. A rectangular flat plate 0.5 m × 1.2 m is to be set at right angles to the flow of water in a river. If velocity of flow is 2.5 m/s, what will be the force required to hold the plate [$C_D = 1.2$] ?

(a) 2250 kN
(b) 225 kN
(c) 2.25 kN
(d) 0.225 kN

10. Speed of sound in Oxygen at 25°C will be [R = 260 J/kg-K, Y = 1.4] :

(a) 10.41 m/s (b) 100.4 m/s

(c) 329.3 m/s (d) 500.4 m/s

SECTION – B

[Marks : 6 × 4 = 24

(Short Answer Type Questions)

1. The dynamic viscosity of an oil, used for lubrication between a shaft and sleeve is 6 poise. The shaft is of diameter 0.4 m and rotates at 190 rpm. Calculate the power lost in bearing for a sleeve length of 90 mm. The thickness of oil film is 1.5 mm.

2. Derive an expression for the depth of centre of pressure from free surface of liquid of an inclined plane surface submerged in the liquid.

3. The stream function for a 2D flow is given by $\psi = 2xy$. Calculate the velocity at the point (2, 3). Also find the velocity potential.

4. 250 L/s of water is flowing in a pipe having a diameter of 300mm. If the pipe is bent by 135° (change from initial to final direction is 135°). Find the magnitude and direction of the resultant force on the bend. Pressure of water flowing is 39.24 N/cm².

5. The efficiency η of a fan depends on density ρ, dynamic viscosity μ of fluid, angular velocity ω, diameter D of rotor and discharge Q. Express η the in terms of dimensionless parameter.

6. Derive the Von Karman momentum integral equation.

SECTION – C

[Marks : 12 × 3 = 36

(Long Answer Type Questions)

1. Derive the general mass diffusion equation in stationary medium.

2. A gas is flowing through a horizontal pipe at a temperature of 4° C. The diameter of the pipe is 8 cm and at a section 1-1 in this pipe, the pressure is 30.3N/cm² (gauge). The diameter of the pipe changes from 8 cm to 4 cm at the section 2-2, where the pressure is 20.3 N/cm² (gauge). Find the velocities of gas at these sections assuming an isothermal process. [R = 0.287 Nm/kg-K, P_{atm} = 10 N/cm²]

3. Obtain an expression of lift produced on a rotating cylinder placed in a uniform flow field such that the axis of cylinder is perpendicular to the direction of flow.

4. Derive the Navier-Stokes Equation in Cartesian coordinate.

5. For the velocity profile for laminar boundary layer flows given as :

$$\frac{u}{U} = 2\left(\frac{y}{\delta}\right) - \left(\frac{y}{\delta}\right)^2$$

Find an expression for boundary layer thickness (δ) shear stress(τ_0) in terms of Reynolds number.

Total Printed Pages : 3

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E-947

B. E. IVth Semester (Main & Re) Examination, May – 2019

MMM (ME)

Time : Three Hours]

[Maximum Marks : 75

[Minimum Marks : 30

Note : Attempt *all* questions in **Section – A**, *four* questions from **Section – B** and *three* questions from **Section – C**.

SECTION – A

[Marks : 1.5 × 10 = 15

(Objective Type Questions)

1. Delta iron occurs at temperature of :

(a) room temperature

(b) above melting point

(c) between 1400°C & 1539°C

(d) between 910°C and 1400°C

2. The following types of materials are usually the most ductile :

(a) FCC lattice

(b) BCC lattice

(c) HCP lattice

(d) all of the above

3. Dislocations in materials refer to the following type of defect :

(a) point defect

(b) line defect

(c) plane defect

(d) volumetric defect

4. An example of amorphous material is :

(a) zinc

(b) lead

(c) silver

(d) glass

P. T. O.

5. Which is false statement about tempering, tempering is done to ?

(a) improve machinability (b) improve ductility

(c) improve toughness (d) release stresses

6. Basic constituents of monel metal are :

(a) nickel, copper (b) nickel, tin

(c) zinc, tin, lead (d) lead, tin

7. Eutectoid steel contains following percentage of carbon :

(a) 0.02% (b) 0.3%

(c) 0.8% (d) 1.2%

8. Process of austempering results in :

(a) formation of bainite structure (b) carburized structure

(c) mortenistic structure (d) relieving of stresses

9. Which phenomenon is not used in measurement of hardness ?

(a) Scratch (b) Wear

(c) Indentation (d) Fracture

10. Machining properties of steel are improved by adding :

(a) sulphur, lead, phosphorous (b) silicon, aluminium, titanium

(c) vanadium, aluminium (d) lubricants

SECTION – B

[Marks : 4 × 6 = 24

(Short Answer Type Questions)

1. Define APE (Atomic Packing Factor) and derive unit cell length and calculate APE for FCC, BCC if radius of atom is 'R'.

2. Define ceramic. Give the classification and list down the examples of ceramic materials.

3. What is stress-strain diagram ? Explain the various factors affecting stress-strain diagram with suitable diagram.

4. What is hardness ? How does the Rockwell hardness test differ from brinell hardness test.

5. Discuss the importance of dislocations. Differentiate between edge and screw dislocation.

6. Define the term refractories and state their properties.

SECTION – C

[Marks : 3 × 12 = 36

(Long Answer Type Questions)

1. With the help of suitable diagram, explain the process of martempering. How does it differ from austempering ? What do the microstructures of martempered and austempered steels consists of ?

2. Draw Iron-Iron carbide equilibrium diagram and label temperatures, compositions and phases.

3. What is the significance of TTT diagram ? Draw TTT diagram for eutectoid steels. What are the effects of corbon on TTT diagram.

4. Schematically draw the S-N curves for ferrous and non-ferrous metals and explain the curves.

5. Define the term miller indices and find spacing of (i) (200) plane, (ii) (220) planes (iii) planes of lead which is the FCC with an atomic radius r = 1.747 Å.

Total Printed Pages : 4 *Roll No.* .....

E-948

B. E. IV Semester (Main & Re-Exam) Examination, May 2019

ASM

Branch : ME

Time : Three Hours] *[Maximum Marks : 75*

[Minimum Marks 30

Note : Attempt all questions from **Section-A**, Four questions from **Section-B** and Three questions from **Section-C**.

SECTION – A [Marks : 10 × 1.5 = 15

1. The modulus of elasticity is dimensionally equivalent to :

(a) Strain (b) Stress

(c) Surface tension (d) Poisson's ratio

2. If by applying a force, the shape of a body is changed, then the corresponding stress is known as :

(a) Tensile stress (b) Bulk stress

(c) Shearing stress (d) Compressive stress

3. According to Horke's law of elasticity, within elastic limits, if the stress is increased, the ratio of stress to strain :

(a) Increases (b) Decreases

(c) Becomes zero (d) Remains constant

4. Which one of he following does not affect the elasticity of a substance ?

(a) Hammering (b) Adding impurity in the substance

(c) Changing the dimensions (d) Change of temperature

5. Euler's formula holds good only for :

(a) Short columns (b) Long columns

(c) Both Short and long Columns (d) Weak columns

P. T. O.

6. Within elastic limit, stress is :
   (a) Inversely proportional to strain
   (b) Directly proportional to strain
   (c) Square root of stress
   (d) Equal to strain

7. A shaft is said to be in pure torsion if :
   (a) Turning moment is applied at one end and other end is free
   (b) Turning force is applied at one end and other end is free
   (c) Two opposite turning moments are applied to the shaft
   (d) Combination of torsional load and bending load is applied to the shaft

8. In power transmission equation, $P = 2\,\Pi NT/60 \times 1000$
   (a) P is in kw and T is maximum torque
   (b) P is in N.m/sec and T is maximum torque
   (c) P is in N.m/sec and T is mean torque
   (d) P is in kw and T is mean torque

9. Shear stress energy theory is called as
   (a) Distortion theory
   (b) Von Mises theory
   (c) Both (a) and (b)
   (d) none of the above

10. For designing ductile materials, which of the following theories is/are used?
   (a) Maximum shear stress theory
   (b) Shear strain energy theory
   (c) Both (a) and (b)
   (d) None of the above

SECTION – B

[Marks : $6 \times 4 = 24$

1. The state of stress at a point is characterised by $\sigma_x = 18\ \sigma_y = -50, \sigma_z = 32\ \tau xy = 0$ $\tau xz = 24,\ \tau yz = 0$ (All stress values are in kPa); Calculate the principal stresses and the direction of largest tensile principal stress ?

2. Find an expression for the maximum shear stress induced in an elliptical bar under torsion?

3. What is meant by warping of non-circular shafts? Prove that St.Venants warping function is harmonic.

4. Find the value of load P in Fig. 1, so that the maximum bending stress allowed is 15MPa for the case of beam shown below, subjected to unsymmetrical bending.

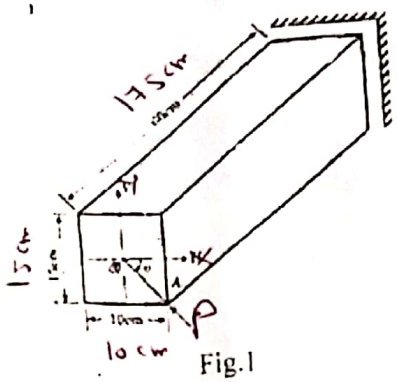


Fig.1

5. (a) Explain the minimum potential energy theorem.

   (b) Explain the principle of virtual work.

6. Obtain the expression for strain energy in a bar subjected to :

   (i) Axial force

   (ii) bending moment

   (iii) twisting moment

$U = \frac{\sigma^2}{2E} \times V$

(b)

(c)

SECTION – C

[Marks : 3 × 12 = 36

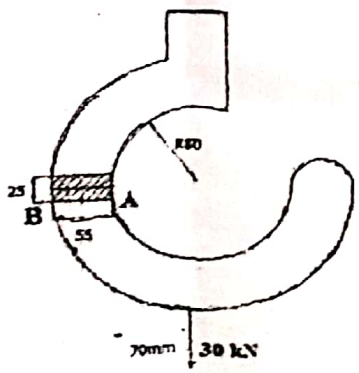
1. (a) State and prove reciprocal relation in strain energy.

   (b) Derive the expression for stress function and components of stress for the bending of a cantilever with an end load.

2. (a) State and explain Generalized Hook's law.

   (b) Derive the relationship between stress and strain for an isotropic material in terms of Lame's coefficient.

3. A crane hook of rectangular cross section 25 mm wide and 55 mm deep has an inner radius of curvature 80 mm. The load line is at 70 mm from the inside of the section. Determine the maximum fiber stress induced, if it carries a load of 30kN.



4. (a) Define the term "State of stress" at a point.

   (b) Derive the Cauchy's equation for components of traction along the x, y and z direction. Also derive the characteristic equation for the principle stresses and principle plane from Cauchy's equation.
