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B.Tech. (Electronics & Communication Engg.)
3rd Semester G-Scheme

Examination, December–2024

ECONOMICS FOR ENGINEERS

Paper-HSMC-01-G

Time allowed : 3 hours] *[Maximum marks : 75*

Note : *Attempt **five** questions in all, selecting **one** question from each unit. **Question No. 1 is compulsory.** All questions carry equal marks.*

1. (a) Define Micro Economics.

   (b) Define Marginal Cost.

   (c) What is Economic Problem?

   (d) Define Monopoly.

   (e) What is Law of Demand?

   (f) What is Globalization?

   6×2.5=15

Unit-I

2. What is Economics? Explain the nature of Economic Problem also discuss the significance of production possibility curve. 15

3. Explain the term Demand. Discuss the nature and importance of Law of Demand. 15

Unit-II

4. What is Production? Explain various factors of production and their significance. 15

5. Discuss the Law of Production. Illustrate the various cost in short run and in long run. 15

Unit-III

6. Define Market and its characteristics. Differentiate between Perfect Competition, Monopoly, Monopolistic and Oligopoly. 15

7. What is Law of Supply? Explain the various factors that affect the supply of the product. 15

Unit-IV

8. What do you understand by Privatization? Explain its merits and demerits. 15

9. What are Commercial Banks? Explain various functions of commerical banks. 15

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B.Tech. (ME) 5th Semester G-Scheme

Examination, December–2024

COMPUTER AIDED DESIGN & MANUFACTURING

Paper-PCC-ME-301-G

Time allowed : 3 hours] *[Maximum marks : 75*

Note : *Attempt **five** questions in all selecting **one** question from each unit. **Question No.1 is compulsory.** All questions carry equal marks.*

1. Explain the following : 6×2.5=15

(i) Application of CAD

(ii) What is transformation?

(iii) Name the basic steps to perform additive Manufacturing.

(iv) Control points of curves.

(v) What do you mean by local coordinate system?

(vi) Benefits of CAPP

Unit-I

2. (i) Explain the computer application in design process. 8

(ii) Explain the hardware and software of CAD. 7

3. (i) Explain the classification of additive manufacturing. 8

(ii) Explain the application of AM in aerospace. 7

Unit-II

4. For the points $P_1(1,1)$, $P_2(3,1)$, $P_3(4,2)$, $P_4(2,3)$ that define a 2-D polygon, develop a single concatenated transformation matrix that : 15

(i) Reflects about line x=0.

(ii) Translate by–1 in both x and y direction

(iii) Rotates about z-axis by 180°

Using this matrix, determine the new coordinates.

5. Explain the following :

(i) Bi-cubic surface 8

(ii) Constructive solid geometry 7

Unit-III

6. (i) Explain the coordinates and shape function of one dimensional problems. 8

(ii) Explain the different types of forces in finite element structural analysis problem. 7

7. Explain the following:

(i) Extrusion based additive manufacturing systems. 8

(ii) Photo polymerization additive manufacturing process 7

Unit-IV

8. Define FMS, its components and types in detail. 15

9. (i) Explain the steps in variant process planning. 7

(ii) Explain the need for CAPP and also explain the benefits of CAPP. 8

B.Tech. (ME) 5th Semester

(G-Scheme) Examination, December-2024

SOLID MECHANICS

Paper -PCC-ME-303-G

Time allowed : 3 hours] *[Maximum marks : 75*

Note : *Attempt **five** questions in total, selecting one question from each section. **Question No. 1 is compulsory.***

1. Explain the term.

(a) Fatigue 2.5

(b) Stress concentration factor 2.5

(c) Endurance limit 2.5

(d) Yield point 2.5

(e) Ultimate stress 2.5

(f) Young's modulus 2.5

Section-A

2. Explain leaf spring and how are leaf springs designed? 15

3. A Helical spring of wire dia. 6mm and spring index 6 is acted by initial load of 8000N. After compressing it further by 10mm the stress in the wire is 500 MPa. Find the number of active coils. G = 84000 MPa. 15

Section-B

4. Explain Lame's equation and how do you find the stress of a cylinder? 15

5. What do you mean by hoop stress? And how is hoop stress calculated? And why is hoop stress twice longitudinal stress? 15

Section-C

6. What are the expression of bending equations? 15

7. What are the reasons for unsymmetrical bending? Explain the shape of distribution of bending stress in a curved beam. 15

Section-D

8. Explain Winkler-Bach Theory and Castigliano's Theorem. 15

9. Explain energy method and virtual work method. 15

B.Tech. (ME) 5th Semester G-Scheme

Examination, December–2024

MANUFACTURING TECHNOLOGY-I

Paper-PCC-ME-305-G

Time allowed : 3 hours] *[Maximum marks : 75*

Note : *Attempt **five** questions in all selecting **one** from each unit. **Question no. 1 is compulsory.** All questions carry equal marks.*

1. (i) What is jig bushes?

(ii) List the operation peformed on lathe machine.

(iii) What is the function of flux in welding?

(iv) Tool life

(v) Merchant cutting force circle

(vi) Define brazing and soldering.

6×2.5=15

Unit-I

2. Draw a neat labelled diagram of right single point cutting tool showing various tool angles. What are the various effecs of tool angles on machining? Explain built-up edge. 15

3. (a) What is the effect of cutting speed, feed and depth of cut on forces on cutting tool?

   (b) Discuss the effect of cutting fluid on tool life.

10+5=15

Unit-II

4. Define Jigs and Fixtures. Explain in detail about location and location device, principal of location and advantages of using jigs and fixtures. 15

5. Write short notes on : 15

   (a) Mechanical comparator

   (b) Surface finish and its measurement

   (c) Sine bar

Unit-III

6. (a) What is a Planner? Illustrate and describe its working principles, also list the classification of planner.

   (b) Explain quick return mechanism for shaper machine.

10+5=15

7. Explain the basic steps in casting process. Also explain the pattern and allowances. 15

Unit-IV

8. Explain the working principle of resistance welding and its types. Also explain the different type of welding defects. 15

9. Explain the principle of hot working and cold working. Explain the shearing, blanking and piercing operation. 15

B.Tech. (ME) (5th Semester) (G-Scheme) Examination,

December–2024

KINEMATICS OF MACHINE

Paper–PCC-ME-307-G

Time allowed : 3 hours] *[Maximum marks : 75*

Note : *Attempt any **five** questions in all, selecting **one** question from each unit. **Question No. 1 is compulsory.** All questions carry equal marks.*

1. Explain the following :

(a) Define kinematic pair and explain all its types with example. 2.5

(b) Explain the pressure angle, circular pitch, diametral pitch and total depth. 2.5

(c) Define cam and its types. 2.5

(d) Explain Law of solid friction. 2.5

(e) Differentiate between belt drive, rope drive and chain drive. 2.5

(f) Define function and path generation. 2.5

Section–A

2. In a crank and slotted lever quick return motion mechanism, the distance between the fixed centers is 240 mm and the length of the driving crank is 120 mm. Find the inclination of the slotted bar with the vertical in the extreme position and the time ratio of cutting stroke to the return stroke. If the length of the slotted bar is 450 mm, measure the length of the stroke if the line of stroke passes through the extreme positions of the free end of the lever. 15

3. In a four bar chain ABCD, AD is fixed and is 150 mm long. The crank AB is 40 mm long and rotates at 120 r.p.m. clockwise, while the link CD = 80mm oscillates about D. BC and AD are of equal length. Find the angular velocity of link CD when angle BAD = 60°. 15

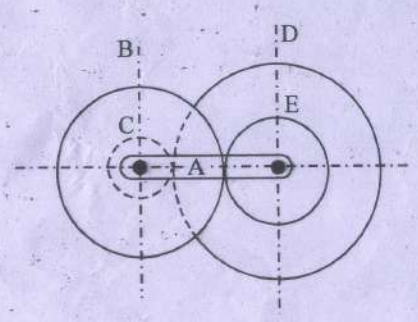
Section–B

4. Draw the displacement, velocity and acceleration diagram for a follower when it moves with simple harmonic motion. Derive the expression for velocity and acceleration during outstroke and return stroke of the follower. 15

5. Derive an expression for the length of arc of contact in a pair of meshed gears. 15

Section–C

6. In a reverted epicyclic gear train, the arm A carries two gears B and C and a compound gear D-E. The gear B meshes with gear E and the gear C meshes with gear D. The number of teeth on gears B, C and D are 75, 30 and 90 respectively. Find the speed and direction of gear C when gear B is fixed and the arm A makes 100 r.p.m. clockwise. 15



7. Derive the Freudenstein's equation of four bar mechanism for displacement analysis. 15

Section–D

8. An effort of 1500 N is required to just move a certain body up an inclined plane of angle 12°, force acting parallel to the plane. If the angle of inclination is increased to 15°, then the effort required is 1720 N. Find the weight of the body and the coefficient of friction. 15

9. Derive the derivation for the ratio of driving tension for flat belt drive.. 15

B.Tech. (ME) 5th Semester G-Scheme

Examination, December–2024

FLUID MACHINES

Paper-PCC-ME-309-G

Time allowed : 3 hours] *[Maximum marks : 75*

Note : *Attempt any **five** question, selecting at least **one** question from each unit. **Question No.1 is compulsory.***

1. Write about : 6×2.5=15

(a) What is Reaction turbine?

(b) Mechanical efficiency of turbine.

(c) Outward flow reaction turbine.

(d) Minimum starting speed of a centrifugal pump.

(e) Working principle of reciprocating pump

(f) Functions of Hydraulic press.

Unit-I

2. A jet of water 50mm in diameter, moving with velocity of 15 m/s, impinges on a series of vanes moving with a velocity of 6 m/s. Find. 15

(a) Force exerted by the jet

(b) Work done by the jet, and

(c) Efficiency of the jet

3. Write about :

(a) Efficiency of a Pelton wheel 8

(b) Governing of impulse turbines 7

Unit-II

4. Explain construction, working principle, design parameters of Francis turbine with neat and clean diagram. 15

5. A Kalpan Turbine, operating under a net head of 20 metres, develops 20000 KW with an overall efficiency of 86 percent. The speed ratio is 2.0 and flow ratio is 0.6. The hub diameter of the wheel is 0.35 times the outside diameter of the wheel. Find the diameter and speed of the turbine. 15

Unit-III

6. Write about :

(a) Buckingham's π theorem 8

(b) Causes and harmful effects of cavitation 7

7. A Centrifugal pump is discharging water at the rate of 15 litres/s at 500 r.p.m. The internal and external diameters and the impeller widths are 120mm, 240mm, 16mm and 8mm respectively. The vanes are curved back at 25° to the tangent at outlet. Find the rise in the water pressure, when it passes through the pump. 15

Unit-IV

8. Write about :

(a) Centrifugal vs reciprocating pumps 8

(b) Maximum speed of the rotating crank 7

9. Write about :

(a) Hydraulic intensifier 8

(b) Hydraulic Ram 7

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B.Tech. 3rd Semester (Civil Engg.) G-Scheme

Examination, November-2023

ECONOMICS FOR ENGINEERS

Paper–HSMC-01-G

Time allowed : 3 hours] *[Maximum marks : 75*

Note : *Attempt **five** questions in all, selecting **one** question from each unit. **Question no. 1 is compulsory**. All questions carries equal marks.*

1. Write short notes in 40-50 words : 6×2.5=15

(i) Law of Demand

(ii) Factors of Production

(iii) Types of Costs

(iv) Features of Monopoly Market

(v) Supply

(vi) Merits of Privatization

Unit-I

2. What do you mean by Demand ? Explain law of demand in detail. 15

3. Define Economics. What is the most acceptable Definition of Economics in your point of view ? 15

Unit-II

4. Explain the following : 3×5=15
   (a) Opportuniy cost
   (b) Marginal cost
   (c) Total cost

5. Define Production. Explain in detail the law of variable proportions. 15

Unit-III

6. What is Perfect Competition Market ? Explain various features of perfect competition market . 15

7. Define Supply. Explain role of demand and supply in price determination. 15

Unit-IV

8. What do you mean by Privatization ? Explain its merits and demerits. 15

9. Write a detailed note on Globalisation of Indian economy. Also explain its merits and demerits. 15

B.Tech. (Mechanical Engg.) 5th Semester

(G-Scheme) Examination, November-2023

COMPUTER AIDED DESIGN & MFG.

Paper-PCC-ME-301-G

Time allowed : 3 hours] *[Maximum marks : 75*

Note : *Attempt **five** questions in all selecting **one** question from each unit. **Question no. 1 is compulsory**. All questions carry equal marks.*

1. Explain the following : 6×2.5=15

   (a) Define CAD.

   (b) Name the component of design process.

   (c) Name the basic steps to perform Additive Manufacturing.

   (d) What is ruled surface ?

   (e) What do you mean by local coordinate system ?

   (f) What is FMS ?

Unit–I

2. (a) Explain the computer application in design process. 8

   (b) Give the importance and necessity of CAD. 7

3. Explain the basic steps used to perform the additive manufacturing. 15

Unit–II

4. For the points $P_1(1,1)$, $P_2(3,1)$, $P_3(4,2)$, $P_4(2,3)$ that define a 2-D polygon, develop a single concatenated transformation matrix that : 15

   (a) Reflects about line x=0.

   (b) Translate by-1 in both x and y direction.

   (c) Rotates about z-axis by 180°.

   Using this matrix, determine the new coordinates.

5. Explain the following :

   (a) Bezier Surface 8

   (b) Boundary representation 7

Unit–III

6. (a) Explain the procedure for finite element analysis. 8

   (b) Explain the different types of forces in finite element structural analysis problem. 7

7. Give the difference between matching and additive manufacturing and also explain the powder bed fusion processes. 15

Unit–IV

8. What are the various types of FMS layouts ? Discuss them schematically. 15

9. (a) Explain the types of CAPP. 7

   (b) Explain the need for CAPP and also explain the benefits of CAPP. 8

B. Tech. (ME) 5th Semester (G-Scheme)

Examination, November-2023

SOLID MECHANICS

Paper-PCC-ME-303-G

Time allowed : 3 hours] *[Maximum marks : 75*

Note : *Attempt any **five** questions in all, selecting **one** from each unit. **Question no. 1 is compulsory**. All questions carry equal marks.*

1. Explain the following : 6×2.5=15

(a) Proof Resilience

(b) Maxwell's theorem

(c) Ellipse of inertia

(d) Concentric spring

(e) Neutral axis

(f) Radial and hoop stress

Unit-I

2. Derive the expression for strain energy store in a body when load is applied : 15

(a) Gradually

(b) Suddenly

(c) Impact

3. Explain the various theories of elastic failures with their graphical representation. 15

Unit-II

4. Define shear center. Derive expression of shear center for an I section. 15

5. A leaf spring is to be made of seven plates 6.5 cm wide and 6.3 cm thick find out length of spring so that it may carry a central load of 2.75 kN. The stress being limited to 160 MPa. Also find out deflection at center of the spring. E=210 GPa. 15

Unit-III

6. Derive the expression for Lame's equation for thick walled cylindrical shell. 15

7. A steel disc of uniform thickness and of diameter 90 mm is rotating about its axis at 3000 rpm. Determine the radial and hoop stresses at the center and outer radius. Density of the material is 7800 kg/m^3 and Poisson's ratio 0.3. 15

Unit-IV

8. What is difference in stresses in bars of initial large radius of curvature and bar of initial small radius of curvature ? Explain in detail. 15

9. A curved bar of rectangular section, initially unstressed is subjected to bending moment of 1500 Nm. which lead to straighten the bar. The section is 4cm wide by 5cm deep in plane of bending and the mean radius of curvature is 10 cm. Find out the position of neutral axis and magnitude of greatest bending stress. 15

B.Tech (ME) 5th Semester (G-Scheme)

Examination, November-2023

MANUFACTURING TECHNOLOGY-I

Paper-PCC-ME-305-G

Time allowed : 3 hours] *[Maximum marks : 75*

Note : *Attempt **five** questions in all, selecting **one** question from each unit. **Question no. 1 is compulsory**. All questions carry equal marks.*

1. (a) Define shear plane angle. 6×2.5=15

(b) Thermit welding principle

(c) Welding defects

(d) Gating system

(e) Locating and clamping device with examples

(f) Orthogonal and oblique cutting

Unit-I

2. Explain the mechanism of chip formation. Also explain continuous chips with built-up edge. 15

3. Explain Merchant cutting force circle and shear angle relationship in orthogonal cutting. 15

Unit-II

4. Define jigs and fixtures. Explain in detail about various types of jigs and fixtures with their neat sketch. 15

5. Write short notes on : 5+5+5=15

   (a) Screw gauge

   (b) Auto-collimator

   (c) Factor influencing surface finish

Unit-III

6. With the help of neat sketch explain the working principle of Turret lathe and Capstan lathe. 15

7. (a) Discuss the variouss and casting defects and their remedies in details.

   (b) Discuss about the construction and working of cupola furnace. 8+7=15

Unit-IV

8. Explain the working principle of solid state welding with neat sketch and its advantages over other types of welding process. 15

9. Write short notes on : 5+5+5=15

   (a) Rolling process and its working principle

   (b) Extrusion and its types

   (c) Wire drawing

B. Tech. (ME) 5th Semester (G-Scheme)

Examination, November-2023

KINEMATICS OF MACHINE

Paper-PCC-ME-307-G

Time allowed : 3 hours] *[Maximum marks : 75*

Note : *Attempt any **five** questions in all, selecting **one** question from each unit. **Question no. 1 is compulsory**. All questions carry equal marks.*

1. Explain the following : 6×2.5=15

(a) Constrained motion with suitable examples

(b) Coriolis component of acceleration

(c) Law of gearing

(d) Grashof's law

(e) Crowning of pulley

(f) Friction circle

Unit-I

2. Sketch a pantograph, explain its working, and show that it can be used to reproduce to an enlarged scale a given drawing. 15

3. In a slider-crank mechanism, the lengths of the crank and the connecting rod are 200mm and 800mm respectively. Locate all the I-centres of the mechanism for the position of the crank when it has turned 30° from the inner dead Centre. Also, find the velocity of the slider and the angular velocity of the connecting rod if the crank rotates at 40 rad/s. 15

Unit-II

4. Draw the profile of a cam with oscillating roller follower for the following motion : 15

   (a) Follower to move outwards through an angular displacement of 20° during 120° of cam rotation.

   (b) Follower to dwell for 50° of cam rotation.

   (c) Follower to return to its initial position in 90° of cam rotation with uniform acceleration and retardation.

   (d) Follower to dwell for the remaining period of cam rotation.

   The distance between the pivot centre and the roller centre is 130 mm and the distance between the pivot centre and cam axis is 150 mm. The minimum radius of the cam is 80 mm and the diameter of the roller is 50 mm.

5. Derive an expression for the minimum number of teeth required on pinions to avoid interference. 15

Unit-III

6. In sun and planet gear train, the sun gear wheel having 60 teeth is fixed to the frame. Determine the number of teeth on the planet and the annulus wheels if the annulus rotates 130 times and the arm 100 times both in the same direction. 15

7. Describe the method for designing a four-bar mechanism as a function generation. 15

Unit-IV

8. Describe force analysis of a sliding body resting on a horizontal plane. 15

9. Write a short note on : 3×5=15

   (a) Types of belts

   (b) Cone pulleys

   (c) Effect of slip on velocity ratio

B.Tech (ME) 5th Semester(G-Scheme)

Examination, November-2023

FLUID MACHINES

Paper-PCC-ME-309-G

Time allowed : 3 hours] *[Maximum marks : 75*

Note : *Attempt **five** questions in all selecting **one** question from each unit. **Question no. 1 is compulsory**. All questions carry equal marks.*

1. (a) State impulse - momentum principle.

(b) What difference between impulse & reaction turbine ?

(c) What is priming ? Why it is necessary ?

(d) What is NPSH and draw its expression ?

(e) Hydraulic intensifier

(f) Purposes of Draft tube $6 \times 2.5 = 15$

Unit-I

2. (a) Derive an expression for force exerted by a jet of water on an inclined fixed plate in the direction of the jet.

(b) A nozzle of 50mm diameter deliver a stream of water at 20m/s perpendicular to the plate that moves away from the jet at 5m/s. Find the force on plate, work done and efficiency of jet. 5+10=15

3. (a) Derive an expression for efficiency and maximum efficiency of Pelton turbine.

(b) A Pelton wheel is required to develop 6MW power when working under a head of 300m. It rotates at a speed of 600rpm. If jet ratio is 10 and overall efficiency is 85%, then determine. diameter of wheel, quantity of water required and number of jets. 5+10=15

Unit-II

4. Explain the component parts, construction and operation of modern Francis turbine with detailed sketch. 15

5. In a tidal power plant, bulb turbine (which is basically an axial flow turbine) operates a 5MW generator at 150 rpm, under a head of 5.5m the generator efficiency is 93% and overall efficiency of turbine is 88%. The

tip diameter of runner is 4.5 m and hub diameter is 2m. Assuming hydraulic efficiency of 94% and no exit whirl, determine the runner vane angles at inlet and exit at the mean diameter of the vanes. 15

Unit-III

6. Derive an expression for minimum speed required for starting a contrifugal pump. Define the term specific speed of a centrifugal pump and deduce an expression for it in terms of the Head H, Discharge Q, and the Speed N. 15

7. The pressure difference Δp in a pipe of diameter D and length L due to turbulent flow depends on the velocity V, viscosity μ, density ρ and roughness k. Using Buckingham's π-theorem, obtain an expression for Δp. 15

Unit-IV

8. Write an expression for discharge, work done and power required to drive a double acting reciprocating pump. Also explain the effect of acceleration on suction and discharge pipes in case of reciprocating pump. 15

9. Write short notes on : 5+5+5=15

(a) Torque converter

(b) Fluid coupling

(c) Hydraulic accumulator