

VINAYAKA MISSIONS RESEARCH FOUNDATION**(Deemed to be University)****B.E. (PART TIME) DEGREE EXAMINATIONS - FEB-2022****COMMON TO CIVIL AND MECH****Third Semester****NUMERICAL METHODS**

(Candidates admitted under 2017 Regulations-CBCS)

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions**Part-A (10 x 2 =20 Marks)**

- 1 Mention the numerical methods to find the eigen values and eigen vectors.
- 2 Find the first approximation to the root near $x=0$ of $x^3 + 3x - 1 = 0$ by Newton's method.
- 3 State Lagrange's interpolation formula.
- 4 Say true or false. Newton's interpolation formulae are not suited to estimate the value of a function near the middle of a table.
- 5 Using Trapezoidal rule evaluate $\int_0^{\pi} \sin x dx$ by dividing the range into 6 equal parts.
- 6 In order to evaluate by Simpson's (1/3) rule as well as by Simpson's (3/8) rule, what is the restriction on the number of intervals?
- 7 Write down Adam-Bashforth predictor formula
- 8 Write the merits and demerits of Taylor series method.
- 9 What is the purpose of Liebmann's process?
- 10 Write the Crank Nicholson difference scheme to solve $u_{xx} - au_t = 0$ with $u(0,t) = T_0$, $u(l,t) = T_1$ and the initial condition as $u(x, 0) = f(x)$.

PART-B (5 x 16 = 80)

- 11 a. Using Newton's iterative method, find the root between 0 and 1 of $x^3 = 6x - 4$ correct to two decimal places.

OR

- b. Solve the system of equations, using the Gauss-Elimination method.

$$28x + 4y - z = 32$$

$$x + 3y + 10z = 24$$

$$2x + 17y + 4z = 35$$

(P.T.O)

- 12 a. Using Newton's backward interpolation formula, find the polynomial $f(x)$ satisfying the following data. Hence evaluate at $x = 9$

X	4	6	8	10
f(x)	1	3	8	16

OR

- b. From the following table, using Stirling's formula estimate the value of $\tan 16^\circ$

x:	0°	5°	10°	15°	20°	25°	30°
tan x:	0.0	0.0875	0.1763	0.2679	0.3640	0.4663	0.5774

- 13 a. Compute the value of the definite integral $\int_4^{52} \log_e x \, dx$ using (i) Trapezoidal rule. (ii) Simpson's 1/3 rule. (iii) Simpson's 3/8 rule by dividing the range into 6 equal parts.

OR

b.

(i) Evaluate $\int_{-1}^1 (1 + x + x^2) \, dx$ by Gaussian three point formula

(ii) By taking 8 intervals, evaluate $\int_0^2 x e^x \, dx$, using Trapezoidal rule.

- 14 a. Solve $y' = 1 - y, y(0) = 0$ by modified Euler's method and tabulate the solutions at $x = 0.1$ and 0.2 .

OR

b.

Given $\frac{dy}{dx} = x^2(1 + y), y(1) = 1, y(1.1) = 1.233, y(1.2) = 1.548, y(1.3) = 1.979$, evaluate $y(1.4)$ by Adams-Bashforth method.

15 a.

Solve $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ in $0 < x < 5, t \geq 0$ given that $u(x,0) = 20, u(0,t) = 0, u(5,t) = 100$.

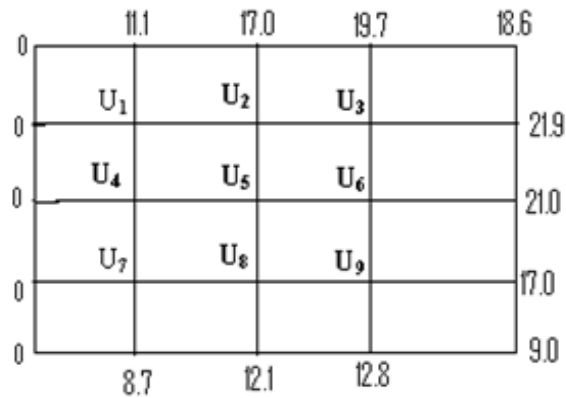
Compute u at one time step, with $h = \Delta x = 1$ by Crank – Nicholson method

OR

b.

Solve $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ at the nine mesh points of the square given the

Values of u at the boundary as shown.



Sl.No. 4005 D

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
B.E. (PART TIME) DEGREE EXAMINATIONS - FEB-2022
MECHANICAL ENGINEERING
Seventh Semester
ELECTIVE - TOTAL QUALITY MANAGEMENT
(Candidates admitted under 2017 Regulations-CBCS)

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions
Part-A (10 x 2 =20 Marks)

- 1 Explain and expand the term “TQM”.
- 2 Mention any four tangible benefits of TQM.
- 3 Give a note on customer retention.
- 4 Expand and explain the term “PDSA”.
- 5 Differentiate between “data” and “information”.
- 6 Differentiate between process capability and process capability index.
- 7 Mention the importance of TPM.
- 8 Explain the term reliability.
- 9 Give an example of standard quality management system.
- 10 Two party quality system – Explain

PART-B (5 x 16 = 80)

- 11 a. Enlighten the habits of successful people according to Stephen Covey.
OR
b. Describe the process of strategic planning and state its importance.
- 12 a. Describe the Juran Trilogy in detail with diagram.
OR
b. Explain the different ways to recognize people.
- 13 a. Discuss the importance/necessity of sampling plan.
OR
b. Write a detailed note on measures of central tendency and dispersion.
- 14 a. Discuss in detail the quality function development with suitable diagram.
OR
b. Explain the different types of maintenance techniques in detail.
- 15 a. Explain the various stages of quality auditing.
OR
b. Describe the purpose of ISO 9000 quality system. What are the benefits of ISO certification?

VINAYAKA MISSIONS RESEARCH FOUNDATION**(Deemed to be University)****B.E. (PART TIME) DEGREE EXAMINATIONS - FEB-2022****MECHANICAL ENGINEERING****Fifth Semester****DESIGN OF TRANSMISSION SYSTEMS****(Candidates admitted under 2017 Regulations-CBCS)**

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions**Part-A (10 x 2 =20 Marks)**

- 1 Write any four wire rope applications.
- 2 What is the significance of centre distance in belt drive?
- 3 What are the advantages of toothed gears over the other types of transmission systems?
- 4 What is interchangeability of gears?
- 5 When do we use skew gears or spiral gears?
- 6 Why the crossed helical gear is not used for power transmission?
- 7 Define progression ratio.
- 8 Name the types of speed reducers.
- 9 Differentiate a brake and a dynamometer.
- 10 In Cone clutches, semi-cone angle should be greater than 12° why?

PART-B (5 x 16 = 80)

- 11 a. Design a V- belt drive to the following specifications:

Power to be transmitted = 7.5 KW

Speed of driving wheel = 1440 r.p.m.

Speed of driven wheel = 400 r.p.m.

Diameter of driving wheel = 300 mm.

Centre distance = 1000mm.

Service = 16 hours/ day

OR

- b. Design a wire for an elevator in a building 60 metres high and for a total load of 20 KN. The speed of the elevator is 4 m/sec and the full speed is reached in 10 seconds
- 12 a. Design a spur gear device for transmitting 50 KW from motor running at 1440 r.p.m. to a machine running 360 r.p.m. Use C45 steel for the gears and specify the heat treatment, if necessary. Design the gears

OR

- b. A pair of helical gears subjected to moderate shock loading is to transmit 30 KW at 1500 r.p.m. of the pinion. The speed reduction ratio is 4 and the helix angle is 20° . The service is continuous and the teeth are 20° FD in the normal plane. For the gear life of 10,000 hours, design the gear drive

(P.T.O)

- 13 a. Design a bevel drive to transmit a power of 9KW at 20 r.p.m. of the pinion. Gear ratio is be 3. Material to be used is C20. $\sigma_u = 500 \text{ N/mm}^2$; $\sigma_y = 260 \text{ N/mm}^2$; Assume the expected gear life as 10000 hours

OR

- b. Design a worm gear drive to transmit 8 KW at 720 r.p.m. The desired velocity ratio is 36:1
- 14 a. Draw the kinematic arrangement and the speed diagram of the headstock gear box of a turret lathe having arrangement for 9 spindle speeds ranging from 31.5 r.p.m. to 1050 r.p.m. Calculate the number of teeth on each gear if the minimum number of teeth on a gear is 25

OR

- b. A machine tool gearbox is to provide 12 spindle speed ranging from 20 to 400 r.p.m. Draw the kinematic arrangement and the ray diagram
- 15 a. A car engine has its rated output of 12 KW. The maximum torque developed is 100 N-m. The clutch used is of single plate having two active surfaces. The axial pressure is not to exceed 82 KN/m². The external diameter of the friction plate is 1.25 times the internal diameter. Determine the dimensions of the friction plate and the axial force exerted by the springs. Coefficient of friction =0.3.

OR

- b. A leather faced conical friction clutch has a cone angle of 30°. The intensity of pressure is not to exceed $6 \times 10^4 \text{ N/mm}^2$. And the breadth of the conical surface is not to be grater than 1/3 of the mean radius if $\mu = 0.2$ and the clutch transmits 37 KW at 2000 rpm. Find the dimensions of contact surface

Sl.No. 4012 D

VINAYAKA MISSIONS RESEARCH FOUNDATION

(Deemed to be University)

B.E. (PART TIME) DEGREE EXAMINATIONS - FEB-2022

MECHANICAL ENGINEERING

Seventh Semester

ELECTIVE - UNCONVENTIONAL MANUFACTURING PROCESSES

(Candidates admitted under 2017 Regulations-CBCS)

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

- 1 Why UMP is needed?
- 2 List any four disadvantages of conventional machining methods.
- 3 Name any four parameters considered in AJM.
- 4 State Magnetostriction effect.
- 5 Define the Principle of EDM.
- 6 How ionization takes place in EDM process?
- 7 What are the factors that influence oxidation in ECM?
- 8 How the current densities affect the MRR?
- 9 What is the function of magnetic lens used in EBM?
- 10 What are the main elements of LBM equipment?

PART-B (5 x 16 = 80)

- 11 a. Explain the process economy of various unconventional machining processes.

OR

- b. Discuss the energies employed in the EDM, ECM, USM and LBM processes.

- 12 a. Discuss with neat diagram various feed mechanism used in USM.

OR

- b. Explain the construction and working principle of AWJM.

- 13 a. Explain the functions of dielectric fluid used in EDM.

OR

- b. Discuss the working of flushing system in EDM with neat diagram.

- 14 a. Discuss the advantages, disadvantages and applications of ECG.

OR

- b. Elaborately discuss about metal removal rate and surface finish in ECH.

- 15 a. Elaborately discuss about process parameters in EBM.

OR

- b. Compare the characteristics of EBM, LBM and PAM.

VINAYAKA MISSIONS RESEARCH FOUNDATION**(Deemed to be University)****B.E. (PART TIME) DEGREE EXAMINATIONS - FEB-2022****MECHANICAL ENGINEERING****Fifth Semester****HEAT AND MASS TRANSFER****(Candidates admitted under 2017 Regulations-CBCS)**

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions**Part-A (10 x 2 =20 Marks)**

- 1 Define convection.
- 2 Write down steady state, two dimensional conduction equations without heat generation.
- 3 Define fin effectiveness.
- 4 What are Heisler charts?
- 5 Define Prandtl number and what is its physical significance?
- 6 What is meant by condensation?
- 7 State Stefan – Boltzmann law.
- 8 What is meant by effectiveness of a heat exchanger?
- 9 Give the examples of mass transfer
- 10 Define mass density.

PART-B (5 x 16 = 80)

- 11 a. A wire of 6mm diameter with 2mm thick insulation ($K=0.11\text{W/mK}$) and the convective heat transfer co-efficient between the insulating surface and air is $25\text{W/m}^2\text{K}$, find the critical thickness of insulation. And also find the percentage of change in heat transfer rate if critical radius is used.

OR

- b. The wall of furnace is made up 250mm fire clay of thermal conductivity 1.05W/mK , 120mm thick of insulation brick of conductivity 0.15W/mK , and 200mm thick red brick of conductivity 0.85W/mK . The inner and outer surface temperatures of wall are 850°C and 65°C respectively. Calculate the temperatures at the contact surfaces.
- 12 a. A carbon steel ($K=55\text{W/mK}$) 90mm long rod with cross sectional area $5 \times 10^{-3}\text{m}^2$ and perimeter 0.69m is attached to a plane wall which is maintained at a temperature of 400°C . The surrounding environment is at 50°C and heat transfer coefficient is $90\text{W/m}^2\text{K}$. Calculate the heat dissipated by the rod.

OR

- b. A large steel plate 5cm thick is initially at a uniform temperature of 400°C . It is suddenly exposed on both sides to a surrounding at 60°C with convective heat transfer co-efficient of $285\text{W/m}^2\text{K}$. Calculate the centre line temperature and the temperature inside the plate 1.25cm from the mid plane after 3 minutes. Take K for steel= 42.5W/mK , $\alpha=0.043\text{m}^2/\text{hr}$.

(P.T.O)

- 13 a. A vertical tube of 65mm outside diameter and 1.5m length is exposed to steam at atmospheric pressure. The outer surface of the tube is maintained at a temperature of 60°C by circulating cold water through the tube. Calculate the following
1. The rate of heat transfer to the coolant.
 2. The rate of condensation of steam

OR

- b. 250 kg/hr of air is cooled from 100°C to 30°C by the following through a 3.5cm inner diameter pipe coil bent in to a helix of 0.6m diameters. Calculate the value of air side heat transfer coefficient if the properties of air at 65°C are $K = 0.0298 \text{ W/mK}$, $\mu = 0.003 \text{ kg/hr-m}$, $Pr = 0.7$, $\rho = 1.004 \text{ kg/m}^3$.
- 14 a. A furnace wall emits radiation at 2000K. Treating it as black body radiation, calculate (i) monochromatic radiant flux density at $1 \mu\text{m}$ wavelength. (ii) Wavelength at which emission is maximum and the corresponding emissive power. (iii) Total emissive power.

OR

- b. In a counter flow double pipe heat exchanger, oil is cooled from 85°C to 55°C by water entering at 25°C. The mass flow rate of oil is 9,800 kg/h and specific heat of oil is 2000 J/kgK. The mass flow rate of water is 8,000kg/h and specific heat of water is 4180 J/kg k. determine the heat exchanger area and heat transfer rate for overall heat transfer co-efficient of 280W/m²K
- 15 a. CO₂ & air experience equimolar counter diffusion in a circular tube whose length & diameter are 1 m & 50 mm. The system is at a total pressure of 1atm & a temperature of 25°C. The ends of the tube are connected to large chambers in which the species concentrations are maintained at fixed values. Partial pressure of CO₂ at one end is 190 mm of Hg while at the other end is 95 mm Hg. Estimate the mass transfer rate of CO₂ & air through the tube.

OR

- b. Estimate the rate of diffusion of water vapour from a pool of water at the bottom of a well which is 6.2 m deep & 2.2 m diameter to dry ambient air over the top of the well. The entire system may be assumed at 30°C & one atmospheric pressure. The diffusion co-efficient is $0.24 \times 10^{-4} \text{ m}^2/\text{s}$

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
B.E. (PART TIME) DEGREE EXAMINATIONS - FEB-2022
MECHANICAL ENGINEERING
Seventh Semester
ELECTIVE - INDUSTRIAL ENGINEERING
(Candidates admitted under 2017 Regulations-CBCS)

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions
Part-A (10 x 2 =20 Marks)

- 1 Draw any four method study symbol.
- 2 List the objectives of work study.
- 3 Give any two techniques used to improve plant layout.
- 4 List out the disadvantage of the product layout.
- 5 What are the basic elements of forecasting?
- 6 What is meant by sequencing?
- 7 What are the types of inventory models?
- 8 What is the purpose of control charts?
- 9 What do you understand by margin of safety?
- 10 Give the types of co-operative societies.

PART-B (5 x 16 = 80)

- 11 a. List out the various steps in conducting a stop watch time study. Explain.

OR

- b. Write notes on the following
- i. Design of man machine systems and
 - ii. Design of working environment

- 12 a. Explain the various principles of material handling.

OR

- b. Why the plant site is selecting in urban (city) area? Explain with suitable example and also give the advantages and disadvantages.

- 13 a. Explain the scheduling procedure with suitable example. Give the centralized advantages, disadvantages and applications.

OR

- b. Explain the Dispatching procedure, and also explain the centralized and decentralized dispatching. Give the advantages, disadvantages and applications.

- 14 a. Explain the different phases of bench marking? How are gaps identified and used in the process of bench marking?

OR

- b. Writes shorts notes on
 - a. Importance of 'R' chart
 - b. Comparison between attribute charts and variable charts.
 - c. Basis for control limits on 'C' chart.

- 15 a. Explain the concepts in break even analysis with examples. What are the assumptions involved?

OR

- b. Define Labour Unions. Explain the functions and objectives of Labour Unions.

Sl.No. 4047 D

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
B.E. (PART TIME) DEGREE EXAMINATIONS -FEB- 2022
MECHANICAL ENGINEERING
Seventh Semester
ELECTIVE - POWER PLANT ENGINEERING
(Candidates admitted under 2017 Regulations-CBCS)

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions
Part-A (10 x 2 =20 Marks)

- 1 What is the main purpose of the reservoir?
- 2 List out any four Hydropower plants in India.
- 3 What are the two types of super heater?
- 4 What are the methods to improve thermal efficiency of single stage gas turbine?
- 5 What are the parts of a nuclear reactor?
- 6 What are the components of tidal power plant?
- 7 What is meant by load curve?
- 8 What is the significance of load curve in power generator?
- 9 What is use of fuel cell?
- 10 What are the two types of hydrogen fuel cells?

PART-B (5 x 16 = 80)

- 11 a. Briefly explain non renewable sources of energy.

OR

- b. What do you understand by run-off river power plant? How its performance is increased by introducing a pondage in the plant?

- 12 a. Explain the various ash handling systems with a neat sketch.

OR

- b. Briefly explain the analysis of pollution from thermal power plant.

- 13 a. Explain pressurized water reactor with a neat sketch.

OR

- b. Explain various nuclear power stations in India.

- 14 a.

The peak load on the thermal plant is 75MW. The loads having maximum demands of 35MW, 20MW, 15MW and 18MW are connected to the power plant. The capacity of the power plant is 90MW and the annual load factor is 0.53. Calculate (a) The average load on the power plant (b) The energy supplied per year (c) The demand factor (d) The diversity factor

OR

- b. The output of a generating station is 12 MW and annual load factor is 0.58. The annual cost of a fuel for running the plant is Rs 1.2×10^5 and the annual wages and taxes are Rs 1×10^5 . The capital cost of the plant is Rs 70×10^5 and interest and depreciation charges are made 10% of capital cost per annum. Determine the cost of generation.

- 15 a. Explain the principle of thermionic power generation.

OR

- b. Explain how the waste heat of gas turbines and diesel engines can be utilized for thermoelectric power generation

VINAYAKA MISSIONS RESEARCH FOUNDATION**(Deemed to be University)****B.E. (PART TIME) DEGREE EXAMINATIONS - FEB-2022****MECHANICAL ENGINEERING****Fifth Semester****ELECTIVE – UNCONVENTIONAL MANUFACTURING PROCESSES**

(Candidates admitted under 2017 Regulations-CBCS)

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions**Part-A (10 x 2 =20 Marks)**

- 1 In which of the unconventional machining process spark erosion is occurred.
- 2 Define EDM.
- 3 State principle of AWJM.
- 4 Name the different types of transducer is use in USM.
- 5 List any four dielectric fluid used in EDM.
- 6 List the applications of EDM.
- 7 State Faraday's First law of electrolysis.
- 8 Write the applications of CHM.
- 9 What are the main elements of EBM equipment?
- 10 What is solid state LASER?

PART-B (5 x 16 = 80)

- 11 a. Explain the process economy of various unconventional machining processes.
OR
b. Explain the parameters to be considered for the selection of unconventional machining processes.
- 12 a. Discuss with neat diagram various feed mechanism used in USM.
OR
b. Explain the construction and working principle of AWJM.
- 13 a. Explain the functions of dielectric fluid used in EDM.
OR
b. Explain any three spark generating circuits in EDM.
- 14 a. Discuss the advantages, disadvantages and applications of ECM.
OR
b. Elaborately discuss about metal removal rate and surface finish in ECM.
- 15 a. Elaborately discuss about process parameters in EBM.
OR
b. Explain the working of two types of plasma torches

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
B.E. (PART TIME) DEGREE EXAMINATIONS -FEB-2022
MECHANICAL ENGINEERING
Seventh Semester
ELECTIVE - LEAN MANUFACTURING SYSTEMS
(Candidates admitted under 2017 Regulations-CBCS)

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions
Part-A (10 x 2 =20 Marks)

- 1 State any two limitations of lean manufacturing.
- 2 Write any two advantages of mass production system.
- 3 What are the 5s?
- 4 List out the various types of maintenance.
- 5 What is meant by JIT?
- 6 State the limitations of VSM.
- 7 Name the basic elements of Jidoka.
- 8 What is meant by variation reduction?
- 9 What are the different levels of kaizen?
- 10 Mention the benefits of hoshin planning.

PART-B (5 x 16 = 80)

- 11 a. What is meant by system thinking? Explain its different elements.
OR
b. Explain the advantages and disadvantages of Mass production system. Also explain its socioeconomic impacts.
- 12 a. What is meant by cell layout? Explain the various types of layouts with neat diagram.
OR
b. Draw Work Combination Chart for any process and explain it in detail.
- 13 a. Explain the merits and limitations of JIT over the traditional manufacturing system.
OR
b. Explain CSM and FSM with suitable example.
- 14 a. What is meant by automation? Explain with examples.
OR
b. Explain the implications and advantages of implementing Poka Yoke system.
- 15 a. Explain the advantages and limitations in implementing Kaizen.
OR
b. Explain how deployment of objectives is achieved in Hoshin planning system.

VINAYAKA MISSIONS RESEARCH FOUNDATION

(Deemed to be University)

B.E. (PART TIME) DEGREE EXAMINATIONS - FEB - 2022

MECHANICAL ENGINEERING

Sixth Semester

AUTOMOBILE ENGINEERING

(Candidates admitted under 2017 Regulations-CBCS)

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

- 1 Why is the frame narrow at front?
- 2 What are the driving advantages of a Four Wheel Drive?
- 3 What is carburetion?
- 4 What is an Electronic Ignition System?
- 5 List the different friction lining materials used in clutches.
- 6 What is the primary function of a planetary gearset in automatic transmission?
- 7 What is the effect of shot peening on leaves of leaf spring?
- 8 What are the requirements of an automobile brakes?
- 9 Write down the components of LPG equipment.
- 10 What are the main components of electric and hybrid vehicles?

PART-B (5 x 16 = 80)

- 11 a. Describe the various types of chassis frames used in vehicles.

OR

- b. Discuss the various functions of piston in an automotive cylinder. Discuss different types of pistons.

- 12 a. Explain an Electronic Fuel-injection system with air-flow meter with necessary sketch.

OR

- b. Explain Electronic Control of Diesel Injection with a neat diagram.

- 13 a. Describe, with the help of a neat and labeled sketch, the construction and operation of a synchromesh gearbox.

OR

- b. Write descriptive notes on
a). Constant velocity Universal Joints and b). Slip Joint.

- 14 a. Explain the necessity of power steering in an automobile. Draw any power steering system and explain its working.

OR

- b. How do hydraulic brake systems sometimes have to be bled? Describe the two most common methods of bleeding hydraulic brakes.

(P.T.O)

15 a. Explain the production process of hydrogen fuel and explain the performance characteristics of hydrogen fuel.

OR

b. Detail the applicability of alcohol based fuels as an alternative fuel in CI engine. What are its advantages and disadvantages?

Sl.No. 4052 D

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
B.E. (PART TIME) DEGREE EXAMINATIONS - FEB - 2022
MECHANICAL ENGINEERING
Seventh Semester
HYDRAULICS AND PNEUMATIC SYSTEMS
(Candidates admitted under 2017 Regulations-CBCS)

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions
Part-A (10 x 2 =20 Marks)

- 1 What are the types of fluid power system?
- 2 What are the four primary functions of hydraulic fluid?
- 3 Why gear pump cannot be used as variable displacement pump?
- 4 What is the purpose of quick exhaust valve?
- 5 What is meant by a 4/3 DC valve?
- 6 What is cylinder cushion? What is its purpose?
- 7 What is meant by intensifier?
- 8 What is meant by hydraulic power pack?
- 9 What is meant by step counter?
- 10 What is meant by grouping in the case of cascade circuit design?

PART-B (5 x 16 = 80)

- 11 a. Discuss about the various hydraulic fluids.

OR

- b. Describe the various pneumatic symbols used in pneumatic circuit design.

- 12 a. Explain the working of piston pumps and discharge rates (swash plate type).

OR

- b. Describe function of FRL unit.

- 13 a. Explain the flow control valve with a neat sketch and mention the location of the flow control valves in the hydraulic circuits.

OR

- b. Explain the construction and working of double acting cylinder with neat sketch.

- 14 a. Give any two application circuits employing accumulator for different purposes.

OR

- b. Sketch and explain in detail about reciprocating cylinder circuit.

- 15 a. Design a system in which cylinder A is used to clamp the work piece, cylinder B is used for punching and cylinder C removes the work piece from the station using the cascade method. The cylinder sequence is A^+ , B^+ , B^- , A^- , C^+ , C^-

OR

- b. Consider an automatic drilling machine. The complete cycle as follows: cylinder A extends to clamp the work piece, then cylinder B extends to drill a hole and then retracts. Cylinder A then retracts to unclamp the work piece. Design a control circuit applying the step-counter method. The circuit provided the start valve to avoid continuous cycling.

Sl.No. 4053 D

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
B.E. (PART TIME) DEGREE EXAMINATIONS - FEB-2022
MECHANICAL ENGINEERING
First Semester
ENGINEERING MECHANICS

(Candidates admitted under 2012 Regulations-CBCS)

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions
Part-A (10 x 2 =20 Marks)

- 1 State the equations of equilibrium of a co-planner of forces?
- 2 What do you understand from the concept of “Law of dimensional homogeneity”?
- 3 What is moment of the couple?
- 4 Write about unstable equilibrium.
- 5 Define centroid axis.
- 6 What is the mass moment of inertia of a circular cylinder of radius ‘r’ and height ‘h’ about its axis?
- 7 What is normal acceleration?
- 8 Define angular momentum.
- 9 What is meant by general plane motion?
- 10 Write the expression for acceleration in the plane motion.

PART-B (5 x 16 = 80)

- 11 a. i). Discuss on “Laws of Mechanics”
ii). Discuss on vector operations such as addition, subtraction , dot product and cross product with suitable equation.

OR

b. i). The following forces act at a point O.

a. 10 N inclined 20° towards north east

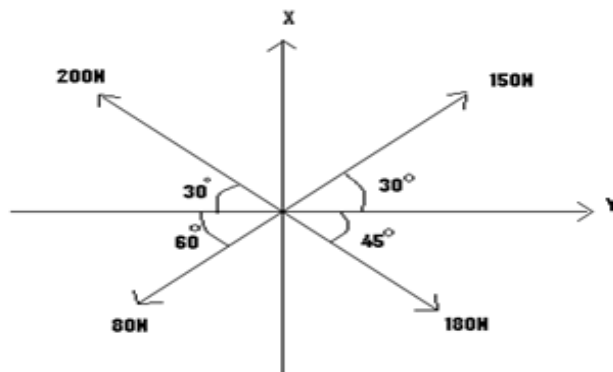
b. 15 N towards north

c. 15 N towards north west and

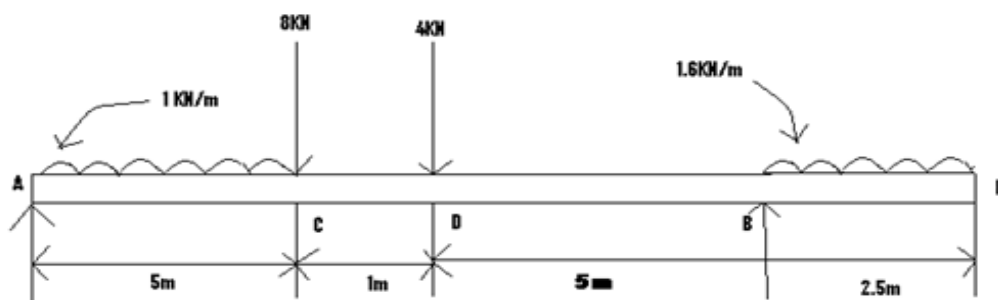
d. 20 N inclined at 30° towards south west

Find the magnitude and the direction of the resultant force.

ii). Determine the resultant of the concurrent force system shown in the fig

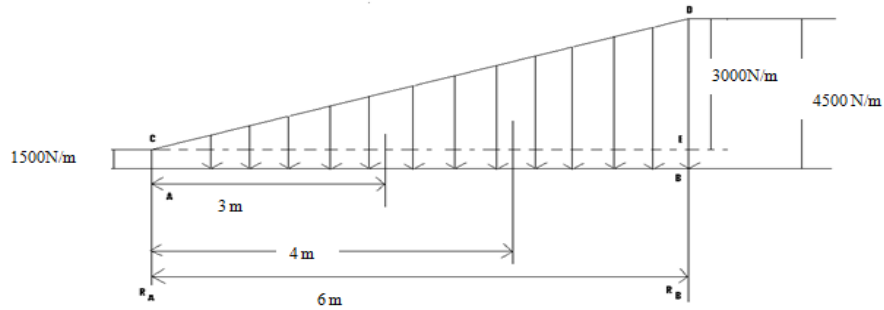


12 a. An overhanging beam carries the load as shown in the fig. Calculate the reaction at the both the ends

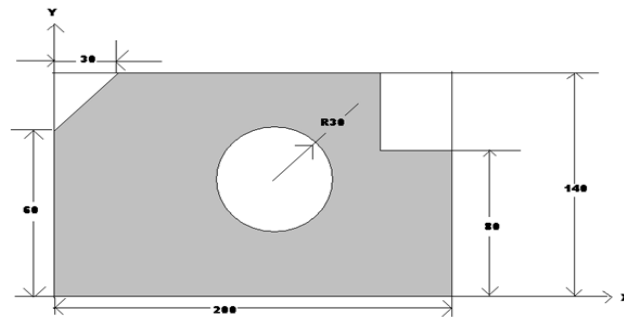


OR

- b. A simply supported beam of length 6 m, carries the uniformly increasing load of 1500 N/m at one end to 4500 N/m at the other end, as shown in the fig. determine the reactions at the supports.



- 13 a. Find the moment of inertia of the shaded area shown in the fig.



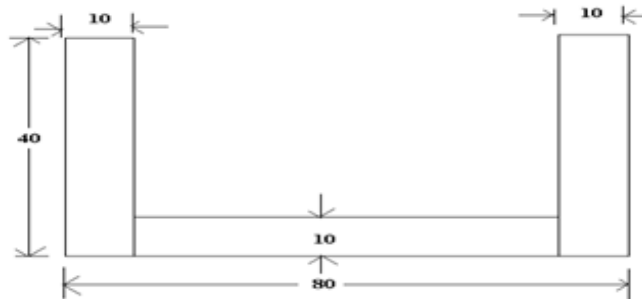
All dimensions are in mm

(P.T.O)

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OR

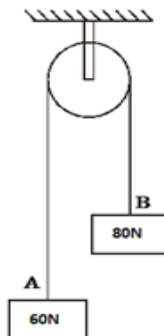
- b. Find the center of gravity and the moment of inertia about its centroidal axes for the channel section shown in the fig



- 14 a. a) A projectile is projected with an initial velocity of 40 m/sec and at angle of 25° with the horizontal ground. Determine
- The time of flight,
 - Maximum height attained by the projectile,
 - Horizontal range of the projectile on the ground.
- b) A projectile is projected at angle of 45° with the horizontal. The horizontal range of particle is 2 km.
- Find
- the velocity of projection,
 - the maximum height attained by the projectile.

OR

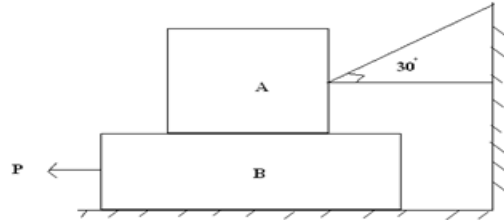
- b. Two blocks A and B of weight 80N and 60N are connected by a string passing over a smooth pulley as shown in figure. Calculate the acceleration of the body and tension in the string. Use energy method.



(P.T.O)

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- 15 a. Two blocks A & B of weights 1 kN and 2 kN respectively are in equilibrium position as shown in fig. If the coefficient of friction between the blocks as well as block B and the floor is 0.3, find the force (P) required to move the block B.



OR

- b. Block A weighing 1000 N rests on a rough inclined plane whose inclination to the horizontal is 45° . It is connected to another block B, weighing 3000 N, which rests on a rough horizontal plane by a weightless rigid bar inclined at an angle of 30° to the horizontal. Find the horizontal force required to be applied to the block B just to move the block A in the upward direction. Assume the angle of friction as 15° at all surfaces where there is sliding.

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VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
B.E. (PART TIME) DEGREE EXAMINATIONS - FEB 2022
MECHANICAL ENGINEERING
Seventh Semester
ELECTIVE - AUTOMOTIVE INFOTRONICS
(Candidates admitted under 2017 Regulations-CBCS)

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions
Part-A (10 x 2 =20 Marks)

- 1 What are the principles aims of an engine developer?
- 2 List out the dash board instruments.
- 3 What are the pollutants emitted by an automobile?
- 4 List the application of air bag.
- 5 What kind of sensing method used in the Distributor mounted timing, speed, trigger sensors?
- 6 What is the usage of " PVdF" material in Piezo-Electric detectors?
- 7 What is the function of IO/M signal in the 8085?
- 8 Explain the purpose of the I/O instructions IN and OUT.
- 9 Define steering gear.
- 10 What is meant by anti-lock brake system?

PART-B (5 x 16 = 80)

- 11 a. Explain about electromagnetic interference.

OR

b. Describe the construction and working of an Overdrive with a neat sketch and list out its advantages.
- 12 a. With a neat sketch, explain the electronically controlled diesel injection system.

OR

b. Explain Artificial Intelligence and also explain how it is used in engine management.
- 13 a. Explain the following:
(a)Exhaust oxygen level sensor, (b) Sensing air mass flow for engine application

OR

b. What is meant by Digital Actuators? Explain any one type of Digital actuator.
- 14 a. With example explain the various addressing modes of 8085.

OR

b. Write a program for subtraction of two 8 bit numbers using 8085 with flowchart.
- 15 a. Explain the working of power steering with neat sketch.

OR

b. List out various types of clutches. Describe the working of any two types of clutches and mention the advantages and disadvantages of those clutches.

VINAYAKA MISSIONS RESEARCH FOUNDATION

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B.E. (PART TIME) DEGREE EXAMINATIONS - FEB - 2022

MECHANICAL ENGINEERING

Seventh Semester

ELECTIVE - INDUSTRIAL ROBOTICS

(Candidates admitted under 2017 Regulations-CBCS)

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

- 1 Write short notes on Robot Anatomy.
- 2 Define the term “wrist yaw”.
- 3 Write down the functions of a controller.
- 4 Write down the advantages of magnetic grippers.
- 5 What is the use of proximity sensors?
- 6 Define the term “Segmentation” in machine vision.
- 7 What is mean by circular interpolation?
- 8 Write short notes on “Paths” and “Frames” in robot programming languages.
- 9 Say few benefits of robot spray coating.
- 10 Write down the two approaches used with vision sensors for arc welding.

PART-B (5 x 16 = 80)

- 11 a. Explain the working principle of jointedarm configuration system robots with reference to the work volume with suitable sketch.

OR

- b. List the advantages and disadvantages of Continuous path control of Industrial Robots.

- 12 a. Explain the working principle of Magnetic grippers.

OR

- b. With neat sketch, explain the working principle of a stepper motor.

- 13 a. With neat sketch, explain in detail about Proximity and range sensors.

OR

- b. Explain the different types of Lighting techniques used in machine vision system.

- 14 a. Explain the manuallead through programming method.

OR

- b. Explain the capabilities and limitations of leadthrough methods.

- 15 a. Explain the role of Robots in CIM.

OR

- b. Discuss in detail about pick and place operations by Industrial Robot.
