Sl.No. 24858 SUBJECT CODE: 34115305/34116301

VINAYAKA MISSIONS RESEARCH FOUNDATION

(Deemed to be University)

B.E.DEGREE EXAMINATIONS- APR/MAY - 2019

COMMON TO AERO, AUTO & MECHANICAL

THIRD SEMESTER

MATHEMATICS FOR MECHANICAL SCIENCES

(Candidates admitted under 2015/2016 Regulations-CBCS)

Time : Three Hours Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

1 Form the partial differential equation by eliminating arbitrary function f from $z = f\left(x^2 + y^2\right)$

2 Obtain the Complete integral of $z = px + qy + p^2 + q^2$

3 Find b_n in the expansion of x^2 as a Fourier series in $(-\pi, \pi)$

4 Find the value of a_n in the cosine series expansion of $f(x)=k$ in $(0,10)$

5 . In the wave equation $\frac{\partial^2 y}{\partial t^2} = a^2 \frac{\partial^2 y}{\partial x^2}$ what does a^2 stand for?

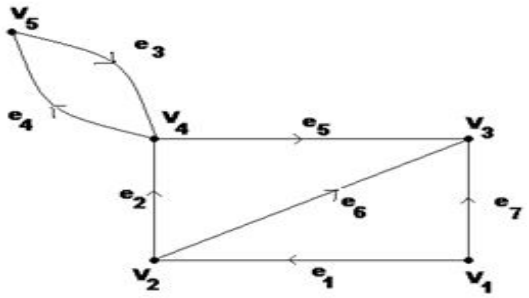
6 In steady state conditions derive the solution of one dimensional heat flow equation

7 Define Mobius transformation

8 Check whether xy^2 can be the real part of an analytic function

9 Define degree sequence of a graph

10 Construct the circuit matrix for the following digraph



p.t.o

PART-B (5 x 16 = 80)

11 a. (i) Solve $z = p^2 + q^2$

(ii) Solve $p^2 + q^2 = x^2 + y^2$

OR

b. (i) Solve $(3z - 4y)\frac{\partial z}{\partial x} + (4x - 2z)\frac{\partial z}{\partial y} = 2y - 3x$

(ii) Solve $\sqrt{p} + \sqrt{q} = 1$

12 a. Express $f(x) = (\pi - x)^2$ as a Fourier series of period 2π in the Interval $0 < x < 2\pi$

OR

b. Obtain the Fourier expansion of $x \sin x$ as a cosine series in $(0, \pi)$

13 a. If a string of length l is initially at rest in its equilibrium position and each of its points is given the velocity $\left(\frac{\partial y}{\partial t}\right)_{t=0} = v_0 \sin^3 \frac{\pi x}{l}$, $0 < x < l$, determine the displacement function $y(x,t)$

OR

b. Find the solution of the equation $\frac{\partial u}{\partial t} = \alpha^2 \frac{\partial^2 u}{\partial x^2}$ that satisfies the conditions

(i) $u(0,t) = 0$

(ii) $u(l,t) = 0$ for $t > 0$

(iii) $u(x,0) = \begin{cases} x, & 0 < x < l/2 \\ (l - x), & l/2 < x < l \end{cases}$

14 a. Find $f(z) = u + iv$ given that $u - 2v = e^x(\cos y - \sin y)$

OR

b. If $u(x, y) = e^x(x\cos y - y \sin y)$ find $f(z) = u + iv$

15 a. Prove that a simple graph with n vertices k components can have $\frac{(n-k)(n-k+1)}{2}$ edges

OR

b. Prove that a connected multi graph has an Euler tour if and only if each of its vertices has an even degree

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Sl.No.24858

Sl.No. 24965 SUBJECT CODE: 34415302/34416301

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
B.E.DEGREE EXAMINATIONS- APR/MAY - 2019
COMMON TO AUTO AND MECH
THIRD SEMESTER
ENGINEERING THERMODYNAMICS

(Candidates admitted under 2015/2016 Regulations-CBCS)

Time : Three Hours Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

1 What is a quasi-static process?

2 Define the term internal energy.

3 State Carnot Theorem.

4 What are the processes involved in Carnot cycle?

5 What is meant by super heated steam?

6 State Gibbs function.

7 State Regnault's law

8 What is meant by real gas?

9 What are secondary fuels? List out some important secondary fuels.

10 What is meant by cloud point?

PART-B (5 x 16 = 80)

11 a. 1.5 kg of certain gas at a pressure of 8 bar and 20ºC occupies the volume of 0.15m³. It expands adiabatically to a pressure of 0.9 bar and volume 0.73 m³. Determine the work done during the process, gas constant, ratio of the specific heats, values of two specific heats, change in internal energy and change in enthalpy.

OR

b. In a steady flow system the working substance flow at a rate of 4 kg/s enters a pressure of 620 kN/m^2 at a velocity of 300 m/s. The internal energy is 2100 kJ/kg. The specific volume 0.37 m^3/kg. It leaves the system at a pressure 130 kN/m^2, a velocity of 150 m/s, internal energy of 1500 kJ/kg and specific volume of 1.2 m^3/kg. During its passage in the system, the substance has a heat transfer loss of 302 kJ/kg to its surroundings. Determine the power of the system. State that it is from (or) to the system.

12 a. A reversible heat engine operating between reservoirs at 900K and 300K drives a reversible refrigerator operating between reservoirs at 300K and 250K. The heat engine receives 1800 kJ heat from 900K reservoir. The net output from the combined engine refrigerator is 360 kJ. Find the heat transferred to the refrigerator and the net heat rejected to the reservoir at 300K?

OR

P.T.O

b. 0.2 kg of air at 1.5 bar and 27^{o}C is compressed to a pressure of 15 bar according to the law $PV^{1.25}$ = C. Determine work done on or by air, heat flow to or from the air, increase or decrease in entropy.

13 a. Steam is contained in a closed vessel of 30 litres capacity at a pressure of 10 bar with dryness fraction 0.95. Calculate its internal energy. Due to loss by radiation, the pressure of steam falls to 7 bar. Calculate the total loss of heat and the final quality of steam.

OR

b. Derive the two Tds equations of an ideal gas.

14 a. A perfect gas of 0.5 kg has a pressure of 300kPa, a temperature of 100°C and a volume of 0.06 m^3. The gas undergoes an irreversible adiabatic process to a final pressure of 400 Pa and final volume of 0.15 m^3, work done on the gas is 50kJ. Find Cp, Cv.

OR

b. A perfect gas of 0.25 kg has a pressure of 298kPa, a temperature of 80°C and a volume of 0.08m^3 The gas undergoes an irreversible adiabatic process to a final pressure of 350kPa and final volume of 0.10 m^3, work done on the gas is 25kJ. Find Cp, Cv.

15 a. Draw the neat sketch of bomb calorimeter and explain the procedure for determining the calorific value of the solid fuel.

OR

b. Explain in detail three types of fuels and oxidizer of solids, liquid and gases.

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Sl.No. 25005 SUBJECT CODE: 34415304/34416305

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
B.E.DEGREE EXAMINATIONS- APR/MAY - 2019
MECHANICAL ENGINEERING
THIRD SEMESTER
MANUFACTURING TECHNOLOGY- I

(Candidates admitted under 2015/2016 Regulations-CBCS)

Time : Three Hours Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

1 State the applications of casting process.

2 State functions of flux in melting metals and alloys.

3 List the metals welded using neutral flame.

4 How is an arc obtained in arc welding?

5 What is tubular extrusion?

6 List the materials of the dies used for drawing operation.

7 What is meant by trimming?

8 Name any five tools used in sheet metal hand operations.

9 Name the natural and synthetic organic materials.

10 Define Bonding of plastics.

PART-B (5 x 16 = 80)

11 a. Explain the CO_2 process of core making. State its advantages, limitations and applications.

OR

b. Enumerate the various casting defects and suggest suitable remedies.

12 a. Describe briefly the working principle of TIG welding. Mention its advantages and applications.

OR

b. Explain the working principle of electro slag welding. Mention its advantages and disadvantages.

13 a. Describe the wire drawing, tube drawing and rod drawing process and state advantages and applications.

OR

b. Explain the latest trends in forging technology.

14 a. Describe various types of bending operations with a neat sketch.

OR

b. Explain the power spinning process with a neat sketch. Give their applications.

15 a. Describe the working principle of Blow moulding.

OR

b. Explain with a neat sketch the working of Ultrasonic welding of plastics.

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Sl.No. 24610 SUBJECT CODE: 34415401/34416405

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
B.E.DEGREE EXAMINATIONS- APR/MAY - 2019
COMMON TO AUTO AND MECT
FOURTH SEMESTER
MANUFACTURING ENGINEERING

(Candidates admitted under 2015/2016 Regulations-CBCS)

Time : Three Hours Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

1 How do you classify various manufacturing processes?
2 Name the various sands that are normally encountered in foundry practice.
3 Define rolling mill.
4 Mention various types of extrusion processes.
5 What are the types of shaping machine?
6 What are the types of planer machine?
7 What is MIG welding?
8 What is the application of welding process?
9 Write down the principle of ECM.
10 Write the typical application of ultrasonic machining?

PART-B (5 x 16 = 80)

11 a. Discuss centrifugal casting process with neat sketches. What are all its merits, demerits and applications?

OR

b. Listing the casting defects explain the causes and remedies with necessary sketches.

12 a. Describe the various types of Extrusion process with neat sketch?

OR

b. Describe Explosive forming process with a neat sketch.

13 a. Draw a neat sketch of lathe and explain its various parts

OR

b. Explain any six operations performed on drilling machines, with neat sketch

14 a. Explain the working principle of TIG welding. With neat sketch?

OR

b. Explain with a neat sketch the principle of brazing and typical Brazed components?

15 a. Explain the working principle of electrochemical discharge grinding and discuss the Process capabilities?

OR

b. Explain ECG with neat sketch

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Sl.No. 24472 SUBJECT CODE: 34415403/34416401

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
B.E.DEGREE EXAMINATIONS- APR/MAY - 2019
COMMON TO MECH AND MECT
FOURTH SEMESTER
DYNAMICS OF MACHINES

(Candidates admitted under 2015& 2016 Regulations-CBCS)

Time : Three Hours Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

1 State D'Alembert's principle.

2 What is the velocity of the piston, when the crank is at the inner dead centre?

3 What is meant by static balancing?

4 Why multi-cylinder engine are preferred?

5 Define logarithmic decrement.

6 What is meant by critical damping?

7 What do you understand by transmissibility?

8 Write the expression for the amplitude of forced vibration.

9 Give the applications of gyroscopic principle.

10 What is the effect of friction on the governor?

PART-B (5 x 16 = 80)

11 a. A punching press is required to punch 30 mm diameter holes in a plate of 20 mm thickness at the rate of 20 holes per minute. It required 6 Nm of energy per mm^2 of sheared area. If punching takes place in 1/10 of a second and the r.p.m. of the flywheel varies from 160 to 140, determine the mass of the flywheel having radius of gyration of 1 meter.

OR

b. A horizontal cross compound steam engine develops 300 KW at 90 rpm. The coefficient of fluctuation of energy as found from the turning moment diagram is to be 0.1 and the fluctuation of speed is to be kept within ± 0.5% of the mean speed. Find the weight of the flywheel required, if the radius of gyration is 2 meters.

12 a.

The reciprocating mass per cylinder of a two cylinder locomotive is 300kg. The angle between the cranks is 90˚. The crank radius is 0.3m and driving diameter 1.7m.the distance between the driving wheel central plans is 1.6m. and that between the cylinder centerline 0.7 m determine

a) The fraction of the reciprocating masses to be balanced if the hammer blow is not to exceed 40 KN at 90km /hr.

b) variation in tractive effort.

c) maximum swaying couple.

OR

p.t.o

b. The three cranks of a cylinder locomotive are all on the same axle and are set at 120°. The pitch of the cylinder is 1 meter and the stroke of each piston is 0.6 m. The reciprocating masses are 300 kg for inside cylinder and 260 kg for each outside cylinder and the planes of rotation of the balance masses are 0.8 m from the inside crank.
If 40% of the reciprocating parts are to be balanced, find:
1. The magnitude and the position of the balancing masses required at a radius of 0.6 m and
2. The hammer blow per wheel when the axle makes 6 rps.

13 a. An instrument vibrates with a frequency of 1 Hz when there is no damping. When damping is provided, the frequency was observed to be 0.9 Hz. Find the
i) damping factor
ii) logarithmic decrement.

OR

b.
Calculate the whirling speed of a shaft 20 mm diameter and 0.6 m long carrying a mass of 1 kg at its mid point. The density of the shaft material is 40 Mg/m3 and Young's Modulus is 200 GN/m2 . Assume the shaft to be freely supported.

14 a. A machine of mass 75kg is mounted on springs of stiffness 12X105 N/m and with an assumed damping factor of 0.2 A piston within the machine of mass 2 kg has a reciprocating motion with a stroke of 80 mm and a speed of 3000 cycles / min.
Assuming the motion to be simple harmonic, find:
i). the amplitude of motion of the machine
ii). its phase angle with respect to the exciting force,
iii). the force transmitted to the foundation
iv). the phase angle of transmitted force with respect to the exciting force, and
v). the phase lag of the transmitted force with respect to the applied force.

OR

b. A machine part having a mess of 2.5 kg executes vibration in a viscous damping medium. A harmonic exciting force of 30N acts on the part and causes a resonant amplitude of 14mm, with a period of 0.22 sec. find the damping coefficient when the frequency of the exciting force is changed to 4Hz. Determine the increase in amplitude of the forced vibration upon the removal of the damper.

15 a. Calculate the range of speed of a porter governor, which has equal arms of each 200mm long and pivoted on the axis of rotation. The mass of each ball is 4kg and the central mass of the sleeve is 20kg. The radius of rotation of the ball is 100mm when the governor begins to lift and 130mm when the governor is at maximum speed.

OR

b. A uniform disc having a mass of 6 Kg and a radius of gyration 175 mm is mounted on one end of a horizontal arm of length 220mm.The other end of the arm can rotate freely in a universal bearing. The disc is given a clockwise spin of 300 r.p.m as seen from the disc end of the arm. With what speed will it precess about the vertical axis?

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Sl.No. 24611 SUBJECT CODE: 34415404/34416402

VINAYAKA MISSIONS RESEARCH FOUNDATION

(Deemed to be University)

B.E.DEGREE EXAMINATIONS- APR/MAY - 2019

MECHANICAL ENGINEERING

FOURTH SEMESTER

MANUFACTURING TECHNOLOGY II

(Candidates admitted under 2015/2016 Regulations-CBCS)

Time : Three Hours Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

1 Mention the different types of chips.
2 State the functions of cutting fluid.
3 List out the type of mandrels is there in common use? What is the purpose of a mandrel?
4 State the advantages of Swiss type screw cutting machine.
5 Mention any four operations that can be performed in a drilling machine.
6 What is reaming operation?
7 What are the advantages and limitations of broaching machine?
8 Define duplex broach.
9 What is meant by grinding?
10 Illustrate different types of bonds used in grinding.

PART-B (5 x 16 = 80)

11 a. Explain orthogonal cutting and oblique cutting with necessary diagrams, and compare.

OR

b. Discuss the different types of cutting fluid used in industries.

12 a. Explain the working principle of turret lathe with a neat sketch.

OR

b. Explain the working principle of Swiss type automatic lathe with a suitable sketch.

13 a. Describe the construction and principle of operation of a slotter with a neat sketch.

OR

b. Illustrate the construction and working principle of horizontal knee type milling machine.

14 a. Explain the classification of a broaching operation.

OR

b. Draw and describe the nomenclature of the broach.

15 a. Describe the process of reconditioning of Grinding Wheels in detail.

OR

b. Explain the different methods of external centreless grinding with a neat sketch.

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Sl.No. 24691 SUBJECT CODE: 34415405/34416404

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
B.E.DEGREE EXAMINATIONS- APR/MAY - 2019
MECHANICAL ENGINEERING
FOURTH SEMESTER
THERMAL ENGINEERING

(Candidates admitted under 2015/2016 Regulations-CBCS)

Time : Three Hours Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

1 Define reheating cycle.

2 What are the different methods of governing in steam turbines?

3 What is meant by highest useful compression ratio?

4 What is the purpose of a thermostat in an engine cooling system?

5 What are the methods available to improve the thermal efficiency of the open cycle gas turbine?

6 Give two merits of rotary compressor over reciprocating compressor.

7 Define tonne of refrigeration.

8 Define refrigeration.

9 What factors affect effective temperature?

10 What is meant by dehumidification?

PART-B (5 x 16 = 80)

11 a. Write a brief note on pressure compounding with a neat sketch.

OR

b. A steam power plant operates on a theoretical reheat cycle. Steam at boiler at 150 bar, 550oC expands through the high pressure turbine. It is reheated at a constant pressure of 40 bar to 550oC and expands through the low pressure turbine to a condenser at 0.1 bar. Draw T-s and h-s diagrams. Find :
(i) Quality of steam at turbine exhaust;
(ii) Cycle efficiency ;
(iii) Steam rate in kg/kWh.

12 a. Discuss with a neat sketch of simple carburetor.

OR

b. An engine with 200 mm cylinder diameter and 300 mm stroke works on theoretical Diesel cycle. The initial pressure and temperature of air used are 1 bar and 27 °C. The cut-off is 8% of the stroke. Determine:
i. Pressure and temperature at all salient points.\
ii. Theoretical air standard efficiency.
iii. Mean effective pressure.
iv. Power of the engine if the working cyles per minute are 380.
Assume that compression ratio is 15 and working fluid is air consider all conditions to be ideal.

13 a. Derive an expression for work done in single stage compressor with clearance volume. p.t.o

OR

b. A two stage single acting reciprocating compressor takes in air at the rate of 0.2 m3/s. The intake pressure and temperature of air are 0.1 MPa and 16 °C. The air is compressed to a final pressure of 0.7 MPa. The intermediate pressure is ideal and inter cooling is perfect. The compression index in both the stages is 1.25 and the compressor runs at 600 r.p.m. Neglecting clearance, determine:
i. The intermediate pressure.
ii. The total volume of each cylinder.
iii. The power required to drive the compressor, and
iv. The rate of heat rejection in the intercooler.
Take Cp = 1.005 kJ/kg K and R = 0.287 kJ/kg K.

14 a. Classify refrigerants and list desired properties of refrigerants.

OR

b. A refrigerating plant works between temperature limits of – 5°C and 25°C. The working fluid ammonia has a dryness fraction of 0.62 at entry to compressor. If the machine has a relative efficiency of 55%, calculate the amount of ice formed during a period of 24 hours. The ice is to be formed at 0°C from water at 15°C and 6.4 kg of ammonia is circulated per minute. Specific heat of water is 4.187 kJ/kg and latent heat of ice is 335 kJ/kg. Properties of NH3 (datum – 40°C).

Temperature °C	Liquid heat kJ/kgK	Latent heat kJ/kg	Entropy of liquid kJ/kg K
25	298.9	1167.1	1.124
-5	158.2	1280.8	0.630

15 a. The sling psychrometer in a laboratory test recorded the following readings :
Dry bulb temperature = 35°C
Wet bulb temperature = 25°C.
Calculate the following :
(i) Specific humidity (ii) Relative humidity
(iii) Vapour density in air (iv) Dew point temperature
(v) Enthalpy of mixture per kg of dry air
Take atmospheric pressure = 1.0132 bar.

OR

b. It is required to design an air-conditioning plant for a small office room for following winter conditions :

Outdoor conditions ..... 14ºC DBT and 10ºC WBT

Required conditions ..... 20ºC DBT and 60% R.H.

Amount of air circulation ..... 0.30 m3/min./person.

Seating capacity of office ..... 60.

The required condition is achieved first by heating and then by adiabatic humidifying.

Determine the following :

(i) Heating capacity of the coil in kW and the surface temperature required if the by pass factor of coil is 0.4.

(ii) The capacity of the humidifier.

Solve the problem by using psychrometric chart.

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Sl.No. 24691

Sl.No. 24846 SUBJECT CODE: 34415503/344

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
B.E.DEGREE EXAMINATIONS- APR/MAY - 2019
MECHANICAL ENGINEERING
FIFTH SEMESTER
DESIGN OF MACHINE ELEMENTS

(Candidates admitted under 2015/2016 Regulations-CBCS)

Time : Three Hours Maximum Marks:100

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

1 What is strain hardening and damping capacity?
2 What are factors affecting endurance (Fatigue) Strength / endurance limit?
3 What is a spindle?
4 Name the types of keys.
5 List the advantages of screwed joints
6 State the relationship between pitch and lead for single start and double start threads.
7 What are active and inactive coils?
8 What is nipping of laminated leaf spring? Discuss its role in spring design?
9 What are the required properties of bearing materials?
10 What are the types of rolling contact bearing?

PART-B (5 x 16 = 80)

11 a. Determine the maximum stress induced in the following cases taking stress concentration into account.

Case 1. A rectangular plate of 10mm thick and 50mm width with a hole of 20mm diameter under an axial load of 10 kN.

Case 2. A circular shaft with a step under a bending moment of 50Nm.

OR

b. Taking stress concentration into account, find the maximum stress induced when a tensile load of 20kN is applied to
i) A rectangular plate 80mm wide and 12mm thick with a transverse hole of 16mmDiameter.
ii) A stepped shaft of diameters 60 and 30mm with a filled radius of 6mm

12 a. Find the diameter of a solid steel shaft to transmit 20kW at 200rpm. The ultimate shear stress for the steel may be taken as 360MPa and a factor of safety as 8. If a hollow shaft is to be used in place of the solid shaft, find the inside and outside diameter when the ratio of inside to outside diameter is 0.5

OR

b. A solid shaft is subjected to bending moment of 3.46 kN-m and a torsional moment of 11.5KN-m. The shaft is made of C-45 steel and factor of safety is 6. Find the diameter of shaft

13 a.

A head of steam engine cylinder 60cm diameter is subjected to a steam pressure of 1.3MPa.The head is held in place by 16Nos of M39 bolts. A copper gasket is used to make the joint steam tight. Determine the probable stress in the bolt. The combine stiffness of assembly is 0.25

OR

b. A plate 100mm wide and 12.5mm thick is to be welded to another plate by means of two parallel fillet welds as shown in figure below. The plates are subjected to a load of P=50kN. Find the length of the weld so that the maximum stress does not exceed 56N/mm2. (Assume static loading).

14 a. Design a leaf spring for a truck to the following specifications.
Total load on the springs = 140kN Span of spring- =1000mm
Number of springs- =4 Maximum number of leaves =10
Permissible tensile stress- =600N/mm2 Permissible deflection- = 80mm
Young's modulus of the spring =200kN/mm2
Material for spring =Chromium Vanadium Steel

OR

b. Design a tension spring for a spring balance when the maximum load to be weighed is 1.2KN. Length of scale is 90mm and the spring index is 6. The material has maximum permissible shear stress of 400N/mm^2 and G=$0.82x10^5$N/mm^2

15 a. Design a journal bearing for a centrifugal pump with the following data:
Diameter of the journal=75mm
Load on each journal=11500kN
Speed of journal=1140 rpm

OR

b. A single cylinder I.C engine working on four stroke cycle develops 75kW at 360rpm.The maximum fluctuation of energy can be assumed to be 0.9 times the energy developed/cycle. If the total fluctuation of speed is not to exceed 1% and the maximum centrifugal stress in the flywheel is to be 5.5MN/m2, estimate the mean diameter and the cross sectional area of the rim. Fywheel is made of cast iron.

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16503

Marks

Sl.No. 24874 SUBJECT CODE: 34415504/34416504

VINAYAKA MISSIONS RESEARCH FOUNDATION

(Deemed to be University)

B.E.DEGREE EXAMINATIONS- APR/MAY - 2019

MECHANICAL ENGINEERING

FIFTH SEMESTER

Mechanical Behaviour Of Materials And Metallurgy

(Candidates admitted under 2015&2016 Regulations-CBCS)

Time : Three Hours Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

1 What are alloy steels? How are steel classify?

2 What are the primary effects of adding Ni, and Mo in cast irons?

3 Define the term twinning.

4 What are the factors affecting creep?

5 What are the purposes of the processing heat treatments?

6 What is meant by solid solution hardening?

7 What is meant by season cracking of brass?

8 How pitting is occurred.

9 What do you understand by compaction?

10 What are reinforcement matrix materials in ceramic composite materials?

PART-B (5 x 16 = 80)

11 a. Give classification of steels. Explain each of them with chemical composition, properties and applications.

OR

b. What are the classifications of ceramic materials? Explain each of them.

12 a. Explain the mechanisms of ductile fracture and brittle fracture.

OR

b. Draw a typical TTT diagram and show different cooling curves super imposed on this diagram.

13 a. Describe the jominy end test in detail for determination of hardenability.

OR

b. What is carburizing? Discuss nitriding process and its importance for industrial application.

14 a. Briefly discuss various means for control and prevention of corrosion.

OR

b. Explain in detail the corrosive protection method of Chemical Vapour Deposition (CVD).

15 a. Explain any one manufacturing methods of ceramic matrix composites.

OR

b. Explain the term (i). Filament Winding (ii) pultrusion process

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Sl.No. 24920 SUBJECT CODE: 34415505/34416505

VINAYAKA MISSIONS RESEARCH FOUNDATION

(Deemed to be University)

B.E.DEGREE EXAMINATIONS- APR/MAY - 2019

MECHANICAL ENGINEERING

FIFTH SEMESTER

ENGINEERING METROLOGY AND MEASUREMENTS

(Candidates admitted under 2015/2016 Regulations-CBCS)

Time : Three Hours Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

1 What is resolution?
2 What is meant by supplementary units?
3 Name the two types of accelerometer.
4 Why are electrical tachometers preferred over mechanical tachometers?
5 Define stagnation pressure.
6 State the advantages of thermocouples.
7 What is a proving ring?
8 What are optical strain gauges?
9 Define Constant Chord.
10 Define degree of fullness.

PART-B (5 x 16 = 80)

11 a. Explain the purpose of calibrating the instrument and discuss primary and secondary calibration.

OR

b. Explain the principle and construction of an auto collimator with a neat sketch.

12 a. Explain with a neat sketch displacement measurement using LVDT.

OR

b. Explain any one type of non contact type tachometer

13 a. With a neat sketch explain single column manometer.

OR

b. Briefly explain liquid filled thermometer.

14 a. Explain gravity balance method of torque measurement

OR

b. Briefly explain electrical torsion meter

15 a. Describe with a neat sketch floating carriage micrometer.

OR

b. Briefly explain vernier gear tooth caliper with a neat sketch.

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Sl.No. 24952 SUBJECT CODE: 34415506/34416506

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
B.E.DEGREE EXAMINATIONS- APR/MAY - 2019
MECHANICAL ENGINEERING
FIFTH SEMESTER
GAS DYNAMICS AND JET PROPULSION

(Candidates admitted under 2015/2016 Regulations-CBCS)

Time : Three Hours Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

1 Define characteristic Mach number (M*).

2 What is Mach number of incompressible flow and supersonic flow?

3 What type of nozzle used for sonic flow and supersonic flow?

4 Draw the variation of Mach number along the length of convergent and divergent duct when it acts a venture meter.

5 Define Fanno flow.

6 Define isothermal flow with friction

7 Give the expression for Ty/Tx across the normal shock.

8 What is the difference between normal shock and oblique shock.

9 What is thrust (or) drag?

10 Classify rocket engines based on source of energy employed.

PART-B (5 x 16 = 80)

11 a. The pressure , temperature and Mach number at the entry of a flow passage are 2.45 bar. 26.5^0 C and 1.4 respectively. If the exit Mach number is 2.5, determine the following for adiabatic flow of a perfect gas (g=1.3, R= 0.469 kJ/kg k.). a) Stagnation temperature. b) Temperature and velocity of gas at exit. c) Flow rate per square meter of the inlet cross section

OR

b. An air jet (g =1.4, R = 287 J/kgK) at 400K has sonic velocity. Determine the following: (i) velocity of sound at 400 K, (ii) velocity of sound at the stagnation condition, (iii) maximum velocity of the jet, (iv)Stagnation enthalpy, (v) Crocco number

12 a. A conical air diffuser as an Entry area of 0.11 m2 and Exit area of 0.44 m2. Air enters the diffuser with a static pressure of 0.18 Mpa., static temperature of 37°C and velocity of 267m/s. Calculate (i) Mass Flow rate of air through the diffuser, (ii) Mach number, Static Pressure, Static Temperature of the air leaving diffuser (iii) The net thrust acting upon the diffuser due to diffusion.

OR

p.t.o

b. The pressure, velocity and temperature of air (g = 1.4, CP = 1 kJ/kgK) at the entry of a nozzle are 2 bar, 145 m/s and 330 K. The exit pressure is 1.5bar. Find (a)What is the shape of the nozzle (b) determine for isentropic flow (i) the mach no. at entry and exit, (ii) the flow rate and maximum possible flow rate

2

13 a. The pressure, temperature and velocity of a gas in a combustion chamber at Entry are 0.35 bar, 300K, and 55m/s. The increase in stagnation enthalpy of the gas between entries and exit is 1170 KJ/kg. Calculate the following (a) Exit Mach number (b) Exit Pressure (c) Exit Temperature (d) Exit Velocity

OR

b. Air is heated in a frictionless duct from an initial static property of Pressure 110KPa and Temperature 300K. Calculate the amount of heat necessary to check the flow at exit of the duct when the inlet Mach number is a) 2.2 and b) 0.22

14 a. An aircraft flies at a mach number of 1.1 at an altitude of 15000 meters. The compression in its engine is partly achieved by a normal shock wave standing at the entry of its diffuser. Determine the following for downstream of the stock.
(i). Mach number
(ii). Temperature of the air
(iii). Pressure of the air
(iv). Stagnation pressure loss across the shock.

OR

b. The upstream Mach number, pressure and Temperature of normal shock wave are 2.4, 2bar and 270 K respectively. Calculate the Mach number, Pressure, Temperature and velocity of the gas for the downstream of the shock. Check the calculated values with those given in gas tables. Take g=1.3, R= 460J/kg K.

15 a. Explain the principle and operation of turbojet engine and state its advantages and disadvantages

OR

b. Explain the principle and operation of Pulsejet engine and write merits and demerits with suitable diagram

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Sl.No. 25026 SUBJECT CODE: 34415507

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
B.E.DEGREE EXAMINATIONS- APR/MAY - 2019
MECHANICAL ENGINEERING
FIFTH SEMESTER
ELECTIVE - REFIGERATION AND AIR CONDITIONING

(Candidates admitted under 2015 Regulations-CBCS)

Time : Three Hours Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

1 Differentiate clearly between open and closed air-refrigeration system.

2 State the functions of the following parts of a simple vapour compression system (i) Expansion valve

3 Write any two functions of reciprocating compressor.

4 Define oil free compressor.

5 Explain specific humidity.

6 Explain sensible heating.

7 Write any five parts present in the refrigerator.

8 Define ventilation.

9 State the factors which contribute to food spoilage.

10 What are the main components of steam jet refrigeration system.

PART-B (5 x 16 = 80)

11 a. Sketch the T-S and P-H diagrams for the vapour compression cycles when the vapour after compression is (i).dry saturated, and (ii).Wet.

OR

b. A vapour compression refrigerator uses methyl chloride (R-40) and operates between temperature limits of-10^0c and 45^0c. at entry to the compressor ,the refrigerator is dry saturated and after compression it acquires a temperature of 60^0c .find the COP of the refrigerator .the relevant properties of methyl chloride are as follows:

Saturation Temperature ^{0}C	Enthalpy in KJ/kg		Entropy in KJ/kg k	
	Liquid	Vapour	Liquid	Vapour
-10	45.4	460.7	0.183	1.637
45	133.0	483.6	0.485	1.587

12 a. Explain the working principle of any two types of condenser with sketch.

OR

b. Differentiate between physical and thermodynamic properties of a refrigerant.

13 a. Explain sensible cooling and humidification with sketch.

OR

P.T.O

b. Atmospheric air with dry bulb temperature of 28 ^{0}C and a wet bulb temperature of 17 ^{0}C is cooled to 15 ^{0}C without changing its moisture content. Find: 1. Original relative humidity; 2. Final relative humidity; and 3. Final wet bulb temperature.

14 a. Differentiate between room and car air conditioning.

OR

b. The amount of air supplied to an air conditioned hall is 300 m^3 /min. The atmospheric conditions are 35 ^{0}C DBT and 55% RH. The required conditions are 20 ^{0}C DBT and 60% RH. Find out the sensible heat and latent heat removed from the air per minute. Also find sensible heat factor for the system.

15 a. Darw the T-S and P-H diagrams for a jet refrigeration system and write the expressions for the following efficiencies:
Nozzle efficiency (b)Entrainment efficiency (c). Compression efficiency

OR

b. Describe briefly with a neat sketch a cold storage plant.

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Sl.No. 24803 SUBJECT CODE: 34415508

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
B.E.DEGREE EXAMINATIONS- APR/MAY - 2019
MECHANICAL ENGINEERING
FIFTH SEMESTER
ELECTIVE-RAPID PROTOTYPING AND TOOLING

(Candidates admitted under 2015 Regulations-CBCS)

Time : Three Hours Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

1 List down the applications of RP?

2 Write about part orientation and support generation.

3 List out any four Powder based RP process.

4 Write down the merits and demerits of SLS process.

5 List out the limitations of LOM process.

6 Why do we need a support for build parts?.

7 List out the Indirect RT processes systems

8 Explain the pattern for sand casting.

9 Give any four Limitations of RE.

10 Write a short note on image analysis.

PART-B (5 x 16 = 80)

11 a. Explain the history of RP systems and its fundamental developments.

OR

b. Write short notes on
i) STL Data generation ii) Part orientation and support generation..

12 a. Brief about strength, Weakness and applications of SGC?

OR

b. Describe 3D Printing process with a neat sketch.

13 a. With a neat sketch, explain the working principle of Multi Jet Modeling systems.

OR

b. Write a note on the need of FDM and List the different materials which may be used in FDM machine.

14 a. Explain the applications of rapid prototyping in medical field with examples.

OR

b. Explain with suitable example the application of RP in Aerospace industry.

15 a. Explain in detail mechanical contact Digitizing techniques for RE.

OR

b. Explain the various types of Bench Marking.

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Sl.No. 24559 SUBJECT CODE: 34415601/34416601

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
B.E.DEGREE EXAMINATIONS- APR/MAY - 2019
MECHANICAL ENGINEERING
SIXTH SEMESTER
AUTOMOBILE ENGINEERING

(Candidates admitted under 2015&2016 Regulations-CBCS)

Time : Three Hours Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

1 What are the main functions of a frame?

2 What is a Front Engine Front Drive automobile?

3 Where does fuel is injected in a single point fuel injection system?

4 What is the basic principle of working of a catalytic convereter?

5 Why are synchronizers used in transmission?

6 Why do the “live” axles in the transaxle need universal joints?

7 What is pitching of a suspension system?

8 What is the function of a brake shoe lining?

9 List the various forms of natural gas.

10 What are the advantages of hydrogen in CI engine?

PART-B (5 x 16 = 80)

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

OR

b. With neat sketch of a cross-section of an Internal Combustion Engine, explain the function of its significant components.

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

OR

b. Describe with the help of neat and labeled sketches, the construction and operating principle of a turbocharger.

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

OR

b. Differentiate between Hotchkiss drive and a torque tube drive.

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?

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Sl.No. 24559

Sl.No. 24426 SUBJECT CODE: 34415602 /34416602

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
B.E.DEGREE EXAMINATIONS- APR/MAY - 2019
MECHANICAL ENGINEERING
SIXTH SEMESTER
HEAT AND MASS TRANSFER

(Candidates admitted under 2015/2016 Regulations-CBCS)

Time : Three Hours Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

1 State Fourier's law of conduction

2 What is critical radius of insulation?

3 Define fin effectiveness.

4 Give example for transient heat transfer.

5 What is hydrodynamic boundary layer

6 Define convection.

7 Define emissive power

8 Compare direct heat exchanger and indirect heat exchanger

9 Give two examples of convective mass transfer.

10 What is effect of temperature in concentration

PART-B (5 x 16 = 80)

11 a. A hollow cylinder 5cm inner radius and 10cm outer radius has an inner surface temperature of 200°C and outer surface temperature of 100°C. If the thermal conductivity is 70W/mK, find heat transfer per unit length.

OR

b. A wire of 6mm diameter with 2mm thick insulation (K=0.11W/mK) if the convective heat transfer co-efficient between the insulating surface and air is 25W/m²K, find the critical thickness of insulation. And also find the percentage of change in heat transfer rate if critical radius is used.

12 a. An aluminium cube 6cm on a side is originally at a temperature of 500 °C. It is suddenly immersed in a liquid at 10 °C for which h is 120 W/m²K. Estimate the time required for the cube to reach a temperature of 250 °C. For aluminium ρ = 2700 kg/m^3, Cp = 900 J/kgK, k =204 W/mK..

OR

b. A large wall 2cm thick has uniform temperature 30°C initially and the wall temperature is suddenly raised and maintained at 400°C. Find

a. The temperature at a depth of 0.8 cm from the surface of the wall after 10s.

b. Instantaneous heat flow rate through that surface per m^2 per hour.

Take α = 0.008 m2 / hr , k = 6 W/m °C.

13 a. Water flows inside a tube of 20 mm diameter and 3m long at a velocity of 0.03 m/s. The Water gets heated from 40°C to 120°C while passing through the tube. The tube wall is maintained at constant temperature of 160°C. Find heat transfer.

P.T.O

OR

b. An aluminum pan of 15 cm diameter is used to boil water and the water depth at the time of boiling is 2.5 cm. The pan is placed on an electric stove and the heating element raises the temperature of the pan to 110 ^{0}C. Calculate the power input for boiling and the rate of evaporation. Take C_{sf} = 0.0132.

14 a. A furnace wall emits radiation at 2000K. Treating it as black body radiation, calculate (i) monochromatic radiant flux density at 1 μ m wavelength. (ii) Wavelength at which emission is maximum and the corresponding emissive power. (iii) Total emissive power.

OR

b. Water flows at the rate of 65kg/min through a double pipe, counter flow heat exchanger. Water is heated from 50°C to 75°C by an oil flowing though a tube. The specific heat of oil is 1.780 kJ/kgK. The oil enters at 115°C and leaves at 70°C. The overall heat transfer co-efficient is 340 W/m^{2}K. Calculate the following

1. Heat exchanger area
2. Rate of heat transfer.

15 a. CO_2 & air experience equimolar counter diffusion in a circular tube whose length & diameter are 1 m & 50 mm respectively. 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 concentration are maintained at fixed values. Partial pressure of CO_2 at one end is 190 mm of Hg while at the other end is 95 mm Hg. Estimate the mass transfer rate of CO_2 & air through the tube.

OR

b. Helium diffuses through a plane membrane of 2mm thick. At the inner side the concentration of helium is 0.025 kg mole/m^3. At the outer side the concentration of helium is 0.007 kg mole/m^3. What is the diffusion flux of helium through the membrane. Assume diffusion co-efficient of helium with respect to plastic is 1 x 10^{-9} m^2/s.

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Sl.No. 24704 SUBJECT CODE: 34415603/34416603

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
B.E.DEGREE EXAMINATIONS- APR/MAY - 2019
MECHANICAL ENGINEERING
SIXTH SEMESTER
DESIGN OF TRANSMISSION SYSTEM

(Candidates admitted under 2015/2016 Regulations-CBCS)

Time : Three Hours Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

1 What is centrifugal effect on belts?

2 In what way, silent chain is better than ordinary driving chain?

3 What factors influence backlash in gear drives?

4 Define axial pitch of a helical gear.

5 When the number of start of a worm is increased in a worm gear drive how it affects the other parameters and action of the drive?

6 What is irreversibility in worm gears?

7 What are preferred numbers?

8 What are the methods of lubrication in speed reducers?

9 Write an expression for the ratio between the tight and slack sides of a band and block brake.

10 In what ways the clutches are differed from brakes?

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

OR

b. Design a chain drive to actuate a compressor from 15 kW electric motor at 1000 r.p.m., the compressor running at 550 r.p.m., Minimum centre distance is 550 mm. The chain tension may be adjusted by shifting the motor on rails. The compressor is to work 8 hrs per day.

12 a. In a spur gear drive for a stone crusher, the gears are made of C40 steel. The pinion is transmitting 20 KW at 1200 r.p.m. The gear ratio is 3. Gear is to work 8 hours per day, six days a week and for 3 years, Design the drive.

OR

b. A parallel helical gear set consists of a 19-teeth pinion driving a 57-teeth gear. The pinion has a left-hand helix angle of 20º, a normal pressure angle of 14 ½ º, and a normal diametral pitch of 0.4teeth/mm. Find: [a] The normal, transverse, and axial circular pitches. [b] The transverse module and the transverse pressure angle. [c] The pitch diameter of the two gears

p.t.o

13 a. Design a cast iron bevel gear drive for a pillar drilling machine to transmit 1.5 KW at 800r.p.m. to a spindle at 400 r.p.m.. The gear is to work for 40 hours per week for 3 years. Pressure angle is 20º.

OR

b. A steel worm running at 240 r.p.m. receives 1.5 KW from its shaft. The speed reduction is 10:1. Design the drive so as to have an efficiency of 80%. Also determine the cooling area required, if the temperature rise is restricted to 45ºC. Take overall heat transfer coefficient as 10 W/m^2 ºC.

14 a. A machine tool gear box is to have 12 speeds. With the output speeds ranging from 63 to 2800r.p.m. draw the speed diagram and the kinematic layout for 3(1) 2(3) 2(6) scheme

OR

b. The minimum and maximum speeds of 6 speed gear box are to be 500 and 1600 r.p.m. Construct the speed diagram and the kinematic arrangement of the gear box. Find the number of teeth on all gears

15 a. Describe with the help of a neat sketch the principles of operation of an internal expanding shoe. Also deduce the expression for the braking torque.

OR

b. A simple band brake is operated by a lever of length 500mm long. The brake drum has a diameter of 500 mm and the brake band embraces 5/8 of the circumference. One end of the band is attached to the fulcrum of the lever while the other is attached to a pin on the lever 100mm from the fulcrum. If the effort applied to the end of the lever is 2000 N and the coefficient of friction is 0.25, then design the simple band brake.

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Sl.No. 24628 SUBJECT CODE: 34415604/34416604

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
B.E.DEGREE EXAMINATIONS- APR/MAY - 2019
MECHANICAL ENGINEERING
SIXTH SEMESTER
COMPUTER INTEGRATED MANUFACTURING SYSTEMS

(Candidates admitted under 2015/2016 Regulations-CBCS)

Time : Three Hours Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

1 What is meant by conceptual design?

2 Name any two reasons for implementing CAD in design.

3 Define Geometric modeling.

4 What is DXF?

5 Describe shortly about the requirements of spindles for CNC machines.

6 Write any two advantages of laser interferometer.

7 List the methods of grouping the parts into families.

8 Classify the GT manufacturing cells.

9 Define the term "FMS".

10 What are the types of flexibility?

PART-B (5 x 16 = 80)

11 a. Explain the general guidelines to be followed in DFM & DFA?

OR

b. Explain the various stages in Ohsuga model.

12 a. Explain in detail about the B-rep technique in 3D solid modeling.

OR

b. Explain two techniques followed in feature based modeling.

13 a. Discuss the methods used for position and velocity feedback in CNC machines.

OR

b. With neat sketch, explain the working principle of double gripper type ATC.

14 a. Explain in detail the process plan activity.

OR

b. Discuss the applications and benefits of GT in detail.

15 a. Explain Bar-code technology?

OR

b. Explain the FMS components in detail.

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Sl.No. 24762 SUBJECT CODE: 34415605/34416605

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
B.E.DEGREE EXAMINATIONS- APR/MAY - 2019
COMMON TO AUTO & MECHANICAL ENGINEERING
SIXTH SEMESTER
ELECTIVE -INDUSTRIAL ROBOTICS

(Candidates admitted under 2015& 2016 Regulations-CBCS)

Time : Three Hours Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

1 Describe shortly about Joint notation scheme.

2 What is the difference between reference coordinate system and body attached coordinate system?

3 Where electric drives preferred?

4 Draw the sketch of a typical two fingered gripper.

5 Write short notes on robot vision systems?

6 What is mean by "Operating range" of a sensor?

7 Define inverse kinematics

8 Write down the three basic modes of operation of robot language operating systems?

9 What do you understand by assembly task?

10 List the limitations of contact arc welding sensor?

PART-B (5 x 16 = 80)

11 a. Explain the working principle of jointed arm configuration system robots with reference to the work volume with suitable sketch?

OR

b. Give a Specification of a robot used for machine loading application.

12 a. Explain the following topics with neat sketch.
i. Harmonic drive system
ii. Servo Motors

OR

b. Explain with a neat sketch the construction and working of the following.
i. Two fingered gripper ii. Three fingered gripper iii. Magnetic grippers

13 a. Explain different types of object recognition techniques?

OR

b. Discuss in detail the functions of following sensors?
a. Binary Sensor b. Force sensor

14 a. Write the inverse kinematic solution for Four DoF manipulator with *3D* space.

OR

b. What is meant by End Effectors command? Give an example with a sample program.

P.T.O

15 a. Explain the features of the welding Robot with suitable diagram?

OR

b. Explain the functions of sensors in Robotic arc welding?

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(SI.NO.24762)

Sl.No. 24495 SUBJECT CODE: 34415701

VINAYAKA MISSIONS RESEARCH FOUNDATION

(Deemed to be University)

B.E.DEGREE EXAMINATIONS- APR/MAY - 2019

MECHANICAL ENGINEERING

SEVENTH SEMESTER

FINITE ELEMENT ANALYSIS

(Candidates admitted under 2015 Regulations-CBCS)

Time : Three Hours Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

1 What is mean by finite element analysis?

2 How do you calculate the size of the global stiffness matrix?

3 What is the classification of co-ordinates?

4 Write down the expression of stiffness matrix for a truss element.

5 Write down the stress-strain relationship matrix for plain stress condition.

6 Write a displacement function equation for CST element.

7 What are the conditions for a problem to be axisymmetric?

8 What is the stationary property of total potential energy.

9 Write down the shape function for four noded rectangular element using natural co-ordinate system.

10 Define Isoparametric elements.

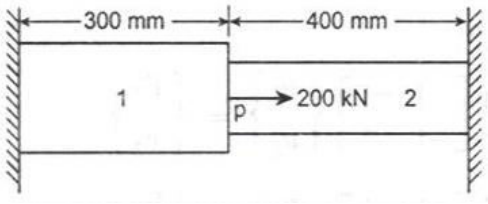
PART-B (5 x 16 = 80)

11 a. Explain the following (i) Variational approach. (ii) weighted residual methods.

OR

b. A simply supported beam subjected to uniformly distributed load over entire span. Determine the bending moment and deflection at midspan by using Rayleigh-Ritz method.

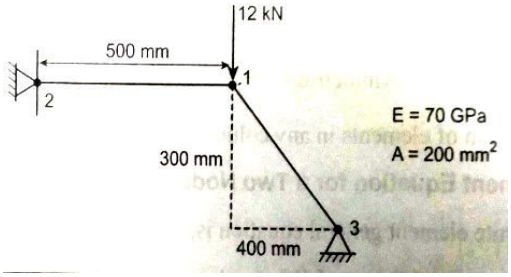
12 a. Consider a bar as shown in fig. An axial load of 200 kN is applied at point P. Take $A_1 = 2400$ mm^2, $E_1 = 70 \times 10^9$ N / m^2, $A_2 = 600$ mm^2 $E_2 = 200 \times 10^9$ N / m^2. Calculate the following: (a) The nodal displacement at point P. (b) Stress in each material. (c)Reaction.



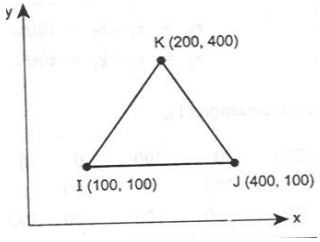
OR

P.T.O

b. For the two bar truss shown in fig. Determine the displacements of node 1 and the stress in element 1-3.

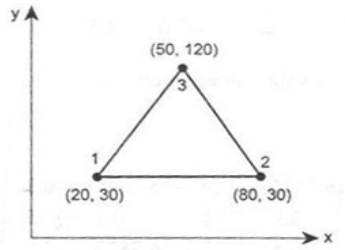


13 a. For the constant strain triangular element shown in Fig. assemble strain-displacement matrix. Take t = 20 mm and E = 2 x 10^5 N/mm^2.

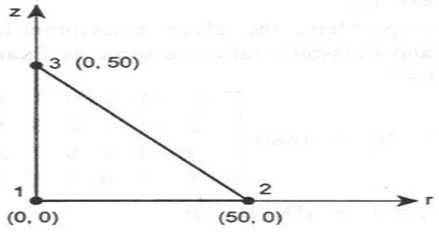


OR

b. For the plane stress element shown in Fig. The nodal displacements are: u_1 = 2.0 mm v_1 = 1.0 mm;u_2 = 0.5 mm v_2 = 0.0 mm ;u_3 = 3.0 mm v_3 = 1.0 mm ;Determine the element stresses $\sigma_x, \sigma_y, \tau_{xy}$, σ_1 and σ_2 and the principal angle $\emptyset_p$ Let E = 210 GPa , γ = 0.25 and t = 10 mm. All co-ordinates are in millimetres

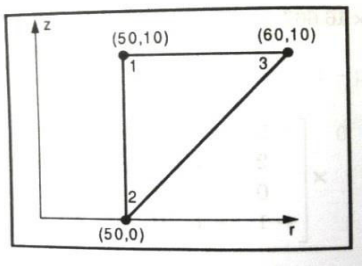


14 a. For the axisymmetric elements shown in Fig, determine the element stresses. Let E = 210GPa and $\gamma = 0.25$. The co-ordinates (in millimeters) are in shown Fig. The nodal displacements are:u_1 = 0.05 mm; w_1 = 0.03mm u_2 = 0.02 mm; w_2 = 0.02mm u_3 = 0 mm; w_3 = 0 mm



OR

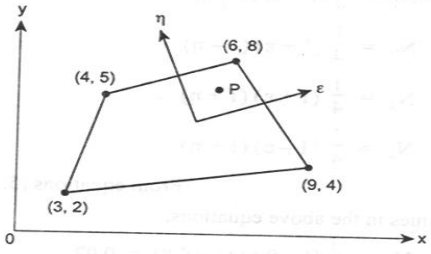
b. Evaluate the strain- displacement matrix [B] and stress strain matrix [D] for an axis- symmetric triangular element as shown in the figure. E= 2.1×10^5 and $\gamma = 0.25$.



15 a. Evaluate the integral and compare with exact solution. $I = \int_{-1}^{1} (2 + x + x^2) dx.$

OR

b. Evaluate the Cartesian co-ordinate of the point P which has local co-ordinates $\varepsilon = 0.6$ $\eta = 0.8$ as shown in fig.



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Sl.No. 24495

Sl.No. 24586 SUBJECT CODE: 34415702

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
B.E.DEGREE EXAMINATIONS- APR/MAY - 2019
COMMON TO MECHANICAL & MECHT
SEVENTH SEMESTER
HYDRAULIC AND PNEUMATIC SYSTEMS

(Candidates admitted under 2015 Regulations-CBCS)

Time : Three Hours Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

1 Define viscosity index.
2 What are the components of Hydraulic system?
3 Why gear pump cannot be used as variable displacement pump?
4 Where the fluidic control system preferred than other control systems?
5 What is bleed-off circuit?
6 What are the difference between single acting and double acting cylinders?
7 Name some applications where it would be desirable to have sequencing of two cylinders.
8 What is meant by hydraulic power pack?
9 What is the purpose of electrical timer?
10 What is the meant by memory valve?

PART-B (5 x 16 = 80)

11 a. Discuss about the various hydraulic fluids.

OR

b. Discuss about the maintenance of the hydraulic oils.

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

OR

b. Explain muffler and its application and give the construction and working of quick exhaust vale.

13 a. Explain the flow control valve with a neat sketch and mention the location of the floe 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. Draw and explain the regenerative hydraulic circuit with suitable example.

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. Discuss the major failures and troubleshooting of fluid power circuits.

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Sl.No. 24445 SUBJECT CODE: 34415703

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
B.E.DEGREE EXAMINATIONS- APR/MAY - 2019
COMMON TO MECHANICAL ENGINEERING , MECHATRONICS
SEVENTH SEMESTER
MECHATRONICS

(Candidates admitted under 2015 Regulations-CBCS)

Time : Three Hours Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

1 What is control system?
2 State various applications shift register.
3 Define resolution.
4 Classify- transducer.
5 Discuss the important of READY signal in 8085 Microprocessor.
6 Define mnemonics.
7 List three common types of PLC programming devices.
8 Write the simple program using EXAMINE IF CLOSED (XIC) INSTRUCTION.
9 What are parts in robot?
10 How does a car park barrier works?

PART-B (5 x 16 = 80)

11 a. Explain briefly about Measurement system with a neat sketch.

OR

b. What is sequential controller? Explain the microprocessor based controller operates a washing machine.

12 a. How a Tachogenerator is used to measure the angular velocity.

OR

b. a. Explain about the selection of sensors? b. Explain about the signal processing

13 a. Discuss the function of following (i) General purpose registers. (ii)Timing and control unit (iii) Stack pointer

OR

b. Explain about the interfacing of stepper motor?

14 a. Explain the digital I/O modules with neat diagram.

OR

b. With neat diagram explain the EXAMINE ON and EXAMINE OFF instruction with one example.

15 a. Explain the design aspects of pick and place robot?

OR

b. Explain about the design of automatic car parking system?

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Sl.No. 24648 SUBJECT CODE: 34415704

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
B.E.DEGREE EXAMINATIONS- APR/MAY - 2019
MECHANICAL ENGINEERING
SEVENTH SEMESTER
RENEWABLE SOURCES OF ENERGY

(Candidates admitted under 2015 Regulations-CBCS)

Time : Three Hours Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

1 What are the 4 elements of absorption type solar cooker?

2 Define photo-sphere.

3 What is the average wind speed (Km/h) considered as good for operation of wind mill.

4 Define thrust force.

5 How much methane content (in %) available in bio gas.

6 What is meant by Biomass direct combustions?

7 Write the objective of a hydro power scheme.

8 List the advantages of tidal power plant.

9 Define energy.

10 Define Embodied energy.

PART-B (5 x 16 = 80)

11 a. Draw and explain the solar thermal power plant.

OR

b. Describe principle of liquid flat plate solar collector.

12 a. Distinguish clearly between the following:
a) Constant speed - constant frequencies WTG. (b) Variable speed - constant frequency WTG.

OR

b. Explain with a neat diagram of various types of wind generators.

13 a. Explain briefly about the construction techniques of bio gas plant with neat sketch.

OR

b. How gasifiers are classified? Give details of up-draught gasifier.

14 a. Explain the Applications of GIS in geo-sciences.

OR

b. Explain the Components of Tidal Power plants.

15 a. Explain the National energy policy.

OR

b. Discuss the advantages and disadvantages of fuel cell.

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Sl.No. 24719 SUBJECT CODE: 34415705

VINAYAKA MISSIONS RESEARCH FOUNDATION

(Deemed to be University)

B.E.DEGREE EXAMINATIONS- APR/MAY - 2019

MECHANICAL ENGINEERING

SEVENTH SEMESTER

LEAN MANUFACTURING SYSTEM

(Candidates admitted under 2015 Regulations-CBCS)

Time : Three Hours Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

1 Name the various lean manufacturing tools.
2 What is meant by value added activity?
3 What is meant by Seiton?
4 List out the various types of maintenance.
5 Name any two companies that has implemented JIT system.
6 What is meant by CSM?
7 What is meant by poka-yoke?
8 What is the three basic function of poka yoke system?
9 What are the activities to support worker involvement?
10 List out the various phases of Hoshin planning systems.

PART-B (5 x 16 = 80)

11 a. What is meant by system thinking? Explain its different elements.

OR

b. Explain any four tools of lean manufacturing.

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 the different types of Kanban.

14 a. What is meant by autonomation? Explain with examples.

OR

b. Discuss the various errors that causes defects and also list the tools used to avoid errors.

15 a. Explain the various steps in Hoshin planning.

OR

b. What is strategic planning? Explain in detail.

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Sl.No. 24795 SUBJECT CODE: 34415706

VINAYAKA MISSIONS RESEARCH FOUNDATION

(Deemed to be University)

B.E.DEGREE EXAMINATIONS- APR/MAY - 2019

MECHANICAL ENGINEERING

SEVENTH SEMESTER

ELECTIVE -CRYOGENIC ENGINEERING

(Candidates admitted under 2015 Regulations-CBCS)

Time : Three Hours Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

1 What is the necessity of studying engineering materials at cryogenic temperature?
2 Give theoretical expression for Debye temperature.
3 Define isentropic expansion co efficient.
4 List any two types of thermodynamics laws.
5 Sketch rectification process.
6 What is operating line?
7 Define vacuum.
8 Write any two merits of opacified powder.
9 Write a short note on stiffening rings.
10 List out the methods of suspension system.

PART-B (5 x 16 = 80)

11 a. Explain any two Electrical properties in Cryogenic engineering.

OR

b. Explain foundation effect in LHe II with neat sketch.

12 a. Explain simple linde Hampton system.

OR

b. Explain adiabatic expansion systems.

13 a. Explain linde double column system with neat sketch.

OR

b. Explain the working principle of argon separation system.

14 a. Explain the theory of gas filled power insulation.

OR

b. Explain opacified powder insulation.

15 a. List out the important steps to design outer vessel in storage system.

OR

b. Explain orifice meter with neat sketch.

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Sl.No. 24816 SUBJECT CODE: 34415709

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
B.E.DEGREE EXAMINATIONS- APR/MAY - 2019
MECHANICAL ENGINEERING
SEVENTH SEMESTER
ELECTIVE-UNCONVENTIONAL MANUFACTURING PROCESSES

(Candidates admitted under 2015 Regulations-CBCS)

Time : Three Hours Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

1 Classify UMP based on energy used.

2 What is the principle of AJM?

3 Differentiate AJM with AWJM.

4 State Magnetostriction effect.

5 List the applications of EDM.

6 Give any four applications of EDM.

7 Define ECM.

8 What are the main functions of electrolysis in ECM?

9 List the characteristics of Electron Beam.

10 What are the main elements of LBM equipment?

PART-B (5 x 16 = 80)

11 a. Explain the physical parameters of various unconventional machining processes.

OR

b. Differentiate the conventional and unconventional machining processes.

12 a. Elabrately discuss about Metal Removal Rate in USM.

OR

b. Explain the construction and working principle of AWJM.

13 a. Explain any three spark generating circuits in EDM.

OR

b. Discuss the metal removal rate and characteristics of EDM.

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

OR

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

15 a. Explain the principle of Laser beam production.

OR

b. Discuss the advantages, disadvantages and applications of PAM.

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