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6E 7011

6E 7011

B.Tech. VI- Semester (Main&Back) Examination, April - 2019
Automobile Engineering
6AE1A Design of Machine Elements - II
Common with AE, ME, PI

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

Instructions to Candidates:

*Attempt any **Five questions**, selecting **One question** from **each unit**. All Questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.) Units of quantities used/calculated must be stated clearly.*

Unit - I

1. a) What is Goodman line? What is the difference between Gerber curve and Soderberg and Goodman Lines? **(8)**

   b) A solid shaft is subjected to a bending moment of 3.46 KNm and torsional moment of 11.5 KNm. The shaft is made of C-45, and factor of safety is 6. Determine the diameter of the shaft. **(8)**

(OR)

1. a) What is physical significance of notch sensitivity factor being one and zero.**(4)**

   b) What is fluctuating stress? Draw stress-time curve for fluctuating stress.**(2+2=4)**

   c) A hot rolled steel shaft is subjected to a torsional moment that varies from 330N-m clockwise to 110 N-m counter clockwise and an applied bending moment at a critical section varies from 440 N-m to - 220 N-m. Determine the required shaft diameter. The material has an ultimate strength of 550 MN/m^2 and a yield strength of 410 MN/m^2. Take endurance limit as half the ultimate strength. FOS = 2 size factor =0.85, surface finish = 0.62. **(8)**

Unit - II

2. Design a plain carbon steel centre crankshaft for a single acting four stroke single cylinder for the following data : **(16)**

   Bore = 400 mm; stroke = 600 mm; Engine speed = 200 rpm, mean effective pressure = 0.5 N/mm^2, maximum combustion pressure = 2.5 N/mm^2; weight of flywheel used as pulley = 50 kN; Total belt pull = 6.5 kN. When crank has turned through 35° from top dead centre, pressure on the piston is 1 N/mm^2 and torque on crank is maximum. Ratio of connecting rod length to the crank radius is 5. Assume any other data required for design.

(OR)

2. Design connecting rod for single cylinder four stroke diesel engine with following specifications:

Power = 7.5 kW, Mechanical eff = 80%, weight of reciprocating parts = 20N, length of connecting rod = 0.30m, speed = 1500 rpm with a possible overspeed of 2500 r.p.m. Assume suitable missing data. **(16)**

Unit - III

3. Determine width of belt and belt length for the following particulars of a flat belt drive : **(16)**

   Centre distance = 6000 mm, power = 100 kW

   Pulley diameters = 420 mm and 1680 mm

   Speed of bigger pulley = 240 rpm, Belt thickness = 8mm of leather, coefficient of friction μ = 0.3 Material density e = 0.92 gm/cm³. Allowable stress in belt = 2.0 N/mm².

(OR)

3. a) Discuss stresses in a helical spring subjected to axial load. **(6)**

   b) A helical compression spring is made from a wire of 1 mm diameter having yield strength of 720 N/mm². It has mean diameter of 12 mm and there are 14 active coils of spring find : **(10)**

   i) Static load corresponding to yield point.

   ii) Deflection.

   iii) Stiffness.

   iv) Solid height.

   v) Free length.

   Take G = 0.84 × 10⁵ N/mm². Mention end conditions.

Unit - IV

4. a) List out the assumptions made in Lewis equation for gear design. **(6)**

   b) Design a 20′ spur gear drive to transmit 10 kW from a shaft running at 1440 rpm to another shaft running at 360 rpm. Use C 45 for gear and pinion with suitable F.O.S. **(10)**

(OR)

4. a) Discuss gear materials and their applications. **(6)**

   b) A helical pair transmits 20 kW with pinion of 20 teeth and 5 module running at 1200 rpm. Pressure angle is 20° and helix angle is 25°. Compute

   i) The Tangential force.

   ii) The radial force and

   iii) The axial thrust.

   Assume suitable positions of gear and pinion and direction of rotation. Accordingly draw a force component diagram. **(10)**

6E7011 (2)

Unit - V

5. a) Discuss bearing characteristics number. With help of diagram discuss different states of Hydrodynamic lubrication. (6)

    b) Design a journal bearing for supporting a generator shaft of 75 mm diameter with a load of 12 kN running at 1440 r.p.m. Suitable data may be picked from design hand book. (10)

(OR)

5. a) Discuss the types of antifriction bearings and their applications. (8)

    b) Select a suitable antifriction bearing for a radial load of 2000 N with operation at 1200 rpm for 2200 hours. Assume the axial load, if any, to be negligible. (8)

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6E 7012

6E 7012

B.Tech. VI - Semester (Main&Back) Examination, April - 2019
Mechanical Engineering
6ME2A Newer Machining Methods

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

Instructions to Candidates:

*Attempt any **Five** questions, selecting **One question** from **each unit**. All Questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly).*

Unit - I

1. a) Explain the principle of modern machining process. What are the factors to be considered while selecting a process? **(8)**

   b) Describe briefly Magnetic Abrasive Finishing (MAF) process for finishing internal surface of cylindrical surface/workpiece. **(8)**

(OR)

1. a) Make a comparison between traditional and non traditional machining process in terms of cost, application, scope, machine time and limitations. **(6)**

   b) A Hollow cylinder (inner dia. = 4 mm, outer dia. = 14 mm) requires improved surface finish on its outer and inner curved surfaces. Would you recommend AFM? Note that workpiece material is hardened steel and permissible dimensional change in its dia is 20µm. Draw the suggested tooling, if any.**(10)**

Unit - II

2. a) Describe in brief the process parameters, tool design and material removal rate analysis of Ultrasonic Machining Process. **(6)**

   b) During AJM, the mixing ratio used is 0.2. Calculate mass ratio if the ratio of density of abrasive and density of carrier gas is equal to 20. **(10)**

(OR)

2. Find out the approximation time required to machine a hole of diameter equal to 6.0 mm in a tungsten carbide plate (fracture hardness = $6900N/mm^2 = 6.9 \times 10^9$ N/m^2) of thickness equal to one and half times of hole diameter. The mean abrasive grain size is 0.015 mm diameter. The feed force is equal to 3.5 N. The amplitude of tool oscillation is 25 μm and the frequency is equal to 25kHz. The tool material used is copper having fracture hardness equal to 1.5×10^3 N/mm^2. The slurry contains one part abrasive to one part of water. Take the values of different constants as $K_1 = 0.3$, $K_2 = 1.8$ mm^2, $K_3 = 0.6$ and abrasive density = $3.8g/cm^3$.

Also calculate the ratio of the volume removed by throwing mechanism to the volume removed by hammering mechanism. **(16)**

Unit - III

3. a) Explain the working principle of Laser Beam Machining. Also brief its process parameters. **(8)**

   b) Why EBM process is performed usually in vacuum chamber? Explain. **(8)**

(OR)

3. a) What are the requirements of tool materials for EDM? Name the common tool material. **(6)**

   b) A molybdenum surface has to be machined by chlorine atoms to from molybdenum trichloride. To get nascent chlorine, a generator is provided. The value of p = 0.13 N/m^2. Assuming the temperature of etchant to be 300K, estimate the machining rate. **(10)**

Unit - IV

4. a) What are the different functions of electrolyte in ECM? List the common electrolytes used in ECM. **(8)**

   b) Explain with sketch ECG operations. **(8)**

(OR)

4. a) Calculate the machining rate and the electrode feed rate when iron is electrochemically machined, using copper electrode and sodium chloride solution (specific resistance = 5.0 ohm cm). The power supply data of the ECM machine used are:

   Supply voltage 18V D.C., Current = 5000 amp.

   A 'tool-work' gap of 0.5 mm (constant) may be assumed. **(10)**

   b) Why surface finish obtained in case of chemical machining of alloys is poor? Explain in brief. **(6)**

Unit - V

5. Explain in detail the nanoscale cutting process. Also highlight the typical advantages, applications and limitations of the process. **(16)**

(OR)

5. a) What are the benefits and applications of laser Micromachining. **(8)**

   b) Explain the various applications of Nano-machining and Micro-machining in industry. **(8)**

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6E 7013

6E 7013

B.Tech. VI-Semester (Main & Back) Examination, April-2019
Mechanical Engineering
6ME3A Mechatronics
(Common with ME, PI)

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

Instructions to Candidates:

Attempt any Five questions, selecting One question from each unit. All Questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.) Units of quantities used/calculated must be stated clearly.

Unit - I

1. a) What is Flexible Manufacturing System (F.M.S.)? What are the advantages of F.M.S.? **(8)**

    b) Describe the nanotechnology in detail. **(8)**

(OR)

1. a) Explain in detail process control automation. **(8)**

    b) Describe the basic structure of micro-controllers. **(8)**

Unit - II

2. a) Explain the working of force sensor with suitable example. **(6)**

    b) Define actuation system and differentiate hydraulic with pneumatic actuation system. **(10)**

(OR)

2. a) Describe the piezoelectric actuators in detail. **(8)**

    b) Classify the sensors and also write the significance of sensors. **(8)**

Unit - III

3. a) What is Adaptive control design? **(8)**

    b) Explain the neural networks with appropriate examples and write its applications. **(8)**

(OR)

3. a) Discuss the role of controls in mechatronics design with appropriate examples. **(6)**

    b) Explain control system design. Differentiate adaptive and non linear control design. **(10)**

Unit - IV

4. a) Explain the working of analog to digital signal convertor system with suitable example. **(8)**

    b) What is a data logger? Differentiate data logging with data recording. **(8)**

(OR)

4. a) What are the advantages of digital communication over analog communication. **(6)**

    b) Describe the operational amplifiers circuit for comparator and non-inverting amplifier. **(6)**

    c) Define frequency response system, write its advantages. **(4)**

Unit - V

5. a) Explain the significance and applications of mechatronic systems used specially in elevators and manipulator arms. **(8)**

    b) Explain Computer Numerical Control (CNC) machines. **(8)**

(OR)

5. a) What is (ABS) Anti-Lock Braking System? Explain its operation in detail. **(10)**

    b) Explain the temperature control systems. **(6)**

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B.Tech. VI-Semester (Main & Back) Examination, April-2019
Mechanical Engineering
6ME4A Vibration Engineering (Old Name - Noise, Vibration And Harshness)

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 24

Instructions to Candidates:

*Attempt any **Five questions**, selecting **One question** from **each unit**. All Questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly). Units of quantities used/calculated must be stated clearly.*

Unit - I

1. a) What is meant by frequency based hearing sensitivity? What are the usual audible frequency range and frequency range of human voice? **(8)**

    b) What are the major sources of noise in Urban environment? Explain the non auditory effects of these on people. **(8)**

(OR)

1. a) Discuss various methods used in controlling industrial noise. **(8)**

    b) Derive an equation for finding out sound intensity at a distance r from the source of sound of known sound power level. **(8)**

Unit - II

2. a) What do you understand by under damped system, over damped system and critically damped system and its use? Explain. **(3+3+4=10)**

    b) A vibratory system in a vehicle is to be designed with the following parameters :

    K = 100 N/m, C = 2N-sec/m, M = 1 kg

    Calculate the decrease of amplitude from its starting value after complete oscillations and the frequency of oscillation. **(6)**

(OR)

2. a) Derive the frequency equation for a compound Pendulum. Explain the Importance of centre of percussion. **(8)**

   b) A steel wire with young's modulus $E = 2 \times 10^{11} N/m^2$ of 1.5 mm diameter and is 30 mm long. It is fixed at the upper end and carries a mass M kg at its lower end. Find M so that frequency of longitudinal vibration is 3 cycles/sec. **(8)**

Unit - III

3. a) Explain the principle of centrifugal pendulum absorber. Also describe with an example how such arrangement can be utilized for an I.C. Engine. **(8)**

   b) Derive the expression for motion transmissibility and plot the curve for the same. **(8)**

(OR)

3. a) Derive an expression for amplitude and phase angle of a vibration because of a rotating unbalance. **(8)**

   b) A vibrating system having mass 1 kg is suspended by a spring stiffness 1000 N/m and it is put to harmonic excitation of 10N. Assuming viscous damping determine. **(8)**

   i) The resonant frequency.

   ii) The phase angle at resonance.

   iii) The amplitude at resonance.

   iv) The frequency corresponding to the peak amplitude and take $C = 40N - sec/m$.

Unit - IV

4. a) Explain the principle of undamped dynamic vibration absorber. **(8)**

   b) A machine runs at 5000 rpm. Its forcing frequency is very near to its natural frequency. If the nearest frequency of the machine is atleast 20% from the forced frequency. Design a suitable vibration absorbed for the system. Assume the mass of the machine as 30 kg. **(8)**

(OR)

4. A vertical shaft of 12 mm diameter is held in long bearings 1 meter apart and carries at its middle a disc of mass 12 kg. The concentricity of the centre of gravity of the disc from the centre of the rotor is 0.30 mm. The modulus of elasticity for the shaft material is 200 N/m² and the permissible stress is 70 MN/m², determine :

a) The critical speed of the shaft.

b) The range of speed over which it is unsafe to run the shaft. Neglect the mass of the shaft. (16)

Unit - V

5. Derive the governing equation of vibration for a tightly stretched string with tension P. Obtain the frequency equation and mode shape for the case when one end of the string is fixed while the other end is attached to a roller free to move vertically in a slot. (16)

(OR)

5. a) Write short note on Stodola's method. (8)

b) Using matrix method, determine the natural frequencies of the system shown in figure. (8)
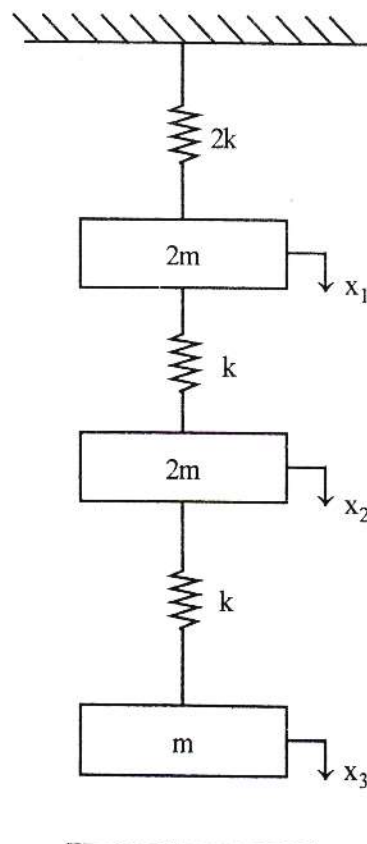
B.Tech. VI Semester (Back) Examination, April-2019
Mechanical Engineering
6ME5(O) Hydraulics Machines & Hydroelectric Power Plant

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

Instructions to Candidates:

Attempt any Five questions, selecting One question from each unit. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly Units of quantities used/calculated must be stated clearly).

Unit - I

1. a) Explain fundamental operations of a turbine with suitable examples. (4)
    b) Give classification of turbines on the basis of non-dimensional specific speed. Derive the expression of force exerted by fluid jet on stationary flat plate.(12)

(OR)

1. a) A 50 mm diameter jet having a velocity of 25 m/s, strikes a flat plate, the normal of which is inclined at 30° to the axis of the jet. Calculate the normal force exerted on the plate
    i)   When the plate is stationary,
    ii) When the plate is moving with a velocity of 10 m/s in the direction of the jet,
    iii) When the plate is moving with a velocity of 8 m/s parallel to itself and in the direction of the normal to its surface. Find also the work done and the efficiency of the jet when the plate is moving. (10)
    b) Explain different heads and efficiencies of hydraulic turbines. (6)

Unit - II

2. Explain the working of Pelton turbine. Derive the work done and efficiencies of Pelton wheel with suitable diagrams. (16)

(OR)

2. a) Explain in detail governing of Impulse turbine. (6)
    b) A Pelton wheel has a mean bucket speed of 12 m/s and is supplied with water at a rate of 750 liters per second under a head of 35 m. If the bucket deflects the jet through an angle of 160°, find the power developed by the turbine and its hydraulic efficiency. Take the coefficient of velocity as 0.98. Neglect friction in the bucket. Also determine the overall efficiency of the turbine if its mechanical efficiency is 80%. (10)

Unit - III

3. a) Explain the construction and working of Kaplan turbine with neat and clean diagram. **(8)**

   b) Discuss draft tube theory and determine the efficiency of a draft tube. **(8)**

(OR)

3. Explain the working of Francis turbine. Derive the expressions of work done and efficiencies of Francis turbine with neat and clean diagrams. **(16)**

Unit - IV

4. a) With neat sketches discuss the principle and working of a hydraulic torque converter. **(8)**

   b) Give the classification of reciprocating pumps on the basis of number of cylinders. Derive the expressions for the work done by different types of reciprocating pumps. **(8)**

(OR)

4. a) Discuss the working of hydraulic accumulator with neat sketches. **(8)**

   b) A double acting pump has a bore of 0.2 m and stroke of 0.4 m. The suction pipe has a diameter of 0.1 m and is fitted with an air vessel. Find the rate of flow into or from the air vessel when the crank makes angles of $30°, 90°, 120°$ with inner dead centre. Determine also the crank angles at which there is no flow to or from the air vessel. Take the speed as 120 rpm and assume that the plunger has simple harmonic motion. **(8)**

Unit - V

5. a) Discuss the factors affecting the selection of site for hydraulic power plant. What are the essential elements of hydro electric power plant? **(8)**

   b) Give the classification of hydroelectric power plants. What are the advantages and disadvantages of power generation from water? **(8)**

(OR)

5. a) What do you understand by hydrological cycle? Explain with the help of neat diagram. **(8)**

   b) The following data refers to a proposed hydro-electric power plant: Available head = 35 m, catchment area = 450 km^2, rainfall = 200 cm/year, turbine efficiency = 85%, generator efficiency = 90%, load factor = 0.48, penstock efficiency = 95%, percentage of total rainfall utilized = 70%. Calculate the power developed. **(8)**

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6E 7015

6E 7015

B.Tech. VI-Semester (Main & Back) Examination, April-2019
Mechanical Engineering
6ME5A Steam Engineering

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 26

Instructions to Candidates:

*Attempt any **Five questions**, selecting **One question** from **each unit**. All Questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.) Units of quantities used/calculated must be stated clearly.*

UNIT - I

1. a) Give an outline sketch showing the arrangement of water tubes and furnace of a Babcock and wilcox boiler. Indicate on it the path of the flue gases and water circulation. Show the positions of fusible plug, blow off cock and super heater. Mention the function of each. **(10)**

   b) List the advantages and disadvantages of firetube and watertube boilers. **(6)**

(OR)

1. a) What is circulation? Differentiate between natural and forced circulation boilers. **(8)**

   b) Write short notes on : **(2×4=8)**

   i)   Pre heater.

   ii) Economizers.

UNIT - II

2. a) A Convergent-Divergent nozzle expands steam from 14 bar and 300°C to 6 bar. If the flow rate is 1 kg/s. Find the throat and exit area. What should be the coefficient of velocity if the exit velocity is 550 m/s? **(10)**

   b) Define Mach number. What is its significance in design of diffusers and nozzles? **(6)**

(OR)

2. a) Air at 10°C and 8 KPa enters the diffuser of a jet engine steadily with a velocity of 200 m/s. The inlet area of the diffuser in $0.4m^2$. The air leaves the diffuser with a velocity that is very small compared with the inlet velocity. Determine: (8)

   i) The mass flow rate of the air.

   ii) The temperature of the air leaving the diffuser.

   b) Explain the physical significance of choked flow. Discuss about the flow through convergent divergent nozzle. (8)

UNIT - III

3. a) What do you mean by throttle governing in steam turbine? (4)

   b) In a simple steam impulse turbine, steam leaves the nozzle with a velocity of 1000 m/s at an angle of 20° to the plane of rotation. The mean blade velocity is 60% of velocity of maximum efficiency. If diagram is 70% and axial thrust is 39.24 N/kg of steam/sec, estimate. (12)

   i) Blade angles.

   ii) Blade velocity co-efficient.

   iii) Heat lost in KJ in friction per kg.

(OR)

3. a) The data pertaining to an Impulse turbine is as follow. Blade speed, 400 m/s, isentropic enthalpy drop, 500 kJ/kg; Nozzole efficiency, 0.9; Nozzole angle 20°; blade velocity coefficient 0.95; blade exit angle 30°. Calculate for a mass flow 1 kg/s. (12)

   i) The Inlet angle of moving blade.

   ii) Axial thrust.

   iii) Driving force and power.

   b) Why governing of turbines is essential. (4)

UNIT - IV

4. a) Explain the difference between ideal and actual regenerative cycles by showing the process on T-S and h-s diagram. Why actual regenerative cycle differs from Ideal Regenerative Cycle? (12)

   b) What do you understand by regenerative feed heating cycle? (4)

(OR)

6E7015   (2)

4. a) At a particular ring of a reaction turbine the blade speed is 67 m/s and the flow of steam is 4.56 kg/s, dry saturated at 1.403 bar. Both fixed and moving blades have inlet and exit angles 40° and 30° respectively. Determine : (12)

    i) Power developed by the pair of rings.

    ii) The required blade height which is to be one tenth of the mean blade ring diameter.

    iii) The heat drop required by the pair if the steam expands with an efficiency of 80%.

  b) What do you understand by "degree of reaction". (4)

UNIT - V

5. a) Explain with neat sketch reheat-regenerative feed heating cycle. Also draw T-S and h-s diagram. (8)

  b) Explain the working of binary vapour cycle with a neat sketch. (8)

(OR)

5. a) What is condenser? Name the different types of condenser. Describe the operation of surface condenser. (8)

  b) Steam is supplied to a turbine at a pressure of 32 bar and a temperature of 410°C. If the steam is reheated at 5.5 bar to a temperature of 395°C and then expands isentropically to a pressure of 0.08 bar. What is the dryness fraction at the end of expansion and thermal efficiency of the cycle? (8)

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6E 3054

6E 3054

B.Tech. VI - Semester (Back) Examination, April.2019
Mechanical Engineering
6ME6(O)Numerical Methods and Applied Statistics

Time : 3 Hours   Maximum Marks : 80
                                                           Min. Passing Marks : 26

Instructions to Candidates:

*Attempt any **Five questions**, selecting **One question** from **each unit**. All Questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly).Units of quantities used/calculated must be stated clearly.*

Unit - I

1. a) If $u = \dfrac{4x^3 y^3}{z^4}$ and error in x,y,z be 0.001, compute the relative maximum error in u when $x = y = z = 1$.   (8)

    b) Solve the equation $e^{-x} - x = 0$ by secant method correct to the four decimal places.   (8)

(OR)

1. a) Find all the roots of the polynomial
        $x^3 - 6x^2 + 11x - 6 = 0$, using the Graeffe's root squaring method.   (8)

    b) Find the root of the equation $x^3 - x - 4 = 0$ correct to the three decimal places using Newton- Raphson Method.   (8)

Unit - II

2. a) Use power Method find the largest eigen value in modulus and the corresponding eigen vector of the Matrix.   (8)

$$A = \begin{bmatrix} -15 & 4 & 3 \\ 10 & -12 & 6 \\ 20 & -4 & 2 \end{bmatrix}$$

    b) Find the polynomial which passes through (0,12) (1,0) (3,6) and (4,12) using lagranges Interpolation formula.   (8)

2. a) Using the partition Method determine the inverse of Matrix. (8)

$$A = \begin{bmatrix} 1 & 1 & 1 \\ 4 & 3 & -1 \\ 3 & 5 & 3 \end{bmatrix}$$

and Hence find the solution of system of following equations:

$$x_1 + x_2 + x_3 = 1$$
$$4x_1 + 3x_2 - x_3 = 6$$
$$3x_1 + 5x_2 + 3x_3 = 4$$

b) Use Bessel formula to find y_{25} from the following data:

$Y_{20} = 24$, $Y_{24} = 32$, $Y_{28} = 35$, $Y_{32} = 40$ (8)

Unit - III

3. a) Use Trapezoidal rule to calculate the value of the following integral and compare it with the exact value :

$$\int_{0.2}^{1.4} e^x dx, \quad h = 0.1$$

(8)

b) Use Taylor's series Method to find Numerical solution of the $\frac{dy}{dx} = x^2 + y^2$ with

$x = 1$, $y = 0$ at $x = 1.3$ (8)

(OR)

3. a) Use picard's Method to solve

$\frac{dy}{dx} = x + x^4 y$, when $x = 0$, $y = 3$ or $y(0) = 3$ also find $y(0.2)$ (8)

b) Use Runge - Kutta method of fourth order, Find an approximate value of $y(0.2)$ by solving.

$\frac{dy}{dx} = -2xy^2$ with $x = 0$, $y = 1$; $h = 0.1$ (8)

Unit - IV

4. a) Calculate the first four moments about the mean for the following distribution:

x:	6	7	8	9	10	11	12
y:	3	6	9	13	8	5	4

(5)

b) If the probability of defective bolts is 0.1, find the mean and standard deviation for the distribution of defective bolts in a total of 500. (5)

c) Prove that poisson distribution as the limiting case of binomial distribution.(6)

(OR)

4. a) X is a Normal variate with mean 30 and standard deviation 5. Find the probability that:

   i) $26 \le x \le 40$

   ii) $x \ge 45$

   iii) $|x - 30| \le 5$ (8)

   b) A dice is thrown 9,000 times and a throw of 3 or 4 is observed 3,240 times. Show that the dice can not be regarded as an unbiased one and find the limit between which the probability of a throw of 3 or 4 lies. (8)

Unit - V

5. a) A random sample of size 16 has 53 as mean. The sum of the squares of the deviation taken from the mean is 150. can the sample be taken from the population having 56 as mean? obtain 95% confidence limit of population Mean. (8)

   b) Calculate the coefficent of correlation between x and y using the following data :

x:	1	2	3	4	5	6	7	8	9
y:	9	8	10	12	11	13	14	16	15
   (8)

(OR)

5. a) Accident that occurred during the various days of the week. Test whether the accidents are uniformly distributed over the week. (8)

Days:	M	T	W	T	F	S
No. accidents:	14	18	12	11	15	14

   (b) i) Define the multiple correlation and partial correlation.

   ii) Three variables have in pairs simple correlation coefficient given by

   $r_{12} = 0.8$, $r_{13} = -0.7$, $r_{23} = -0.9$

   Find the Multiple correlation coefficent $R_{1.23}$ of x_1 on x_2 and x_3. (8)

6E 7018

B.Tech. VI-Semester (Main&Back) Examination, April-2019
Mechanical Engineering
6ME6.3A Maintenance Management

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

Instructions to Candidates:

*Attempt any **Five questions**, selecting **One question** from **each unit**. All Questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.) Units of quantities used/calculated must be stated clearly.*

Unit - I

1. a) Discuss the following terms :

   i)   Maintenance.

   ii)   Maintenance Engineering and list five sources of obtaining maintenance related information.

   b) Discuss environmental issues in maintenance with suitable example. **(10+6)**

(OR)

1. a) Write short notes on :

   i)   Total quality management.

   ii)   Total productive maintenance.

   b) Discuss in brief the safety regulation and importance of maintenance engineering in inventory control.   **(10+6)**

Unit - II

2. a) Discuss Six important maintenance management principle.

   b) Write and explain the important steps for developing preventive maintenance program.   **(8+8)**

(OR)

2. a) What are the benefits and draw back of preventive maintenance. (8)

    b) Compare :

     i) Planned and Unplanned maintenance.

     ii) Breakdown and Preventive maintenance. (2×4=8)

Unit - III

3. a) Discuss the various types of lubrication mechanism with suitable example.(8)

    b) Write a brief note on

     i) Seals and packing.

     ii) Logical fault location. (2×4=8)

(OR)

3. Write short notes :

    a) Friction wear and lubrication.

    b) Tribology in maintenance.

    c) Types of lubricants.

    d) Sequential fault location. (4×4=16)

Unit - IV

4. a) Write and explain about the Vibration and Acoustic analysis.

    b) Discuss the various instrument and equipments used in machine health monitoring. (8+8)

(OR)

4. Write short notes : (4×4=16)

    a) Advantage and disadvantage of condition monitoring.

    b) OIL analysis.

    c) Thermal signature.

    d) Data base design.

Unit - V

5. a) Define RAM in brief and discuss the failure data analysis.

    b) Discuss monte carlo simulation technique for system reliability. (8+8)

(OR)

5. a) Explain reliability of repairable and non repairable system with example.

    b) Write short notes on reliability prediction and testing. (8+8)

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