MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF AERONAUTICAL ENGINEERING

IV Year I Semester

QUESTION BANK

S.NO	SUBJECT
1	AIRFRAME STRUCTURAL DESIGN
2	MECHANICAL VIBRATION AND STRUCTURAL DYNAMICS
3	CONTROL THEORY-APPLICATION TO FLIGHT TO AIRCRAFT CONTROL SYTEM.
4	FLIGHT SCHEDULING AND OPERATIONS
5	CAD/CAM
6	**AME**

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DEPARTMENT OF AERONAUTICAL ENGINEERING

AIRFRAME STRUCTURAL DESIGN

MODEL PAPER-I

Answer all the questions [25]

1.	Discuss with a neat sketch the principal components of a/c	[2]
2.	Enumerate the types of materials evolved in aircraft manufacturing	[3]
3.	Discuss the after body loads on the a/c	[2]
4	Discuss the difference between doublers and splice with neat sketches	[3]
5.	Discuss about root rib bulkhead	[2]
6.	Explain about integrally stiffened panels	[3]
7.	Explain about kinematic design importance	[2]
8.	Explain the functions of fuselage	[3]
9.	Explain the Modes of failure in design phase	[2]
10.	Discuss about scatter factor and service life	[3]

Answer any one from each section 5x10=50

1 Explain with a neat sketch the flight loads acting on the aircraft

(or)

2. Explain the material properties of material used in a/c industry

3. Discuss about shim control and its requirements

(or)

4. Explain with neat sketches the theories of failure with required definitions

5. Explain in detail the principal structural components of wing, discuss about the various arrangements of spars and wing box combinations

(or)

6. Explain in detail the fasteners used in a/c industry

7. Explain the Landing gear functions, arrangement of wheels and gear

(or)

8. Explain the design criteria for forward and aft fuselage

9. Explain the modes of failure discussing the design process for each

(or)

10. Explain about:
service life fatigue life safe life fail safe

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AIRFRAME STRUCTURAL DESIGN

MODEL PAPER-II

Answer all the questions [25]

1. Explain few government regulation bodies in the world [2]
2. Explain the importance of flight envelope on structural design [3]
3. Explain about airplane stiffness data [2]
4 Discuss few points about shim control employed [3]
5. Explain about the bulkheads and pressure bulkhead [2]
6. Discuss about the flap operation mechanism with any one example [3]
7. Explain the oleo-pneumatic shock absorber [2]
8. Explain the visor arrangement for fighter a/c [3]
9. Explain fail safe and safe life [2]
10. Discuss about scatter factor [3]

Answer any one from each section 5x10=50

1 a. Explain the constraint baseline Aerodynamic configuration
b. Discuss the design requirements- certification flow chart, designer's functions, design considerations, engineer functions

(or)

2. Explain about airworthiness requirement and certification bodies for conformity

3. Discuss about the wing loads acting on the a/c by showing the span wise distribution along the wing with neat sketches

(or)

4. Explain about the different types of fasteners employed in a/c design their significance role in maintaining the airframe requirements

5. Explain
Skin stiffened panel Integrally stiffened panel Access holes

(or)

6. Explain the functions of ribs, their types with neat sketches

7. Explain the various types of shock absorbing mechanism used and compare

(or)

8. Discuss the types of engine mount in a/c design
9. Explain the fatigue design philosophy

(or)

10. Explain about:
    service life fatigue life safe life fail safe plain

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AIRFRAME STRUCTURAL DESIGN

MODEL PAPER-III

Answer all the questions [25]

1. Discuss about durability and damage tolerance [2]
2. Discuss about critical load conditions [3]
3. Explain about gust loads of a/c [2]
4 Explain with neat sketches the types of lugs [3]
5. Discuss the wing box arrangement [2]
6. Explain Leading edges with 3 examples . [3]
7. Explain about spring type of shock absorber [2]
8. Explain the 6 configuration in wing mount [3]
9. Explain GAG graph with stress [2]
10. Discuss about mechanical enviromnet [3]

Answer any one from each section 5x10=50

1 a. Explain the construction of flight envelope used in design of a/c
b. Discuss about margin of safety and factor of safety with required equations

(or)

2. Explain the types of materials used in a/c manufacturing from the Wright flyer to x-15

3. Write short notes on the following loads:
a. Fuselage b. Engine nacelle c. Wing Stores d. control surfaces

(or)

4. Explain about the airplane weight data and stiffness data important for a/c design
b. Discuss landing and taxing loads with neat sketches

5. Explain T.E and L.E surface used in a/c

(or)

6. Explain about wing joints, carry through structure and wing box in detail

7. Explain about various support structures in landing gear and discuss about tires, wheels, brakes

(or)

8. Discuss the design phases for landing gear
9. Explain damage tolerance requirements

(or)

10. Discuss the points focused in structural life estimation

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AIRFRAME STRUCTURAL DESIGN

MODEL PAPER-IV

Answer all the questions [25]

1. Explain structural stiffness and the structural integrity with examples [2]
2. Briefly explain about flight loads [3]
3. Write a short note on damage tolerance [2]
4. Write a short note on margin of safety [3]
5. Write a short note on failure theory [2]
6. Explain briefly about atmospheric maneuver. [3]
7. What are the types of loads falling on wing explain in detail [2]
8. What are fasteners [3]
9. What is the use of fittings [2]
10. Write in detail about types of engine mounts [3]

Answer any one from each section 5x10=50

1. Explain in detail the external loads acting on aircraft with required figures

(or)

2. Explain the terms
   a. safety margin
   b. v-n diagram flap up
   c. factor of safety
   d. JAR
   e. FAR

3.Explain wing loads acting on aircraft with required sketch and equations

(or)

4.Explain different types of fasteners with neat sketches

5. Explain the structural requirements of a wing & wing box.

(or)

6. Explain the terms

   a. Ribs b. spars c. bulkheads d. stringers e. stringer panel

7. Explain the terms with neat sketch

   a. Storage and retraction b. Shock absorbers c. Gear lock

(or)

11. Explain the types of engine mounts used on aircraft
12. Explain the catastrophic effects of fatigue failure in detail.

(or)

13. Explain the effect of physical and load environment design and the detail fabrication process.

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AIRFRAME STRUCTURAL DESIGN

MODEL PAPER-V

1. Write a short note on catastrophic effects [2]
2. Explain in detail about fatigue failure [3]
3. Give some examples of modes of failure [2]
4. Write a short note on shim control [3]
5. Write the requirements of shim control [2]
6. How will consider the material properties while choosing any design problem [3]
7. What are the mechanical properties we will consider while designing [2]
8. What is safe fail condition [3]
9. Explain the fatigue life of a structural component [2]
10. Give the modes of fatigue failure [3]

Answer any one from each section 5x10=50

1. Explain in detail the principal structural components with neat figure for fuselage

(or)

2. Explain in details about
   a. Aluminum alloys used in aircraft structural design
   b. Wrought forms used in airframe
3. Explain about landing gear types, and its loads

(or)

4. Explain different types of joints possible with neat sketches

5. Explain the leading edge & trailing edge assembly procedure.

(or)

6. Explain the structural design of flaps and ailerons.
7. Explain the structural design of fuselage with neat sketch.

(or)

8. Explain the landing gear design with its internal components and structure.

9. Explain about fail safe and safe life features in fatigue design.

(or)

10. Explain the terms
    a. Fatigue strength b. Scatter factor c. damage tolerance

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DEPARTMENT OF AERONAUTICAL ENGINEERING

MECHANICAL VIBRATION AND STRUCTURAL DYNAMICS

MODEL PAPER-I(R13)

MAXIMUM MARKS: 75

PART A **Max Marks: 25**

i. All questions in this section are compulsory
ii. Answer in TWO to FOUR sentences.

1. Find mass W, if the system has a natural frequency of 10 Hz shown in fig.1. Take K_1 = 2 N/mm, K_2 = 1.5 N/mm, K_3 = 3 N/mm and K_4 = K_5 = 1.5 N/mm. [3]

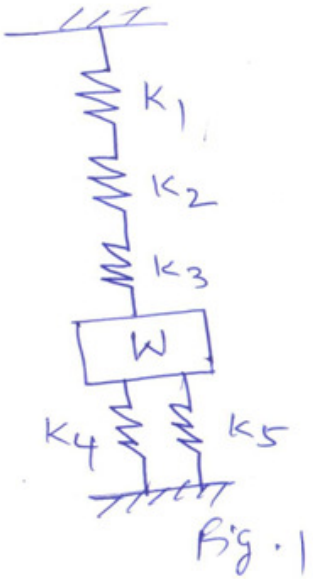


Fig. 1

2. What is vibration; write short notes on importance of vibration. [2]

3. What is meant by vibration isolation and transmissibility [3]

4. Derive the expression for natural frequency of undamped 2 DOF torsional vibration system. [3]

5. Write shortnotes on vibration isolation
   [2]

6. What is meant by coordinate coupling explain briefly
   [2]

7. Define (1) Fundamental frequency(2) Critical damping co-efficient (3) Time period
   [3]

8. Explain briefly about Frahm's read Tachometer with near sketch.
   [2]

9. What is meant by Eigenvalue and Eigenvector and explain with respect to vibration with an example.
   [3]

10. Write short notes about self-excitation and stability analysis
    [2]

PART B **Max Marks: 50**

i. Answer only one question among the two questions in choice.
ii. Each question answer (irrespective of the bits) carries 10M.

11. A weight attached to a spring of stiffness 625 N/m has a viscous damping device. When the weight is displaced and released, the period of vibration is found to be 2 seconds, and the ratio of consecutive amplitudes is 4 to 1. Determine the amplitude and phase when a Force F(t) = 20 Cos(5t) acts on the system [10]

OR

12. An unknown mass 'm' kg attached at the end of an unknown spring 'k' has a natural frequency of 100 cpm when 0.5 kg mass is added to 'm', the natural frequency is altered by 25% Determine the unknowns 'm' and 'k' ? ii) A spring mass system has a natural frequency of 10 rad/sec. The mass is pulled down from its static equilibrium position by 5 mm and given an upward velocity of 10 cm/sec, determine the ensuing motion. [10]

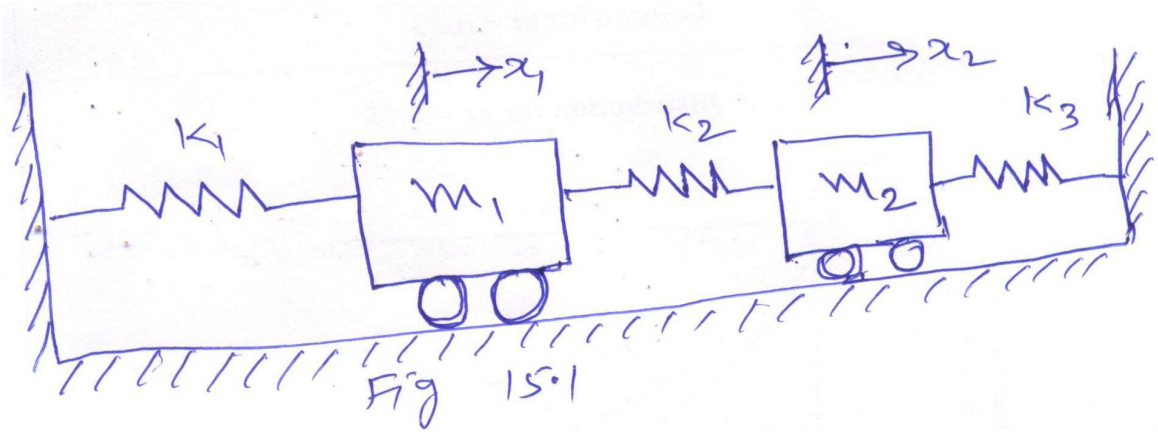
13. In a spring mass damper system the amplitude decays to half the original value in 4 oscillations and it takes 0.2 seconds to complete these oscillations. If the mass is set in

to free vibrations with an initial displacement of 5 mm and initial velocity of 0.5 m/sec, determine i) the subsequent motion ii) maximum amplitude of the mass iii) Time elapsed while the amplitude decays to less than or equal to 0.5 mm. [10]

OR

14. Why the vibration analysis for a vehicle free vibration due to engine balance for the single degree of freedom is required? Explain with an example. [10]

15 a) A uniform rod hangs freely from a hinge at the top. Using the three modes Φ1= x/l, Φ2= sin(x/l), and Φ3 = sin (2x/l), determine the characteristic equation by using the Rayleigh-Ritz method?
b). Determine the flexibility matrix for the spring-mass system shown in Fig.15.1 [5+5]



OR

16. Using Holzer's method, determine the natural frequencies and mode shapes of the torsional system of Fig. 16.1 when J = 1.0 kg-m^2 and K = 0.20 X 10^6 Nm/rad. [10]

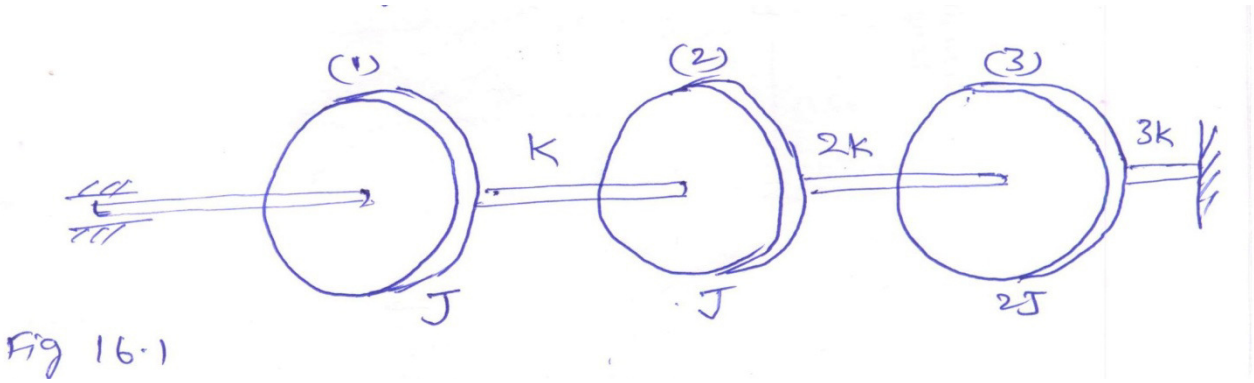


Fig 16.1

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17. Using the Rayleigh-Ritz method, determine the first two natural frequencies and mode shapes for the longitudinal vibration of a uniform rod with a spring of stiffness k0 attached to the free end, as shown in Fig17.1. Use the first two normal modes of the fixed-free rod in longitudinal motion. [10]

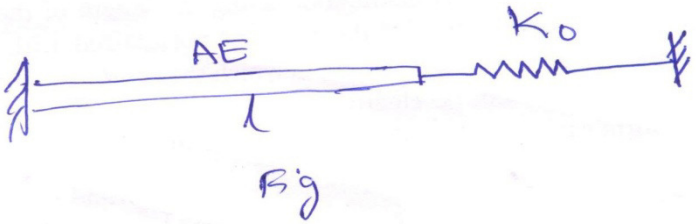

Fig. 17.1

OR

18. A machine of 20 kg mass is to be mounted on a vibrating base. The base vibration rages from 60 Hz to 75 Hz. And the amplitude varies from 2 mm to 3 mm. If the machine is to be isolated such that the amplitude is less than or equal to 0.5 mm determine the equivalent stiffness of the isolator to be used? [10]

19. Why the vibration analysis for a vehicle free vibration due to engine balance for the single degree of freedom is required? Explain with an example. [10]

OR

20. What is the need for vibration analysis for a vehicle free vibration due to road roughness for the single degree of freedom? Explain with an example. [10]

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DEPARTMENT OF AERONAUTICAL ENGINEERING

MECHANICAL VIBRATION AND STRUCTURAL DYNAMICS

MODEL PAPER-II(R13)

MAXIMUM MARKS: 75

PART A **Max Marks: 25**

iii. All questions in this section are compulsory
iv. Answer in TWO to FOUR sentences.

1. Derive the expression for natural frequency of undamped free vibration system (3M)
2. Derive the equation of machine of undamped forced vibratory system (3M)
3. Explain briefly about hysteresis dumpily and coulomb dumpily. (2M)
4. Find the natural frequency of the system shown in fig-1. Take $K_1 = K_2$ =1500 N/m, K_3 =2000 N/m and m= 5kg (3M)

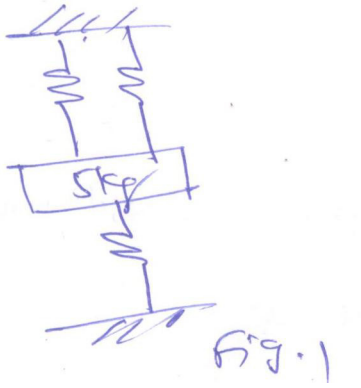

Fig.1

5. Derive the expression for natural frequency of undamped 2 DOF spring –mass system. (3M)
6. Write short notes on inference coefficients (2M)
7. Write the procedure to derive equation of motion using Lagrange's equation (2M)

8. Define the term vibration and write different types of vibrations (2M)
9. Define (1) Logarithmic decrement
   (2) Periodic and a periodic motion
   (3) Potential energy (3M)

10. Write short notes an
    (1) Principal coordinates
    (2) Semi-definite system (2M)

PART B **Max Marks: 50**

iii. Answer only one question among the two questions in choice.
iv. Each question answer (irrespective of the bits) carries 10M.

11. What effect does a decrease in mass have on the frequency of a systems (10M)

(OR)

12. A cylinder of mass M radius' **r** 'rolls without slipping on a cylindrical surface of radius '**R'**. Find the natural frequency for small oscillation about the lowest point. (10M)
13. Find the steady state response of undamped single DOR systems subjected to the force
    F(t)= $F_0 e^{iwt}$ by using the method of Laplace transformation (10M)

(OR)

14. Two rotors A & B are attached to the ends of a shaft 800mm long. The mass of the rotor '**A**' is 600 kg and is radius of gyration is 500mm. The corresponding values of rotor **B** 700kg and 600mm respectively. The shaft is 90mm diameter for the first 300mm, 150mm for next 180mm length and 120mm for the remaining length. Modulus of rigidity of the shaft material is $0.8x10^5 MN/m^2$. Find
    1) The position of the node.
    2) The frequency of torsional vibration (10M)

15. A uniform bar of length **l** is fixed at one end and the free end is stretched uniformly $\boldsymbol{l_0}$ and released at t=o. find the resulting longitudinal vibration.
(10M)

(OR)

16. A uniform circled shaft of length l is fixed at the two ends. at its middle point a torque **To** is applied which twists it by θ_0 radians at the middle point. If the torque is released suddenly. Find the subsequent motion.
(10M)

17. Compare the mode shape of a rotating shaft with a stationary shaft assuming that the shaft is rotating on a soft bearing
(10M)

(OR)

18. (a) what is a principal coordinate
(b) the equation of motion of a two degrees of freedom system is given by

$$\begin{bmatrix} m & 0 \\ 0 & \frac{mL^2}{12} \end{bmatrix} + \begin{bmatrix} 2K & -\frac{KL}{4} \\ -\frac{KL}{4} & \frac{5KL^2}{16} \end{bmatrix} \begin{bmatrix} x \\ \theta \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

The eigenvectors for the above system given by $X_1 = \begin{bmatrix} 1 \\ \frac{1.43}{L} \end{bmatrix}$, $X_2 = \begin{bmatrix} 1 \\ \frac{-8.42}{L} \end{bmatrix}$

Calculate the principal coordinates of the system.
(10M)

19. a) What are static and dynamic couplings?
b) Derive the differential equations governing free vibration of the system shown in figure 19.1, comprising a straight slender balance Supported by two springs and discuss the coupling using **x and θ** as generalized coordinates
(4+6M)

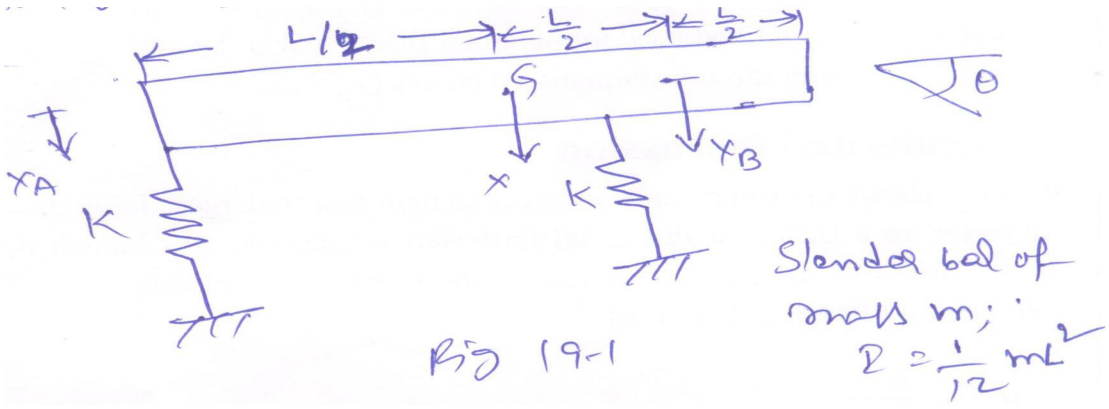

Fig 19-1

OR

20. What is the need for vibration analysis for a vehicle free vibration due to road roughness for the single degree of freedom? Explain with an example. (10M)

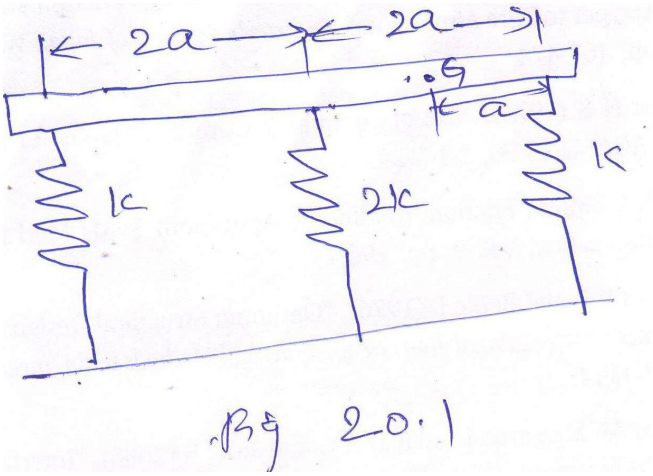

Fig 20.1

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DEPARTMENT OF AERONAUTICAL ENGINEERING

MECHANICAL VIBRATION AND STRUCTURAL DYNAMICS

MODEL PAPER-III(R13)

MAXIMUM MARKS: 75

PART A **Max Marks: 25**

iAll questions in this section are compulsory

iiAnswer in TWO to FOUR sentences.

1. Derive the expression for natural frequency of undamped free vibration system (3M)
2. Derive the equation of machine of undamped forced vibratory system.(3M)
3. Explain briefly about hysteresis dumpily and coulomb dumpily.(2M)
4. Find the natural frequency of the system shown in fig-1. Take K_1=K_2=1500 N/m,K_3=2000 N/m and m= 5kg (3M)

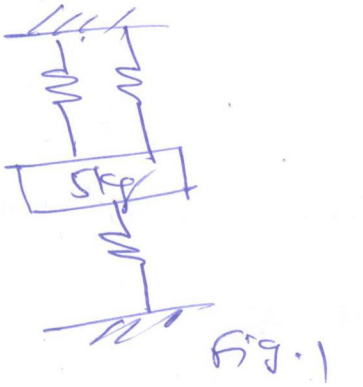


Fig.1

5. Derive the expression for natural frequency of undamped 2 DOF spring –mass system.(3M)
6. Write short notes on inference coefficients (2M)
7. Write the procedure to derive equation of motion using Lagrange's equation(2M)
8. Define the term vibration and write different types of vibrations(2M)
9. Define (1) Logarithmic decrement
   (2) Periodic and a periodic motion
   (3) Potential energy (3M)

10. Write short notes an
    (1) Principal coordinates

(2) Semi-definite system (2M)

PART B **Max Marks: 50**

I Answer only one question among the two questions in choice.

II Each question answer (irrespective of the bits) carries 10M.

11. What effect does a decrease in mass have on the frequency of a systems

(OR)

12. A cylinder of mass M radius' **r** 'rolls without slipping on a alindrical surface of radius '**R'**. Find the natural frequency for small oscillation about the lowest point.

13. Find the steady state response of undamped single DOR systems subjected to the force

F(t)= $F_0 e^{iwt}$ by using the method of laplace transformation

(OR)

14. Two rotors A & B are attached to the ends of a shaft 800mm long. The mass of the rotor '**A**' is 600 kg and is radius of gyration is 500mm. The corresponding values of rotor **B** 700kg and 600mm respectively. The shaft is 90mm diameter for the first 300mm, 150mm for next 180mm length and 120mm for the remaining length. Modulus of rigidity of the shaft material is 0.8x10^5MN/m^2. Find

3) The position of the node.

4) The frequency of torsional vibration

15. A uniform bar of length **l** is fixed at one end and the free end is stretched uniformly l_0 and released at t=o. find the resulting longitudinal vibration.

(OR)

16. A uniform circled shaft of length l is fixed at the two ends at its middle point a torque **To** is applied which twists it by θ_0 radians at the middle point. If the torque is released suddenly. Find the subsequent motion.

17. Compare the mode shape of a rotating shaft with a stationary shaft assuming that the shaft is rotating on a soft bearing.

(OR)

18. (a) what is a principal coordinate

(b) the equation of motion of a two degrees of freedom system is given by

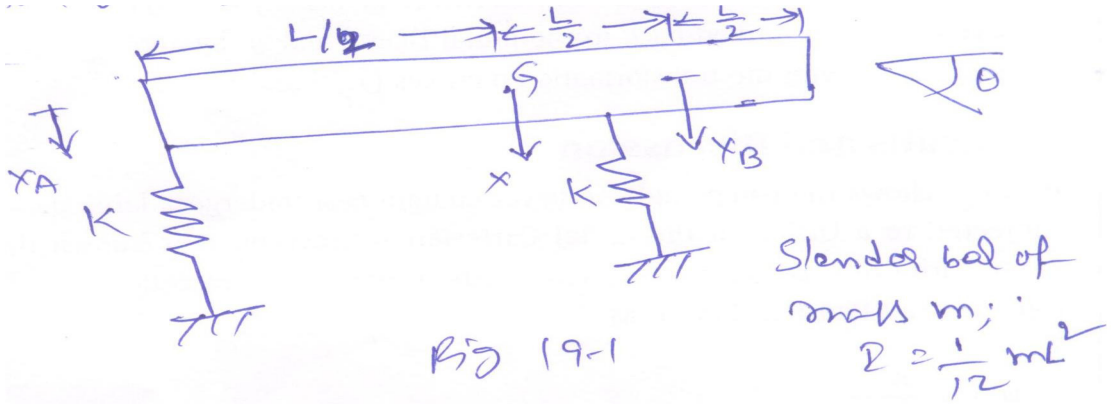
$$\begin{bmatrix} m & 0 \\ 0 & \frac{mL^2}{12} \end{bmatrix} + \begin{bmatrix} 2K & -\frac{KL}{4} \\ -\frac{KL}{4} & \frac{5KL^2}{16} \end{bmatrix} \begin{bmatrix} x \\ \theta \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

The eigen vectors for the above system or given by $X1=\begin{bmatrix}1\\ \frac{1.43}{L}\end{bmatrix}$, $X2=\begin{bmatrix}1\\ \frac{-8.42}{L}\end{bmatrix}$

Calculate the principal coordinates of the system.

19. a) what are static and dynamic couplings?

b) derive the differential equations governing free vibration of the system shown in figure 19.1,comprising a straight slender balance Supported by two springs and discuss the coupling using **x and θ** as generalized coordinates



(OR)

20. The rigid beam shown in figure in its position of static equilibrium in the figure has a mass m and a mass moment of inertia $2ma^2$ about an axis perpendicular to the plane of the diagram and through its centre of gravity G. assuming no horizontal motion of G, derive the equation of motion considering the vertical displacement of CG and the rotation about the CG as the coordinates. Find the frequencies of small oscillations and the corresponding position of nodes. Identify the natural coordinates for decoupling the equations of motion.

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MECHANICAL VIBRATION AND STRUCTURAL DYNAMICS

MODEL PAPER-IV(R13)

MAXIMUM MARKS: 75

PART A **Max Marks: 25**

I All questions in this section are compulsory

II Answer in TWO to FOUR sentences.

1. Write a note on stiffness influence coefficients[2]
2. Derive the equation of motion of a simple spring mass system using energy method[3]
3. Define the terms SHM, resonance and time period[3]
4. Explain briefly about and coulomb dumping[3]
5. Write short notes on vibration isolation [2]
6. What is meant by static coupling in vibration system [3]
7. Write short notes on modeshapes with examples[2]
8. Write the procedure to find eigenvalue for the 3 DOF system[3]
9. Write short notes on transfer function in vibrations[2]
10. List out some vibration applications in airborne system[2]

PART B **Max Marks: 50**

I Answer only one question among the two questions in choice.

II Each question answer (irrespective of the bits) carries 10M.

1.

11. Define force transmissibility and obtain expression for
    i. Force transmissibility
    ii. Phase leg of transmitted force with impressed force.

(OR)

12. A machine of mass 100kg cylinder at 600 rpm has a rotating **unbalance** of 100kg .mm. The machine is mounted on springs having stiffness 85 KN/m and negligible damping. The system is contained to more axially.
    a. Determine the steady state amplitude.
    b. If the damping is introduced to reduce the amplitude. By 50%, what should be the damping coefficient also find damping factor.
13. Find the fundamental natural frequency of Transverse vibration for the student shown in fig.1 by **dunkerles** method.

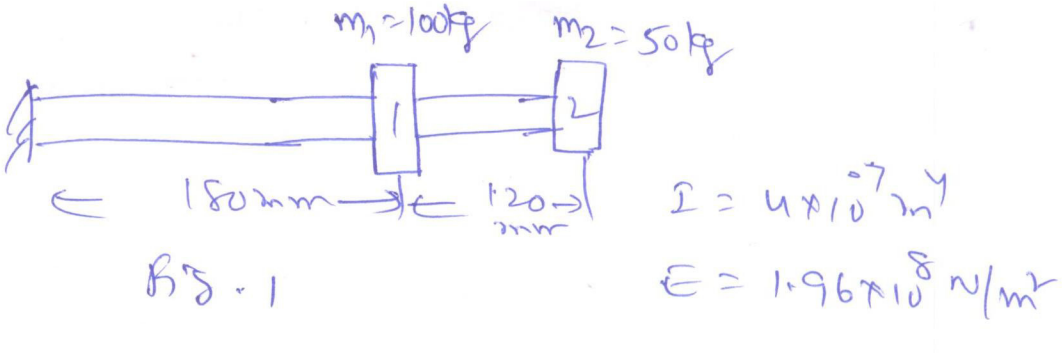
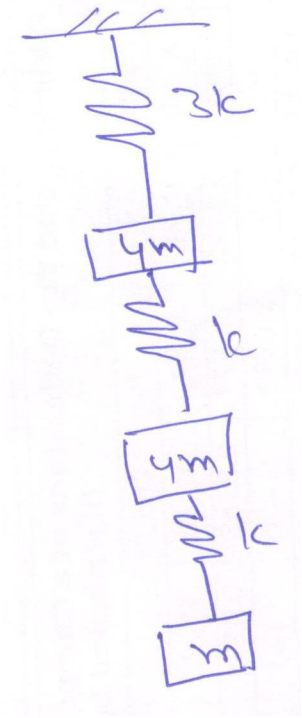


Fig. 1

(OR)

14. Find the fundament material frequency for the system shown in fig.2 by the method of matrix iteration



15. a) State the types of damping and explain in brief viscous damping.
    b) A spring mass- dashpot system has mass 10kg and stiffness 40N/m. if the amplitude of free vibration decreases to 25% of original value after 5 c**ycles.** Determine the damping coefficient.

(OR)

16. Define logarithmic decrement show that logarithmic decrement can be expressed as **S=** $\frac{l}{n}$ **log e** $\frac{x_o}{x_n}$ (derive the expression), where x_o is amplitude at particular maximum and x_n is amplitude after on cycles.

17. A mass of 100 kg is suspended on a spring having a stiffness of 19600 N/m and is acted up on by a harmonic force of 39.2 N at the undamped natural frequency. The damping coefficient is 98 N-S/m, determine**.**
    a) Undamped natural frequency
    b) Amplitude of vibration of mass.
    c) Phase difference between force and displacement.

(OR)

18. A spring is tightly stretched between two supports as shown in fig.3. The tension T θ In the spring may be assumed to be constant for small displacement. Obtain the two natural frequencies for the system.

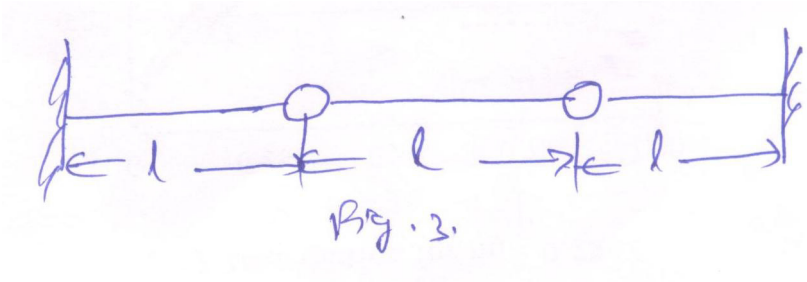


Fig. 3.

19. Derive the expression for longitudinal vibration of a bar.

(OR)

20. Derive the expression for vibration of string under tension.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF AERONAUTICAL ENGINEERING

MECHANICAL VIBRATION AND STRUCTURAL DYNAMICS

MODEL PAPER-V(R13)

MAXIMUM MARKS: 75

PART A **Max Marks: 25**

I All questions in this section are compulsory

II Answer in TWO to FOUR sentences.

1. Write a note on influence coefficients[2]
2. Define the terms damping factor and logarithmic decrement[3]
3. What are continuous systems? explain[2]
4. Derive the equation of motion of a simple spring mass system using Newton's laws of motion[3]
5. Define the terms periodic motion, phase difference and DOF[2]
6. Explain briefly about modal analysis [3]
7. Differentiate discrete systems and distributed systems in vibrations[2]
8. Derive the equation of machine of undamped forced vibratory system[3]
9. Explain briefly about hysteresis dumping[2]
10. Explain briefly about dynamic coupling in vibration system[3]

PART B **Max Marks: 50**

I Answer only one question among the two questions in choice.

II Each question answer (irrespective of the bits) carries 10M.

11. Using **stodola** method find the fundamental natural frequency and mode shape of the system shown in fig .1

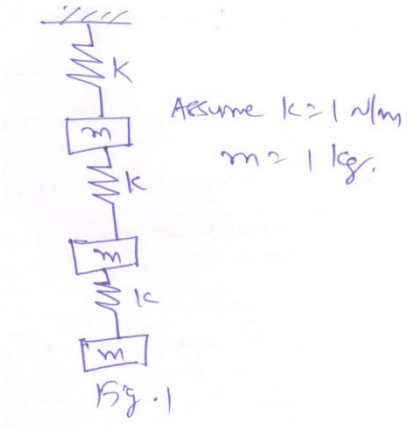


Fig.1

(OR)

12. a). Derive the following terms
    i. Resonance
    ii. Simple harmonic motion
    iii. Time period

    b) Analyse the following motion

    X_1 =2 Cos (wf + 0.5)

    X_2 = 5 sin (wf +1.0)

13. A spring of an auto mobile frailer are compressed 0.1 under its own weight. Find the critical speed when the auto mobile is traveling over a road with a profile approximated by a sine wave of amplitude 0.08m and a wavelength of 14m. What will be the amplitude of ……. At 60 Km/hr.

(OR)

14. Determine the natural frequencies and mode shapes for a system shown in fig.2. J_1 and J_2 are mass moment inertias of the discs K_t isfor final stiffness of shaft.

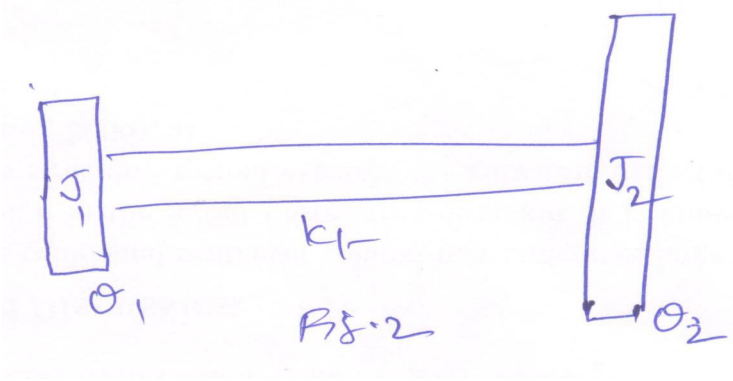
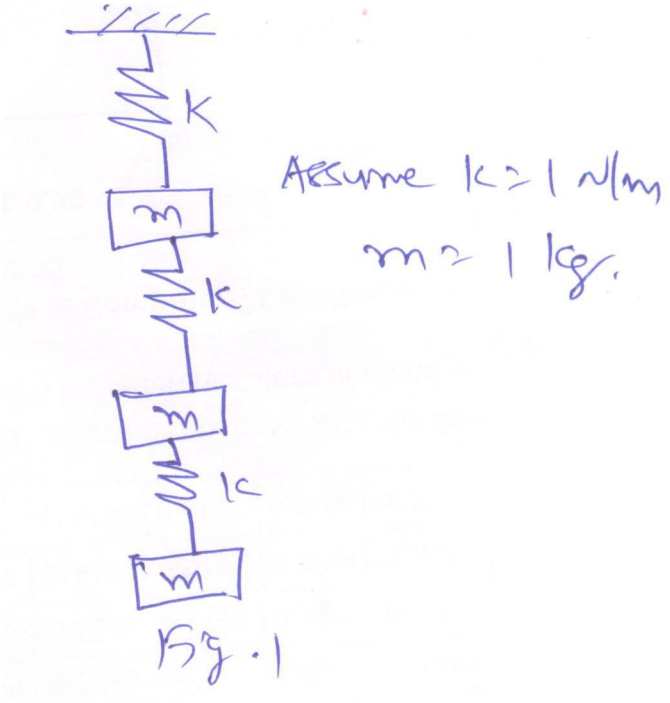


Fig.2

15. A steel cantilever become carrying a weight of 100gms at the free end is used as frequency meter. The beam has a length of 10cm, weight of 0.5gm and thickness of 2mm. The internal friction is equivalent to a damping ratio of 0.05. When the fixed end of the beam is subjected to a harmonic displacement y(t)= 0.5 Cos wt cm, the maximum tip displacement is observed to be 2.5cm, find the forcing frequency w.

(OR)

16. Using **stodola** method find the fundamental natural frequency and mode shape of the system shown in fig .1



17. a). Derive the following terms
    iv. Resonance
    v. Simple harmonic motion
    vi. Time period

    b) Analyse the following motion

    X_1 =2 Cos (wf + 0.5)

    X_2 = 5 sin (wf +1.0)

(OR)

18. A spring of an auto mobile trailer are compressed 0.1 under its own weight. Find the critical speed when the auto mobile is traveling over a road with a profile

approximated by a sine wave of amplitude 0.08m and a wavelength of 14m. What will be the amplitude of 5cm at 60 Km/hr.

19. Derive the expression for torsional vibration of a shaft.

(OR)

20. Derive the expression for transverse vibration of a beam.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF AERONAUTICAL ENGINEERING

CONTROL THEORY-APPLICATION TO FLIGHT TO AIRCRAFT CONTROL SYTEM.

MODEL PAPER-I(R13)

Time: 3 Hours **Max marks: 75**

MODEL QUESTION PAPER- 1

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B contains of 5 units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART –A (25 Marks)

1a) what are the advantages/Disadvantages of open loop system compared to closed loop system? [2]

b) Discuss the effect of feedback on overall gain. [3]

c) Give the expression for the rise time of the step response for

second order system. [2]

d) Define transfer function. [3]

e) Define steady state error constants. [2]

f) Discuss merits of robust control. [3]

g) Discuss need for automatic control. [2]

h) Explain the purpose of auto pilot. [3]

i) Discuss the limitation of classical control. [2]

j) What is time invariant linear system? [3]

PART-B (50 Marks)

2 a) Describe a SISO Single input single output) system and a MIMO (Multiple input and multiple output) system and explain how they are analyzed.

b) Describe non linear system and discuss how they are linearized.

OR

3a) Explain the role of feedback in stability augmentation, control augmentation and automatic control with example.

b) Discuss use of transducer, sensor and filter in control system.

4a) Find the poles and zeros of a control system whose transfer function is given by

$G(s) = (s+3)/ (s^2+7s+12)$

b) With example explain the significance of gain and phase margin.

OR

5a) Discuss the significance of corner frequencies, resonant frequencies and peak gain of a second order system.

b) Explain the experimental method of determining system transfer function by frequency response measurements.

6a) Discuss the functioning of proportional plus derivative control.

b) Discuss the Root Locus method.

OR

7(a) Discuss the purpose and functioning of lead, lag and wash-out filters.

b) Discuss Nyquist criterion.

8a) Discus the relationship between flying qualities and aircraft transfer function.

b) Discuss Zeigler and Nicholos method.

OR

9a) Discuss the role of auto-pilot as stability augmenter.

b) Discuss briefly functioning of fly-by-wire control.

10a) Define the state variable and state equations with examples.

b) Discuss the properties of state transition matrix.

OR

11a) Discuss the significance of Canonical transformation of state equations.

b) Discuss the advantages and disadvantages of digital control system.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF AERONAUTICAL ENGINEERING

CONTROL THEORY-APPLICATION TO FLIGHT TO AIRCRAFT CONTROL SYTEM.

MODEL PAPER-II(R13)

Time: 3 Hours **Max marks: 75**

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B contains of 5 units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART –A (25 Marks)

1a) Define dynamical systems and list its components. [3]

b) Define linear time invariant system. [2]

c) Discuss the relationship between impulse response and transfer function. [3]

d) What do you mean by frequency transfer function? [2]

e) What are the steady state and transient response specified? [3]

f) Discuss the problem with derivative control. [2]

g) Explain the role of rate feedback in stability augmentation system. [3]

h) Differentiate between reversible and irreversible control. [2]

i) Define matrix transfer function. [3]

j) Define controllability. [2]

PART-B (50 Marks)

2. (a) For a unity feedback system given by G(s) = $\frac{20(s+2)}{s(s+3)(s+4)}$

i) Find the static error constants ii) find the steady error for r (t) = 3 u(t).

b) Explain about the standard test signals.

OR

3a) With example explain the method of modeling dynamical systems using differential equations.

b) Discuss modeling and transfer function of i) servomotor ii) actuators.

4a) A control system is defined by the following differential equation. Find the output response y (t) using Laplace transform method. Assuming y(t) and dy(t)/dt are zero at t = 0.

$\frac{d2y(t)}{dt2}$ + 7 $\frac{dy(t)}{dt}$ +12 y (t) = u (t) where u t) is unit step unit.

b) Discuss Bode and Polar Plot.

OR

5a) Discuss the significance of band width, resonant frequencies, peak gain in relation to second order system.

b) With example discuss the time domain specifications of second order control system.

6a) Define and discuss the purpose of gain scheduling.

b) What are the methods of determining the stability of closed loop system?

OR

7a) Discuss merits and constraints of non linear control.

b) Discuss gain and phase margin with suitable examples.

8a) Discuss the flying qualities requirement of an aircraft. What is pilot's opinion rating?

b) Discuss purpose and functioning of pitch, yaw and bank hold auto pilot.

OR

9a) Discuss the role of displacement and rate feedback in the design of stability augmentation system.

b) Discuss the role and purpose of displacement auto-pilot.

10a) What is observability? Explain the tests for observability.

b) Check whether the system represented by

$$\begin{bmatrix} \dot{x}1 \\ \dot{x}2 \\ \dot{x}3 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{bmatrix} \begin{bmatrix} x1 \\ x2 \\ x3 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u,$$ is controllable or not.

OR

11. Write the advantages and disadvantages of digital control system over analog control system.

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DEPARTMENT OF AERONAUTICAL ENGINEERING

CONTROL THEORY-APPLICATION TO FLIGHT TO AIRCRAFT CONTROL SYTEM.

MODEL PAPER-III(R13)

Time: 3 Hours **Max marks: 75**

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B contains of 5 units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART –A (25 Marks)

1a) Discuss the merits of open loop system.

b) Discuss the need for a stable system.

c) Define and explain transfer function.

d) What do you mean by polar plot?

e) Define steady state error.

f) Describe the merits and demerits of non linear system.

g) What do you mean by pilot's opinion rating?

h) Draw the block diagram of a pitch attitude hold auto-pilot.

i) Discuss the significance of canonical transformation.

j) What is matrix transfer function?

PART-B (50 Marks)

2a) Describe a SISO and MIMO system and explain how they are analyzed.

b) Discuss the importance of studying control system.

OR

3a) Discuss the purpose and functioning of various filters used in control systems.

b) How is overall system stability determined?

4a) Discuss second order system specifications in time domain.

b) Transfer function of a control system is s/((s+1)(s+2)). Find the response for the unit step input.

OR

5a) Write short notes on (i) Gain and phase shift . (ii) Resonant frequency.

b) Describe the relation between transfer function and impulse response.

6a) What is compensator? Explain about lead compensator.

b) Discuss the merits and demerits of PID controller.

OR

7a) Write short notes on (i) Gain scheduling (ii) Adaptive control

b) Discuss phase margin and gain margin.

8a) discuss the steps to determine the transfer function of an aircraft.

b) Discuss Zeigler and Nichols method in design of controllers.

OR

9a) Write short notes on reversible and irreversible flight control system.

b) Differentiate between stability control system and control augmentation system.

10a) Discuss the method of modeling dynamical system using state space equations.

b) Discuss general form of time invariant linear system.

OR

11a) What is controllability? How do you test the controllability of a system?

b) Discuss the advantages of digital control system over analog control system.

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DEPARTMENT OF AERONAUTICAL ENGINEERING

CONTROL THEORY-APPLICATION TO FLIGHT TO AIRCRAFT CONTROL SYTEM.

MODEL PAPER-IV(R13)

Time: 3 Hours **Max marks: 75**

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B contains of 5 units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART –A (25 Marks)

1(a) Define dynamical system. (2)

(b) What do you understand by Time invariant linear system? (3)

(c) Briefly discuss impulse and indicial response. (2)

(d) What is the relation between transfer function and impulse response? (3)

(e) Write the properties and application of wash-out filter. (2)

(f) State Nyquist's criterion. (3)

(g) Differentiate between reversible and irreversible control. (2)

(h) Write the purpose of autopilots. (3)

(i) Define state variable and state equation. (3).

(j) Define observability. (2)

PART- B (50 Marks)

2. (a) Discuss deterministic and stochastic control system.

(b) Discuss application of feedback in stability augmentation system.

OR

3(a) Discuss merits of feedback control.

(b) Discuss modeling and transfer function of different filters used in aircraft control.

4.(a) Discuss frequency response method of control system design.

(b) Discuss Bode and Polar plots.

OR

5(a) Discuss the procedure of experimental determination of system transfer functions by frequency response measurements.

(b) Discuss the significance of resonant frequency and bandwidth.

6(a) Discuss the application of proportional and integral control.

(b) Discuss implementation, application of adaptive control.

OR

7(a) Discuss the significance and interpretation of gain margin, phase margin.

(b) Discuss frequency response method of analysis and compensation in control system.

8(a) Discuss the response of an aircraft to pilot's control input and atmosphere.

(b) Discuss pole-zero and time-response specifications of flying quality requirements.

OR

9. (a) With help of block diagram explain the functioning and components of a displacement autopilot.

(b) Discuss the functioning of normal acceleration command maneuvering autopilot.

10.(a) Discuss state space modeling of dynamical system.

(b) Discuss the properties of state –transition matrix.

OR

11. Discuss the process of numerical solution of state equation.

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DEPARTMENT OF AERONAUTICAL ENGINEERING

CONTROL THEORY-APPLICATION TO FLIGHT TO AIRCRAFT CONTROL SYTEM.

MODEL PAPER-V(R13)

Time: 3 Hours **Max marks: 75**

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B contains of 5 units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART –A (25 Marks)

1. (a) Discuss sensitivity of output to control input in a feedback control system. (2)

(b) What is the need for a robust control? (3)

(c) Explain the difference between system parameters and characteristic parameters. (2)

(d) What do you understand by gain margin and phase margin? (3)

(e) Define steady state error. (2)

(f) What do you mean by compensation through pole zero cancellation? (3)

(g) What is the purpose of stability augmentation system? (2)

(h) Bring out the purpose of feedback signals in autopilot. (3)

(i) Differentiate between state variable and state equation. (2)

(j) Define controllability. (3)

PART B

2(a) Discuss the procedure for analyzing SISO and MIMO system.

(b)Discuss linear and non-linear systems with examples.

OR

3. (a) Discuss the rules and conventions of reducing the block diagram of complex systems.

(b) Discuss the application of feedback control in control augmentation system and automatic systems.

4. (a) Discuss the following:

(i) Poles and zeros

(ii) Dominant pole.

(b) Discuss the following

(i) Resonant frequency

(ii) Peak Gain

OR

5(a) Discuss the purpose of Bode plot.

(b) Solve the following differential equation using Laplace transform.

$\frac{d2y(t)}{dt2}$ + 7 $\frac{dy(t)}{dt}$ +12 y (t) = u (t); where u t) is unit step unit. Assume y (t) and d y (t)/dt is 0 at t = 0.

6(a) Discuss steady state and transient specifications of a second order system.

(b) Discuss following type of controllers:

(i) Series controller

(ii) Feedback controller

(iii) Active controller

OR

7. Discuss frequency response method of determining the stability of a closed loop system.

8(a) Discuss how approximate aircraft transfer function is obtained.

(b) Discuss the role of rate feedback in stability augmentation system.

OR

9(a) Discuss the purpose and functioning of fly-by-wire system.

(b) Discuss the need for automatic control.

10. (a) discuss limitation of classical control theory when applied to MIMO systems.

(b) Explain the general form of linear time invariant system.

OR

11(a) Discuss the significance of Canonical transformation.

(b) Write the advantages and disadvantages of digital control systems.

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DEPARTMENT OF AERONAUTICAL ENGINEERING

FLIGHT SCHEDULING AND OPERATIONS

MODEL PAPER-I(R13)

MAXIMUM MARKS – 75

PART A **Max Marks: 25**

v. All questions in this section are compulsory
vi. Answer in TWO to FOUR sentences.

1. Define network [2m]
2. Define destination node [2m]
3. Define demand node [2m]
4. Define transshipment node [2m]
5. Define directed arc [2m]
6. Define hub and spoke [3m]
7. What do you mean by fleet assignment [3m]
8. Write a short note on fleet availability [3m]
9. Write a short note on crew pairing [3m]
10. Write a short note on aisle interference [3m]

PART B **Max Marks: 50**

v. Answer only one question among the two questions in choice.
vi. Each question answer (irrespective of the bits) carries 10M.

11. Describe the hub and spoke concept

or

12. Describe the 'point to point' concept in flight schedules
13. Explain briefly about the scope of scheduling

or

14. Explain briefly about the scope of scheduling and routing
15. Write a short note on Load factor turn around and Passenger spill

or

16. Explain the importance of "optimization" in the airline operations.
17. What is the significance of flight scheduling

or

18. What is the Purpose of fleet assignment?

19. Write a short note on fleet diversity

or

20. How do you formulate the fleet assignment problem

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DEPARTMENT OF AERONAUTICAL ENGINEERING

FLIGHT SCHEDULING AND OPERATIONS

MODEL PAPER-II(R13)

MAXIMUM MARKS – 75

PART A **Max Marks: 25**

i. All questions in this section are compulsory
ii. Answer in TWO to FOUR sentences.

1. Define source node [2m]
2. Write a short note on crew rostering [2m]
3. Write a short note on man power scheduling [2m]
4. Define supply node [2m]
5. Define undirected arc [2m]
6. What do you mean by flight scheduling [3m]
7. Write a short note on gate assignment [3m]
8. How do the flow between the 2 nodes can be represented [3m]
9. What do you mean by crew pairing [3m]
10. write a short note on fleet diversity [3m]

PART B **Max Marks: 50**

i. Answer only one question among the two questions in choice.
ii. Each question answer (irrespective of the bits) carries 10M.

11. Explain in detail about the common strategies for aircraft boarding process

or

12. Write a short note on recapture rate.
13. Explain the importance of 'optimization' in the airline operations

or

14. Describe the Hub & Spoke concept and "point to point" concept in the flight schedules.
15. Write the mathematical formulation for shortest path problem by taking any network using objective functions

or

16. Briefly explain about scheduling and routing using different parameters
17. Draw a network showing of constraints- flight coverage and aircraft availablity

or

18. Write a short note on fleet types
19. Write a short note on significance and development of crew pairing

or

20. Describe in detail about Crew rostering- rostering practices

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DEPARTMENT OF AERONAUTICAL ENGINEERING

FLIGHT SCHEDULING AND OPERATIONS

MODEL PAPER-III(R13)

MAXIMUM MARKS – 75

PART A **Max Marks: 25**

iii. All questions in this section are compulsory
iv. Answer in TWO to FOUR sentences.

1. Define hub airport [2m]
2. Write a short note on fleet assignment [2m]
3. Write a short note on formulation of fleet [2m]
4. Define crew rostering [2m]
5. Define baggage handling [2m]
6. What do you mean by recapture rate [3m]
7. Name some of the factors that impact the assignment of gates [3m]
8. How do the baggage handling done at the airport [3m]
9. What do you mean by RFID [3m]
10. How do calculate baggage transport distance [3m]

PART B **Max Marks: 50**

iii. Answer only one question among the two questions in choice.
iv. Each question answer (irrespective of the bits) carries 10M.

11. Explain in detail about the crew rostering

or

12. Write a short note on passengers flow and distance matrix using tables.
13. Explain the importance of 'scheduling' in the airline operations

or

14. Describe the crew rostering concept in the flight schedules.
15. Write the mathematical formulation for set covering problem by taking any network using objective functions

or

16. Briefly explain about man power scheduling in using different parameters
17. Draw a network showing constraints- gate and aircraft availability

or

18. Write a short note on fleet types
19. Write a short note on significance and development of crew rostering

or

20. Describe in detail about gate assignment practices

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DEPARTMENT OF AERONAUTICAL ENGINEERING

FLIGHT SCHEDULING AND OPERATIONS

MODEL PAPER-IV(R13)

MAXIMUM MARKS – 75

PART A **Max Marks: 25**

v. All questions in this section are compulsory
vi. Answer in TWO to FOUR sentences.

1. Define spoke airport [2m]
2. Write a short note on fleet planning [2m]
3. Write a short note on scenario analysis of fleet assignment [2m]
4. Define passenger flow distance [2m]
5. Define aisle interference [2m]
6. What do you mean by flight scheduling [3m]
7. Write a short note on seat interference [3m]
8. How do you calculate walking distance of passengers in gate assignments [3m]
9. If the capacity of the trailer is 5 bags. We have 19 baggage units to be transported from flight F1 to gate 1.Therefore; the number of trips that the trailer needs to make to move these bags is given by? [3m]
10. write a short note on common strategies for aircraft boarding process [3m]

PART B **Max Marks: 50**

v. Answer only one question among the two questions in choice.
vi. Each question answer (irrespective of the bits) carries 10M.

11. Explain in detail about the common strategies for aircraft planning process

or

12. Write a short note on operation spill rate.
13. Explain the importance of ‘gate assignment’ in the airline operations

or

14. Describe the “point to point” concept in the flight schedules.

15. Write the mathematical formulation for travelling salesman problem by taking any network using objective functions

or

16. Briefly explain about fleet assignment and fleet diversity using different parameters
17. Draw a network showing constraints for aircraft available while crew pairing scheduling

or

18. Write a short note on fleet operations done by taking a network and neat tables
19. Write a short note on significance and development of crew pairing generators

or

20. Describe in detail about Crew pairing- rostering practices

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DEPARTMENT OF AERONAUTICAL ENGINEERING

FLIGHT SCHEDULING AND OPERATIONS

MODEL PAPER-V(R13)

MAXIMUM MARKS – 75

PART A **Max Marks: 25**

vii. All questions in this section are compulsory
viii. Answer in TWO to FOUR sentences.

1. 1. Define flight cover
   [2m]
2. 2.Write a short note on window middle aisle
   [2m]
3. Write a short note on random boarding strategy
   [2m]
4. Write a short note on gate assignment [2m]
5. Define CASM [2m]
6. Name one of the software used while scheduling
   [3m]
7. Name some of the factors that impact the operating cost
   [3m]
8. How do the baggage handling done at the airport [3m]
9. What do you mean by passenger spill cost
   [3m]
10. Define fleet size
    [3m]

PART B **Max Marks: 50**

vii. Answer only one question among the two questions in choice.
viii. Each question answer (irrespective of the bits) carries 10M.

11. Explain in detail about the common strategies for aircraft boarding process

or

12. Write a short note on problems in handling gate assignment.
13. Explain the importance of ‘complexity of airline’ in the airline operations

or

14. Describe the load factor and its frequency in the flight schedules.

15. Write the mathematical formulation for gate assignment problem by taking any network using objective functions

or

16. Briefly explain about level of handling passenger flow using different parameters
17. Draw a network showing of constraints- flight assignment and explain in detail with neat sketches.

or

18. Write a short note on model description of aisle interference
19. Write a short note on significance and development of gate assignment

or

20. Describe in detail about baggage lading in gate assignment

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CAD/CAM

MODEL PAPER-1(R13)

MAXIMUM MARKS: 75

PART A **Max Marks: 25**

Note: A**nswer All the following questions**

1. Give the general configuration of a CAD computer system. (3M)
2. What is the structure of a computing system?
   (2M)
3. What are the types of surfaces that CAD/CAM systems use? (
   2M)
4. What are the limitations in utilizing the sweep method for geometric construction?(3M)
5. Describe the features of CNC machining centers. (2M)
6. Differentiate between CNC and DNC machining. . (3M)
7. List the different types of Practical NC machines (3M)
8. List three advantages of G.T.? (3M)
9. What are the objectives of CAQC (2M)
10. What is computer integrated manufacturing (2M)

PART B **Max Marks: 50**

Note: Answer any *FIVE* questions choosing at least one from each Unit

(5 X10=50)

1. (i). In design, what do you understand by synthesis and engineering analysis?
   (ii). Explain how CAD helps to synthesize a product design and do engineering analysis for
   getting optimal design.

(OR)

2. (i) Write on the importance of studying geometric modeling in CAD.

(ii).What are entities? Explain the methods of defining lines, arcs and Circles in wire frame modeling

3. (i). How do you ensure convex hull property in Bezier surface?

(ii). Describe the effect of characteristic polyhedron over the resulting Bezier surface.

.

(OR)

4. . Explain how the surfaces are represented in
   i. Generic form
   ii. Parametric form.
5. (i) Describe the axis representation system used for CNC Milling machines.

   (ii) Discuss the various interpolation methods used in NC machines.

(OR)

6. Discuss the special features of NC machine tool when compared to the conventional machine tools

7 (i). Explain Opitz classification system.

(ii). Discuss the basic code structures used in group technology.

(OR)

8 What are the objectives of CAQC? Explain the different computer aided inspection methods

9 Explain the concept of FMS with a typical sketch describing its components

(OR)

10 Discuss the possible computer applications in Manufacturing Planning activities.

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MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF AERONAUTICAL ENGINEERING

CAD/CAM

MODEL PAPER-II(R13)

MAXIMUM MARKS: 75

PART A **Max Marks: 25**

Note: A**nswer All the following questions**

1 In what ways CAD can help manufacturing activity? Discuss. (3M)
2 What is the structure of a computing system? (3M)
3 What do you mean by blending function (3M)
4 What are the advantages of Bezier surface over B- spline surface (2M)
5 Differentiate between horizontal and vertical flow patterns giving its utility. (3M)
6 Discuss the several word functions in Numerical Control systems. (2M)
7 Write the steps involved in Production flow analysis (2M)
8 Define the term “Group Technology” and its importance . (2M)
9 What is computer integrated manufacturing? Explain (3M)
10 How does CIM integrate all activities of industry? Explain

(2M)

PART B **Max Marks: 50**

Note: Answer any *FIVE* questions choosing at least one from each Unit

(5 X10=50)

1 (i). What are the functions of an interactive graphic design workstation?

(ii). Explain with the help of a neat sketch, how an image is generated on a computer terminal.

(OR)

2 What do you understand by the form element method of geometric construction? Specify the

applications of this method of modeling in comparison to that of the variant type.

3 Differentiate between Bezier and B- spline surface with reference to number of control points, order of continuity and surface normal

(OR)

4 Specify the three principal classifications of the geometric modeling systems and write in brief about each of them.

5 Draw the Manual Part Programming sheet and explain how the entries are made in the sheet with the help of an example

(OR)

6 (i). What is adaptive control system? Discuss its advantages to the manufacturing technology.

(ii). Discuss the merits and demerits of NC and DNC system

7 (i). What are the advantages of CAPP over Manual process planning? Explain in detail.

(ii). Explain machine cell design in group technology.

(OR)

8 Compare a process-type layout and group technology layout for batch production of a simple component

9 FMS is applied In which type of production? What are the advantages of FMS?

(OR)

10 Explain with the aid of a block diagram the “concept of CIM”

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF AERONAUTICAL ENGINEERING

CAD/CAM

MODEL PAPER-III(R13)

MAXIMUM MARKS: 75

PART A **Max Marks: 25**

Note: A**nswer All the following questions**

1. Discus**s** the Wire frame entities. (2M)
2. Identify the types of printers that would be useful for printing graphic information. (3M)

3. Write briefly about display coordinates?
   (3M)
4. Define composite surface and Bezier surface.
   (2M)
5. List out the different numerical control elements. (2M)
6. Write the principal of operation of a NC machine tool.
   (2M)
7. Define Part family in Group Technology (3M)
8. List out the different types of CAPP (3M)
9. State the working principle of a Flexible Manufacturing System. (3M)
10. Define CIM as per SME
    (2M)

PART B **Max Marks: 50**

Note: Answer any *FIVE* questions choosing at least one from each Unit

(5 X10=50)

1. a) Explain the Graphical Terminal CAD Software.
   b) Derive the cubic spline equations

   (OR)
2. What is a product life cycle? Explain in detail about the conventional manufacturing product life cycle and CAD/CAM product life cycle.
3. Describe the following with reference to a surface patch
   a) Subdividing
   b) Regenerative surface

   (OR)
4. Describe the scheme of boundary representation to create solid models of physical objects
5. Discuss briefly the following NC motion control systems.
   i. Point -to-point
   ii. Straight cut
   iii. Contouring

   (OR)

6. (a) Differentiate between
   (i)Absolute and Incremental positioning system
   (ii)Fixed and Floating zero method
   (b) Differentiate between
   (i) NC, CNC and DNC system

7. a) Explain guidelines and benefits of Group Technology
   b) Discuss the advantages of CAPP over Manual process planning

(OR)

8. a) Explain machinability data system with respect to group technology
   b) Explain briefly the MICLASS system of codification
9. how does CIM integrate all activities of industry ? explain.

OR

10. a) Describe a material handling system
    b) Discuss the objectives of CAQC. Explain the different computer aided inspection methods

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF AERONAUTICAL ENGINEERING

CAD/CAM

MODEL PAPER-IV(R13)

MODEL PAPER -4MAXIMUM MARKS: 75

PART A **Max Marks: 25**

Note: A**nswer All the following questions**

1. What are the various data base models (2M)
2. What are the output devices used in CAD system (3M)
3. Explain how a B-spline surface is defined (2M)
4. Define cell composition (3M)
5. What are the coordinate system used in NC system (2M)
6. Discuss the principle functions of DNC system (3M)
7. What are the steps involved in production flow analysis (2M)

8. What is material resource planning (3M)
9. What are the objectives of CAQC (2M)
10. Define generative process planning (3M)

PART B **Max Marks: 50**

Note: Answer any *FIVE* questions choosing at least one from each Unit

5x10=50

1. (i) justify the need for CAD in present competitive market environment
   (ii) list out the benefits of CAD/CAM

OR

2. (i) what is the basic structure of CAD explain

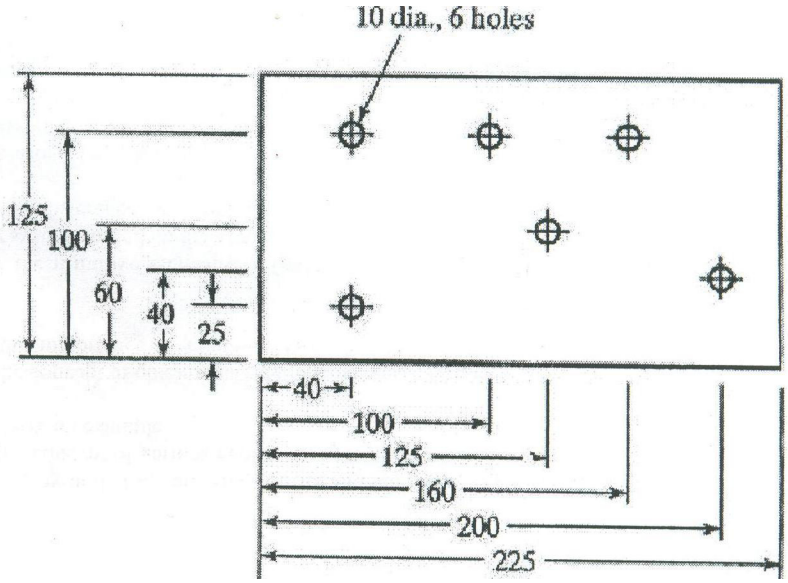
(ii) Define geometric model?explain how a 3-D objective is represented by a wireframe model

3. Explain about regenerative surface with an example

(OR)

4. Differentiate between solid modeling and wireframe modeling

5. (i) Write the part program to drill the holes in the part shown in the figure .The part is 12mm in thick. Cutting speed =100mm/min and fed= 0.06mm/rev. Use the lower left corner of the part as the origin in the X-Y axis system. write the NC part program. Use the absolute positioning. All dimensions are given in mm



(ii) Explain the APT statements (a) GOTO and GO/TO (b) GODLTA and GOBACK (c) INTOL and OUTTOL.

(OR)

6. (i) Discuss the difficulties encountered in using conventional numerical control
(ii)Enumerate the advantages of computer Assisted part programming when compared to manual part programming.
7. (i) Explain the retrieval type process planning system with the help of a block diagram
(ii) Explain the concept of composite part with an example.

(OR)

8. Explain indetail about computer Aided manufacturing and resource planning
   (ii) Write a short notes on capacity requirements planning.
9. Distinguish between CIM and CAD/CAM

OR

10. Describe the material handling system in detail.

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DEPARTMENT OF AERONAUTICAL ENGINEERING

CAD/CAM

MODEL PAPER-V(R13)

MAXIMUM MARKS: 75

PART A **Max Marks: 25**

Note: A**nswer All the following questions**

1. Identify the types of printers that would be useful for printing graphic information(2M)
2. Define i) Free form surface ii) Planar surface (3M)
3. List the different types of industrial manufacturing (2M)
4. List the different types of curves. (3M)
5. State the purpose of a tool pre-setter. (2M)
6. What are the components of DNC system. (3M)
7. What are general methods for grouping parts into families (2M)
8. What is process planning? (3M)
9. Define C-Chart and P-Chart. (2M)
10. Differentiate between inspection and testing (3M)

PART B **Max Marks: 50**

Note: Answer any *FIVE* questions choosing at least one from each Unit

5x10=50

1. (i) Explain the Graphical Terminal CAD Software
   (ii) Derive the cubic spline equations.

(OR)

2. Explain different curve fitting techniques in geometric modeling.

3. Discuss the limitations in utilizing the sweep method for geometric construction

(OR)

4. Write short notes on
   (i) NURBS
   (ii) B-splines.
5. (i) What are the preparatory functions for turning part programming
   (ii) what are the different methods of manual part programming? Explain.

(OR)

6. Explain the steps in APT and also Explain the G codes used for tool offset functions
7. Explain machine cell design in group technology. Compare a process-type layout and group technology layout for batch production of a simple component

(OR)

8. Justify the requirement of CAQC in current advanced manufacturing
9. (i) Explain the SME manufacturing enterprise wheel.
   (ii) Explain the applications of CIMS

(OR)

10. Describe a materials handling system. Explain the three major elements of an ASRS

IV B.TECH I SEMESTER – AERONAUTICAL ENGINEERING

AIRCRAFT MAINTENANCE ENGINEERING(R13)

Model Paper-I

MAXIMUM MARKS: 75

PART A Max Marks: 25

i. All questions in this section are compulsory
ii. Answer in TWO to FOUR sentences.

1.
a) Define Maintenance
b) Mention two types of maintenance
c) What is MSG approach?
d) Define hard time Process
e) State two maintenance tasks for Structural task items
f) Define Quality Assurance
g) Define reliability
h) What is meant by line maintenance
i) Write contents of Airframe log book
j) State purpose of certificate of Personnel

PART B **Max Marks: 50**

a. Answer only one question among the two questions in choice.
b. Each question answer (irrespective of the bits) carries 10M.

2. Explain failure rate pattern with a neat sketch
OR
Explain Manager level Functions of aircraft maintenance
3. Explain maintenance steering group (MSG) approach in steps in aircraft maintenance management with the help of line diagram
OR
Explain Process oriented approach?
4. Explain necessity of development of maintenance program
OR
Explain functions of engineering department in tech services
5. Draw the M & E Organization chart and explain its features in detail
OR
What are the problem areas of hangar maintenance? Brief about operation of overhaul shops
6. Explain about ground support equipment(GSE) in hangar maintenance of aircraft
OR
Explain about basic inspection policies in aircraft management

IV B.TECH I SEMESTER – AERONAUTICAL ENGINEERING
AIRCRAFT MAINTENANCE ENGINEERING(R13)
Model Paper-II
MAXIMUM MARKS: 75

PART A Max Marks: 25

i. All questions in this section are compulsory
ii. Answer in TWO to FOUR sentences.

a) Outline any two maintenance objectives
b) Write ant two FAA requirements
c) Define OC activity?
d) Mention any maintenance tasks for aircraft systems
e) Write any two difference of Engineer & Mechanics in their role
f) Define Quality Control?
g) State any two functions of MCC
h) Mention contents of engine log book
i) Differentiate between line & hangar maintenance

PART B **Max Marks: 50**

a. Answer only one question among the two questions in choice.
b. Each question answer (irrespective of the bits) carries 10M.

1. List out differences between intra flight (TRS) & last flight servicing
OR
Explain Manager level Functions of aircraft maintenance
2. Explain task oriented maintenance approach
OR
Explain HT and OC process
3. Explain about production control & feedback for planning
OR
Explain about multiple checks in production planning
4. What are the functions of material directorate
OR
Discuss about fault isolation and fault report manual
5. What are the elements of reliability program? Explain in brief about safety regulation
OR
Explain about Aircraft Certification & ATA document standards.

IV B.TECH I SEMESTER – AERONAUTICAL ENGINEERING
AIRCRAFT MAINTENANCE ENGINEERING(R13)
Model Paper-III
MAXIMUM MARKS: 75

PART A Max Marks: 25

i. All questions in this section are compulsory
ii. Answer in TWO to FOUR sentences.

a) Write goals of maintenance.
b) Define CM activity
c) Define Zonal maintenance task
d) State two functions of technical service directorate
e) What is the main role of MCC
f) State line station activity
g) What is type 'C' check
h) Write any two functions of material directorate.
i) Define maintenance?

PART B **Max Marks: 50**

a. Answer only one question among the two questions in choice.
b. Each question answer (irrespective of the bits) carries 10M.

1. Explain role of an engineer of aircraft maintenance.

OR

Explain role of mechanic in aircraft maintenance.

2. Explain steps in detail about MSG approach.

OR

Explain in detail about process oriented approach.

3. Explain the role of Quality control organization in aircraft maintenance Management.

OR

Explain about requirement of Quality Assurance.

4. Explain about makeup of line maintenance.

OR

Write functions of MCC

5. What are the elements of reliability program? Explain in brief about safety regulation.

OR

Write short notes on
a) Aircraft certification
b) ATA document standards.

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IV B.TECH I SEMESTER – AERONAUTICAL ENGINEERING
AIRCRAFT MAINTENANCE ENGINEERING(R13)
Model Paper-IV
MAXIMUM MARKS: 75

PART A **Max Marks: 25**

i. All questions in this section are compulsory
ii. Answer in TWO to FOUR sentences.

a) Define reliability
b) Write goals of maintenance
c) Define CM activity
d) What is current MSG process?
e) Define engineering order?
f) Draw organization chart of technical services directorate.
g) Define Quality control?
h) What do you understand by Ground service equipments?
i) Define maintenance?
j) Define aircraft certification?

PART B **Max Marks: 50**

a. Answer only one question among the two questions in choice.
b. Each question answer (irrespective of the bits) carries 10M.

1. Explain about establishing a maintenance program.

OR

Explain the managerial functions of overhaul shops directorate.

2. Explain MSG-3 level –I analysis failure category approach.

OR

Explain MSG-3 level –II analysis hidden failure.

3. Explain the role of Production planning & control in maintenance Management.

OR

Explain about Maintenance Control Center responsibilities.

4. Explain about makeup of line maintenance.

OR

Explain about overhaul shop operations

5. Explain about requirement of Quality assurance.

OR

Write short notes on

a) Statistical reliability
b) Dispatch reliability.

IV B.TECH I SEMESTER – AERONAUTICAL ENGINEERING
AIRCRAFT MAINTENANCE ENGINEERING(R13)
Model Paper-V
MAXIMUM MARKS: 75

PART A **Max Marks: 25**

a) All questions in this section are compulsory
b) Answer in TWO to FOUR sentences.
c) Define redesign
d) State two failure pattern
e) Define HT activity
f) Define Zonal maintenance task?
g) Define engineering order?
h) Draw organization chart of technical services directorate.
i) Define Quality Assurance?
j) Write two difference of FAA & JAA.
k) Define maintenance?
l) State any two QC inspector qualifications?

PART B **Max Marks: 50**

a. Answer only one question among the two questions in choice.
b. Each question answer (irrespective of the bits) carries 10M.

1. Explain goals & objectives of maintenance.

OR

Discuss concept of reliability and redesign in context of maintenance.

2. Explain maintenance task for airframe systems in task oriented maintenance.

OR

Explain task for structural items for task oriented maintenance.

3. Explain manager level functions in technical services directorate.

OR

Explain ‘A’ check and ‘C’ check planning in aircraft hangar maintenance.

4. Explain about maintenance planning document.

OR

Explain about overhaul non-routine parts, parts availability & saga of parts robbing.

5. Explain about organization structure &TPPM.

OR

Explain about ISO-9000 quality standards in aircraft maintenance management.