# SRINIVASAN ENGINEERING COLLEGE

## AE 2027 - AIRFRAME MAINTENANCE AND REPAIR

## TWO MARKS QUESTIONS

## UNIT-1

1. What is welding?

   Welding is a process used joining metal parts by either fusion or forging.

2. What are the joining method uses in aircraft?

   - Bolting
   - riveting,
   - brazing,
   - soldering,
   - bonding,
   - Welding.

3. Give reason for welding process best joining method?

   - Rigidity
   - Simplicity
   - low weight
   - high strength

4. Define Gas welding & its types?

   Gas welding is accomplished by heating end & edges of metal to molten state with a high temperature flame.

   Types:

- Oxy-acteylene
- Oxy-hydrogen

5. Electric resistance welding?

Is a process in which a low –voltage, high amperage current is applied to the metal to be welded through heavy, low resistance copper conductor

6. What are the types of Electric resistance welding?
    - Butt welding
    - Spot
7. List out the equipments of Oxy-acteylene?
    - Cylinder (Oxygen, acetylene)
    - Pressure regulator
    - Welding torch
    - Hose
    - Special wrench
    - Spark lightner
    - Goggles , gloves
    - Fire extinguisher
8. Mention the criteria for quality weld?
    1. Smooth & uniform thickness
    2. Extra thickness at the seam
    3. Weld metal should taper off smoothly into the base metal.

4. Oxide form not more than ½ in
5. No signs of blowholes, porosity & globules.
6. No sign of pitting, burning, cracks.

9. What type of Fire extinguisher used in Oxy-acteylene welding?

Carbon dioxide type fire extinguisher used, it is a chemical powder for specially used in gases or oil fire.

10. Difference between Oxygen and acteylene cylinder?

| **Oxygen cylinder** | **acteylene cylinder** |
|---|---|
| Green colour | Red or maroon colour |
| Small 200 cu.ft , 1800 psi<br>Large 250 cu.ft, 265 psi | Normall 225 cu.ft , 250 psi |
| High pressure valve located in cylinder head | Safety plug valve located in cylinder head |

11. How to identify the oxygen - hose & Acetylene –hose?

Oxygen – right hand thread

Acetylene- left hand thread

12. Enumerate the methods used for NDT testing?

- Eddy current method
- Ultrasonic

- Dye-penetrate
- Magnetic particle inspection

13. Differentiate between soldering and brazing?

Soldering is a process in which two or more metal item are joint together by melting and flowing a filter metal into the joint

Brazing: if the filler metal has a melting point of more than 800F ,the process is called brazing

14. Enumerate the five fundamental types of welded joints?

- Butt joint
- Lap joint
- Tee joint
- Edge joint
- Corner joint

14. What are the purpose of welding jigs & fixtures?

- To minimize distortion caused by heat of welding.
- To prevent Welding in more convenient position.
- Minimize fitting up problem.

15. What is welding jigs?

Welding jigs are a specialized device which enables the component to be easily & rapidly setup& held.

16. Define welding fixtures?

A welding jig, but in addition, it permits the changing of the position during actual welding.

17. What are the maintenance practices taken in Electric Resistance welding?

- Inspect electrical connection
- Clean electrode holders& exterior
- Clean transformers with low pressure hose
- If noisy operation & tighten bolts.

18. What are the different types of welding position?

A welding position refers to with plane (position) in which the work placed for welding. The four welding positions are

- flat-position welding,
- vertical position welding,
- horizontal position welding and
- Over head position welding.

19. What is radiological Inspection?

X-ray inspection was limited in valve in the part because of the in accessibility of many joints and the necessity of taking exposures from several angles to makes certain that all defects was found.

20. What is eddy current inspection?

The electrical current is generated in the parts by means of electromagnetic waves and depending upon signals transmitted defects can be found.

21. What is mean by Fuse welding?

It is the process used by welders in the aviation and other industries in which enough heat is applied to melt the edge or surfaces of the molten parts flow together, leaving a single solid piece of metal when cool.

22. What are the different types of Inert gas welding?

- TIG welding
- MIG welding
- Plasma-Arc welding

23. Define electric Arc welding?

This method requires a special generator to provide a low-voltage high amperage current for the arc. The power supply may be an electric motor driven generator, an engine-driven generator, or a special transformer.

24. Define MIG?

The type of inert gas welding utilizes a metal electrode, which melts and is carried into the weld pool it provide the extra thickness desired. This type of weld has been called metal inert gas welding.

25. What is TIG ?

It is the gas tungsten arc welding by the AWS, is accomplished by the means of a torch with a non-consumable tungsten electrode. The electrode is used to sustain the arc and the molten pool of metal.

26. Define Plasma –Arc welding?

In the plasma arc welding the flow of plasma is restricted but is at an increased speed through an orifice, resulting in higher temp and improved concern of heat.

27. What are the different types of soldering?

The different types of soldering are dip soldering, Resistance soldering, Induction soldering, Furnace soldering.

28. What is Dip soldering?

It is where the joint is lowered into a pot of molten solder.

29. What are the characteristics of welding fixtures?

Supporting, clamping, grounding, imparting movement

30. What is Resistance soldering?

It is where the heat is produced by passing electric current through the joint materials

31. Define Induction soldering?

It is where the passing if a magnetic field over the joint materials produces an electric current.

32. Define Furnace soldering?

It is where the units to be soldered are passed through an electric or gas furnace.

33. Describe the dye-Penetrate inspection process?

Inspection of a metal is easily accomplished by means of dye penetrate inspection. In this process the dye penetrates any small cracks or fissures and seeps out when a developer is applied to the joint. Thus the crack is revealed as bright red line.

34. Describe the basis of fluorescent penetrate inspection?

It can be use for detecting cracks or other flaws in a welding structure. A liquid containing a fluorescent material is applied to the part to be inspected.

# UNIT-2

1. How are plastics classified?

   There are two general classifications of clear plastics used in a/c

   Acrylics and Cellulose acetates

2. Explain the types of plastics used in aircraft?

   - Acrylics plastic
   - Cellousive acetates

3. What is autoclave?

   Autoclaves is an instrument used to sterilize equipment and supplies by subjecting them to high pressure saturated stream at 12C for around 15-20min

4. Differentiate b/w Thermoplastics and Thermosetting plastics

   Thermoplastics: There are a wide range of thermoplastics some that are rigid and some that are extremely flexible.

   Thermosetting plastics: The molecules of thermosetting plastics are heavily cross linked. They form a rigid molecular structure.

5. What are the classifications of Damage?

   - Negligible damage

- Patch Repairable Damage
- Damage Repair by insertion
- Damage requiring replacement.

6. What are the advantages of plastics?
    - Plastics are used in place of glass for windows because they are light in wt & no reduction in clarity.
    - Resistant to breaking than glass
7. Why we use plastics?

    Plastics are easily formed materials. It can be easily printed, decorated or printed.

8. State the composite components used in airplane?

    Fibrous glass – reinforced plastics

    Matrices – epoxy

9. What is the purpose of a relief hole?

    When a piece of metal has two bends, it is necessary to provide relief holes in the metal at the intersection of the bends. If relief holes are not provided, the metal crowds together in the corners and set up stress that lead to cracks.

10. What is Bend allowance?

    The distance of the bend allowance depends upon the thickness of the metals, the radius of the bend and the degree of the bend.

11. What are all the hand tools used for Sheet metal work?

    - Hammer
    - Hand nibbling tool
    - Hole saw
    - Chassis punch
    - Hand rivet set
    - Rivet gun
    - Bucking bar
    - Sheet fasteners
    - Hole finder
    - Rivet cutter

12. What are some of the disadvantages plastics as compared to glass?

    - Plastics is readily accepting a static charge and thus attracting dust and dirt particle.

- Glass is softer, plastic is more easy to damaged by surface abrasion than glass.

13. How are the plastic sheets protected while in storage?

    - Plastic sheets should be store in racks or on flats.
    - Plastic sheets stored on edge at 10 degree angle from the vertical.
    - The bottom edges should rest on blocks about 3 inch wide not more than 42inch apart.

14. If the masking paper adhesive has dried out and will not peel off the surface easily, what can be done?

    Any plastic is storied should have aspray type or paper masking installed. Care should be taken to remove rough egdes from plastics that have been cut before placing them in a storage rack or stack do not allow any dirt plastic metal or other particle to get b/w pieces of plastics as this can damage the plastic surface even with a masking installed.

15. What are the basic tools used in cutting the plastics

    Radial arm saws, table saw, band saw, jig saw, scroll saw.

## UNIT-3

1. Define ‘Mean Aerodynamics Chord’?

   MAC is defined as the chord line is along the wing span and c is the chord at the coordinates y

2. What is rigging of the flight control s/m?

   The rigging involves two principal types of operations, first the a/c structure must be rigged for correct alignment of all fixed components. Second rigging is the alignment of control surface and the controls that moves the surface.

3. What are the helicopter flight controls?

   - Cyclic pitch controls
   - Collective pitch controls
   - Engine throttle power rpm control
   - Anti-torque control

4. Define Flag tracking methods?

   Flag tracking method is one method of tracking the main rotor system of helicopter which uses a aluminium tubing and Prussian blue and finding whether all blades travelling in same plane of rotation.

5. What are jacking?

   Jacking is a lifting the aircraft above the ground surface in order to carry any maintenance tacks like servicing, repair, and replacement etc

6. What is the difference b/w aircraft assembly and rigging?

   Assembly: of an a/c refers to the joining of parts or subassemblies by various by various means until the entire a/c is in condition for operation.

   Rigging is the alignment of a/c parts oo sections to obtain proper flight characteristics.

7. What are the precautions must be taken in the hoisting of an a/c?

   A fuselage is provided with fitting or attachment for the purpose of hoisting or jacking. When it is necessary to hoist or jack the a/c the technician must make sure that the correct procedure is used and the proper fitting are available. The manufacturer's manual gives detailed instruction for handling the a/c.

8. Define symmetric check?

   A/c symmetry is determined by first leveling the a/c and then measuring the distance from reference points on the a/c central axis to reference points on the adjustable components.

9. What are the principle operations involved in a/c rigging?

The a/c structure must be rigged for correct alignment of all fixed components. The fuselage is aligned at the time of manufacture in the assembly jigs.

The second type of rigging is the alignment of control surfaces and the control that move the surface. These operations require the adjustment of cable length, cable tension, push-pull rods, bell cranks, cable drums, and various other parts.

10. Define Stagger in biplane?

Stagger is the longitudinal difference in the position of the leading edges of the wings of the biplane. If the leading edge of the upper wing is ahead of the leading edge of the lower wing, the stagger is positive.

11. Define Decalage in biplane?

Decalage is the difference b/w the angles of incidence of the upper and lower wings.

12. What is angle of incidence?

The angle formed by the intersection of the wing chord line and the horizontal axis of the aircraft.

13. What are the inspections carried on the control s/m ?

    1. Examine all cables for wear or corrosion
    2. Examine all pulleys for wear , cracks and alignment
    3. Where the cables passes through fairleads or guides
    4. Wear of pulley bearing, bearing bolt, bushings, clevis pins and other moving parts
    5. Cable tension
    6. The s/m should be checked to see that no cable fitting comes within 2in of a pulley.
    7. Control surface travel area should be checked
    8. After all adjustments are made, all safetying turnbuckles, clevis pins, nuts, etc…

14. What is tricycle landing gear?

    Tricycle landing gear is characterized by having a nose wheel assembly and two main gear assembly's one on each side of the a/c. This arrangement places the aircraft fuselage in a level attitude when the aircraft is on the ground.

15. Explain the conventional-geared a/c?

It has two main wheel assemblies, one on each side of the a/c, and a tail wheel. This arrangement has the advantage of reduced drag in the air and recorded landing gear weight. There is some loss of forward visibility for the pilot when maneuvering on the ground due to the a/c nose-high attitude.

16. What is the purpose of landing gear?

It supports the air plane during the ground operation, dampens vibrations when the airplane is being taxied or towed and cushions the landing impact. The landing of an airplane often involves stresses far in excess of what may be considered normal.

17. What is anti torque rotor?

The direction in which a helicopter is pointed is controlled by anti torque rotor (tail rotor). The control systems for the tail rotor to change the pitch of the rotor blade, thus changing the sideward thrust exerted by the rotor. The rotor speed remains constant.

18. Explain about rigid landing gear?

A rigid landing gear is commonly found on helicopter and sail planes. This Gear is rigidly mounted to the a/c with no specific component to the cushion the ground contact other than through the flexing of the landing gear on air frame structure.

19. What do you mean by rotor system?

    It is used to convert the engine power into lift, propulsive force, and directional control. The helicopter will have minimum of two main rotors. This system is driven by the a/c power plant through a transmission

20. Explain about fully articulated rotor system?

    It has three or more rotor blades and each blade can move by three different motions, independent of the other blades in the system.

21. What is feathering in Helicopter?

    Each blade is also free to rotate about its central axis this is called feathering.

22. Explain Collective control?

    Collective control lever is located on the left side of the pilot seat. And move up and down to control the amount lift being generated by the main rotor system.

23. What is auto rotation?

    When the freewheeling unit is disconnect the engine from the rotor system, the helicopter enters a type of flight known as auto rotation,

where the air moving upward through the rotor system causes the rotors to turn.

24. What is tracking of Main rotor?

Tracking of a helicopter rotor means determining if one blade follows the path or track of the other blade or the blades as they rotate during operation. The two principle methods for rotor tracking

- stroboscopic light tracking
- flag tracking

25. Explain the flag tracking method?

In this method a tracking flag is constructed from Al or steel tubing. The flag portion should be made of strong, Light weight fabric tape. The rein forcing tape used in aircraft the fabric work is suitable material. The main rotor blade tips are colored with grease pencils, using a different color on each tip.

## UNIT- 4

1. What is mean by troubles shooting?

   Trouble shooting is the process of identifying the cause of a malfunction determining its severity and eliminating the cause, replacing or repairing.

2. Differentiate b/w pressure regulator and Relief valve?

   Pressure regulator valve:- It regulates the flow of pressure

   Pressure relief valve:- It prevents the cabin from being at a higher altitude than the ambient air.

3. Explain the difference b/w safe life and fail safe design?

   Safe Life:-Originally, the recognized theory of structural design was called safe-life. The philosophy of safe life was to test the various components to failures and to use as a component's airworthy maxm life 25% of the average life,when tested to destructive failure.

   Fail safe:-The next stage in the structural design philosophy was fail-safe construction. In fail safe construction each component was designed to be able to accept the forces of adjacent components should their neighbor components fail.

4. What is a safety factor?

   When designing an original structure it is unwise to design a part so that the entire strength of material is utilized under standard operating condition.

5. How is stress measured?

   The result of such forces is called stress. Stress is load applied over a given area, in which these forces are applied determines the type of stress (compression, tension, torsion, bending, or shear) some stress are most typically unidirectional, such as tension and shear. In such cases the cross sectional area over which the load is applied may be easily determined, and these area can be used to calculate the amt of stress.

6. Describes Strain?

   Strain is measured by establishing a ratio of the increased in length the result from a stress divide by the original length of the material. If the unit of measure for a strain calculation inches the unit of measure for strain is inches per inches.

7. What is Fatigue?

   As an a/c ages, it is subject to variety of stress. These stresses come from the load applied on the ground, during take off, taxing, Landing,a/c pressurization and during flight. The accumulation of

these stresses over time results in a weakening of the material. This weakening is called Fatigue.

8. What are the types of the shock absorbing landing gear?

   The two types of shock absorbing landing gear commonly used are the spring-oleo and the air-oelo type.

9. Explain Trunnion?

   The trunnion is the portion of the landing gear assembly attached to the airframe. The trunnion is supported at its ends by bearing assemblies which allows the gear to pivot during retraction and extension.

10. Define Struts?

    The struts is the vertical member of the landing gear assembly that contains the shock absorbing mechanism the top of the strut is attached to, or is an integral part of the trunnion it is also called as the outer cylinder.

11. What is snubbing action?

    During the strut extension stock the fluid is forced return through the metering orifice. This is design to prevent the strut from extending too rapidly on the take off or during bad landing and is often referred to as a snubbing action.

12. Define shimmy dampers?

    The shimmy damper is a hydraulic snubbing unit that reduces the tendency of the nose wheel to oscillate from side to side.

13. Explain the types of shimmy dampers?

    Shimmy dampers are usually constructed in one of the two general designs. They are piston type dampers and vane type dampers.

14. Explain about the piston shimmy damper?

    A piston type shimmy damper is simply a hydraulic cylinder containing apiston rod and a piston and filled with hydraulic fluid.

15. Explain about the vane type dampers?

    Vane type dampers are designed with a set of moving vanes and a set of stationary vane.

16. Explain about Truck?

    The truck is located on the bottom of the strut piston and has the axles attached to it. It is used when wheels are to be placed in tandem or in dual tandem arrangement.

17. What are the Inspection and maintenance of fire protection system?

    Mechanical parts are examined for damage, wear, security of mountings and compliance with technical and regulatory requirements.

18. What are the Inspection and maintenance of ice protection system?

    Examination of the deicer boots for the condition, adherence to the protected surface and the condition of the surface of the boots.

## UNIT – 5

1. What are the flammables in aerospace industry?

   Frequency found flammables or combustibles materials in the aviation industry include fuels, paint-related products, alcohols, acetones, toluence and some metal filings

2. State the eight categories of toxins in the aviation industry?

   - solvents and thinners for bluing
   - solids such as metal dust or asbestos
   - Machine lubricants ,cutting fluids ,and oils
   - Gases such as co2 or N2
   - Polymers, epoxies and plastics
   - sensitizers, such as epoxy
   - Carcinogens
   - Reproductive hazards, such as carcinogens

3. Define Toxins?

   Toxins are generally defined as any substance that can cause an illness or injury.

4. What are the physical hazards ?

   Ray, Microwaves, beta or gamma rays invisible laser beams and HF sound waves.

5. What are the biological hazards?

   Biological hazards are living organism, that cause illness or disease spread through air droplets or spores and enter the body through contact.

6. What are the techniques used to remove paint?
   a. Solvents
   b. Sandblasting
   c. Trialene soap
7. What are the three general categories of hazardous materials?

   Hazardous materials are typically grouped into three categories: chemical agents, and physical and biological hazards.

8. What are the four classes of chemical agents?

   Flammable And Corrosive Toxic Or Reactive
9. How long does it take for a toxic agent to show its effects on human body?

   Toxins are generally defined as any substance that can cause an illness or injury .The effects of toxins, unlike Flammables and corrosives, may appear all at once, or may build up over time with additional exposure. Some toxins may dissipate over time when further exposure. Some toxins may dissipate over time when further exposure is eliminated while others remain in a human's system, even after death.

10. List some of the flammable materials found in the aviation industry?

    Flammables are materials that may easily ignite in the presence of a catalyst such as heat, sparks, or flame. They may be in any of the three physical forms; Solids, Liquid, or Gas. C Combustible liquids are very similar to flammable liquids, but they are not as easy to ignite.

    Frequency found Flammable or combustible materials in the aviation industry include fuels, paints-related products, alcohols, acetone, toluene, and some metal filings.

11. What type of corrosives generally come in powder form?

    Strong acids are most normally found in a liquid form, whereas bases tend to come in powered form.

12. What type of toxin may cause cancer?

    Carcinogens may cause change in the genetics makeup of a human cell, resulting in cancer. Although the use of carcinogens is rare in the aviation industry, aviation maintenance technicians associated with cargo a/c should pay particular attention to the cargo manifest before cleaning spillage

13. What are the basic five requirements of a hazard communication pgm?

- Inventory
- Labeling
- Material safety data sheets
- Training
- Written program

14. List the Personal safety equipments
    - fire retardant clothing
    - fire extinguisher
15. Explain about PPE?

    Personal protection equipment in the form of safety glasses, respirators, dust masks, and chemical resistant gloves should be used when handling any chemical substance.