

Automobile Designer Interview Questions And Answers Guide.



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Automobile Designer Job Interview Preparation Guide.

Question # 1

Tell me what do you mean by Break Lines?

Answer:-

It is used to limit a broken section. For short break an uneven freehand thick line is recommended and for long breaks a long thin ruled dashes joined by freehand 'Zig Zags' are used.

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Question # 2

Do you know where is draft angle used?

Answer:-

Generally draft angle is used in moldings and drop forgings, parts of which maybe left un-machined.

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Question # 3

What is Cycloid?

Answer:-

It is a curve which is generated by a point in the plane of a circle that rolls along a straight line.

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Question # 4

Tell me which orthographic projection has been recommended by Bureau of Indian Standard(BIS)?

Answer:-

Third angle projection

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Question # 5

Tell me in order to derive the torsional formulas what are the assumptions taken?

Answer:-

The torsion equation is derived on the basis of following assumptions:

- * > The shaft material is uniform, throughout the shaft.
- * > Even after loading the shaft circular remains circular.
- * > After the application of torques the plain section of a shaft remains plain.
- * > Any twist that occurs in the shaft remains uniform and constant.
- * > After the application of torque the distance between any two cross-sectional references remains constant.
- * > The elastic limit value of a shaft is never exceeded even after the

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Question # 6

Tell me what are the commonly used various methods of pictorial projection?

Answer:-

- * (a) Isometric projection
- * (b) Oblique projection
- * (c) Perspective projection.

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Question # 7



Explain me what is meant by development?

Answer:-

Development is the drawing of all the surfaces of an object on a plane to make a pattern. If it is folded or rolled it will form the required object. The main applications are in sheet metal work, sheet plastic fabrication and many other industrial applications.

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Question # 8

Tell me what do you mean by detail drawing?

Answer:-

It shows the essential shape, size and specifications required for the construction of each unit of a product.

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Question # 9

Tell me what is meant by interpenetration of solids?

Answer:-

If one solid penetrates into the other solid of the same or different cross section then surfaces of the both solids come in contact and outline of the penetrating solid can be seen which is called interpenetration of solid.

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Question # 10

Explain me what is a sectional view?

Answer:-

The cross section of an object obtained by passing an imaginary cutting plane through the object is called sectional view.

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Question # 11

Do you know what are the planes of projection?

Answer:-

Vertical plane (VP) and Horizontal plane (HP) are generally used in orthographic projection. These planes of an object are obtained to describe it clearly with all dimensions. These are known as principle planes and the position of an object can be fixed by following four quadrants:

- * (1) First Quadrant: It is above HP and in front of VP.
- * (2) Second Quadrant: It is above HP and behind VP.
- * (3) Third Quadrant: It is below HP and behind VP.
- * (4) Fourth Quadrant: It is below HP and in front of VP.

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Question # 12

What is the principle of orthographic projection?

Answer:-

It is the method of representing the exact shape of an object in two or more views on planes. In this projection all the projectors are parallel to each other and perpendicular to the plane of projection. Projectors are assumed to come from infinity. It is generally used in machine drawing.

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Question # 13

What is a Polygon?

Answer:-

It is plane closed figure having many sides and angles. A regular polygon has equal sides and equal angles.

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Question # 14

Tell me what are the basis on which the best material for Sliding Contact Bearings manufacturing?

Answer:-

Some of the important properties to look out for in the material for sliding contact bearings are as follows:

- * > Compressive Strength: In order to prevent the permanent deformation and intrusion of the bearing the material selected should possess a high compressive strength to bear the max bearing pressure.
- * > Fatigue Strength: the material selected for the bearing should be able to withstand loads without any surface fatigue cracks getting created. This is only possible if the material has a high level of fatigue strength.
- * > Comfortability: The material should be able to adjust or accommodate bearing inaccuracies and deflections without much wear and heating.
- * > Embeddability: The material should allow the embedding of small particles without effecting the material of the journal.
- * > Bondability: The bearings may be created by bringing together (bonding) multiple layers of the material. Due to the above reason the bondability of the material should be sufficiently high.
- * > Thermal conductivity and corrosion resistance: Thermal conductivity is an essential property for bearing materials as it can help in quickly dissipating the generated heat. Also the material should have a level of corrosion resistance against the lubricant.

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Question # 15

What is Hertzian stress?

- (a) Tensile stress on inner surface of cylinder
- (b) Bending stress on two contact surface
- (c) Contact stress on two contact surfaces
- (d) Shear stress on two contact surfaces

Answer:-

- (c) Contact stress on two contact surfaces

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Question # 16

Backlash is

- (a) Sum of the clearance of two gears
- (b) Mutual play between two gears
- (c) Amount by which the width of a tooth space exceeds the thickness of the engaging tooth on pitch circle
- (d) Any of the above

Answer:-

- (c) Amount by which the width of a tooth space exceeds the thickness of the engaging tooth on pitch circle

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Question # 17

A bolt of uniform strength can be developed by

- (a) Keeping the core dia of threads equal to the dia of unthreaded portion of bolt
- (b) Keeping the core dia of threads smaller than the dia of unthreaded portion of bolt
- (c) Keeping the nominal dia of threads equal to the dia of unthreaded portion of bolt
- (d) None of the above

Answer:-

- (a) Keeping the core dia of threads equal to the dia of unthreaded portion of bolt

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Question # 18

Short columns are preferred over long columns from

- (a) Strength consideration
- (b) Buckling consideration
- (c) Weight consideration
- (d) None of the above

Answer:-

- (b) Buckling consideration

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Question # 19

Pitot tube is used for measurement of

- (a) Pressure
- (b) Temperature
- (c) Discharge
- (d) Velocity

Answer:-

- (d) Velocity

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Question # 20

Explain me what are the different values that need to be determined in order to design a cylinder for an ICE?

Answer:-

The following values are needed to be determined:

* > Thickness of the cylinder wall: The cylinder walls in an engine is made witness to gas pressure and the side thrust of a piston. This results in two types of stresses: longitudinal and circumferential stress. Both the types of stresses are perpendicular to each other and hence it is aimed to reduce the resulting stress as much as possible.

* > Length and bore of the cylinder: The length of the cylinder and the length of the stroke is calculated on the basis of the formula: length of cylinder $L = 1.15$ times the length of the stroke (l). $L = 1.15(l)$

* > Cylinder flange and studs: The cylinders are always cast integral as a part of the upper crankcase or in some cases attached to it by means of nuts and bolts. The flange is integral to a cylinder and henceforth its thickness should be greater than that of the cylinder wall. The thickness of flange should generally be between $1.2t$ - $1.4t$ where t is the cylinder thickness.

The stud diameter is calculated by equating gas load (due to max pressure) to the grand total of all the resisting forces of the studs.

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Question # 21

Please explain the advantages of Cycloidal and Involute gears?

Answer:-



The advantages of the Cycloidal gears are as follows:

- * > Having a wider flank as compared to Involute gears they are considered to have more strength and hence can withstand further load and stress.
 - * > The contact in case of cycloidal gears is between the concave surface and the convex flank. This results in less wear and tear.
 - * > No interference occurs in these types of gears.
- The advantages of Involute gears are as follows:
- * > The primary advantage of involute gears is that it allows the changing of the centre distance of a pair without changing the velocity ratio.
 - * > The pressure angle remains constant from start to end teeth, this results in less wear and smooth running of the gears.
 - * > The involute gears are easier to manufacture as they can be generated in a single curve (the face and flank).

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Question # 22

Explain me what are the different types of detail drawings?

Answer:-

- * 1) Pattern detail drawings
- * 2) Stamping detail drawings
- * 3) Casting detail drawings
- * 4) Welding detail drawings
- * 5) Forging detail drawings

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Question # 23

Tell me is it essential to show all the hidden lines in dotted in a assembly drawing?

Answer:-

Generally hidden lines are omitted from the sectional view and not essential to show all hidden lines in assembly drawing. If it is necessary to show more clearly a hidden part in the section or aiding in dimensioning the view, they may be drawn.

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Question # 24

Tell us in an orderly manner how the force in the member of a truss be detected using the method of joint?

Answer:-

The steps required to calculate the force are as follows:

- * > The reaction at the support has to be first calculated.
- * > Once the reaction is calculated the direction of force of the member is made to make it tensile. On getting the result to be negative the direction assumed is wrong and this implies the force being compressive in nature.
- * > A joint needs to be selected whose 2 members are not known. The lami's theorem is used on the joint on which less than three forces are acting.
- * > After the above process is complete the free body diagrams of the joint needs to be made. Since the system is in equilibrium the condition of Summation of V and H must result in zero.
- * > After the above step the resolution of forces method needs to be used on the joint on which more than 4 forces are acting.

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Question # 25

Tell me what is a Helix?

Answer:-

It is a curve which is generated by a point moving at uniform rate around and advancing parallel to, or at varying distances from an axis.

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Question # 26

Tell me what do you mean by projectors?

Answer:-

Projectors are the imaginary lines drawn from the object to the plane.

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Question # 27

Explain the difference between Size dimension and Location dimension?

Answer:-

- (a) Size Dimension :It describes the size of an object such as length ,width, thickness, depth, diameter etc.
- (b) Location Dimension: A location dimension describes the location of constructional parts within an object .It includes location of holes, slots, grooves etc.

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Question # 28

What size of material required for making rolled threads?

- (a) Pitch diameter
- (b) Root diameter
- (c) Major diameter
- (d) None

Answer:-



(a) Pitch diameter

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Question # 29

When two elastic bodies collide with each other

- (a) Two bodies will momentarily come to rest after collision
- (b) The two bodies tend to compress & deform at the surface of contact
- (c) Two bodies begins to retain their original shape
- (d) All of the above

Answer:-

- (d) All of the above

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Question # 30

Stress concentration factor is defined as ratio of

- (a) Max stress to endurance limit
- (b) Nominal stress to endurance limit
- (c) Max stress to nominal stress
- (d) Nominal stress to max stress

Answer:-

- (c) Max stress to nominal stress

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Question # 31

Centre of pressure of an aerofoil with an increase of angle of attack will

- (a) Move forward
- (b) Move backward
- (c) Not move
- (d) None of the above

Answer:-

- (a) Move forward

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Question # 32

Slow plastic deformation of material under constant stress is

- (a) Creep
- (b) Fatigue
- (c) Endurance
- (d) Elastic deformation

Answer:-

- (a) Creep

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Question # 33

Principle effect of humidity is

- (a) Corrosion
- (b) Leaking from sealed enclosures
- (c) Permanent set of packing and gaskets
- (d) Differential contraction of metal parts

Answer:-

- (a) Corrosion

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Question # 34

Mohr's circle can be used to determine following stress on inclined surface

- (a) Principal stresses
- (b) Normal stresses
- (c) Maximum shear stresses
- (d) All of the above

Answer:-

- (a) Principal stresses

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Question # 35

A closed cycle gas turbine works on

- (a) Carnot cycle
- (b) Rankine cycle



- (c) Joule cycle
- (d) Atkinson cycle

Answer:-

- (c) Joule cycle

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Question # 36

Mass balancing is done to

- (a) Avoid flutter
- (b) Increase bending stress
- (c) Reduce drag
- (d) Distributing mass on control surface

Answer:-

- (a) Avoid flutter

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Question # 37

Antifriction bearings are

- (a) Thick lubricated bearing
- (b) Thin lubricated bearing
- (c) Ball & roller bearing
- (d) Plastic bearing

Answer:-

- (c) Ball & roller bearing

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Question # 38

Thermal efficiency of a gas turbine plant as compared to diesel engine plant

- (a) Higher
- (b) Lower
- (c) Same
- (d) May be higher or lower

Answer:-

- (a) Higher

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Question # 39

Teflon is used for bearings because of

- (a) Low co-efficient of friction
- (b) Better heat dissipation
- (c) Smaller space constraint
- (d) All of the above

Answer:-

- (a) Low co-efficient of friction

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Question # 40

Tell me what are Bevel Gears and what are its types?

Answer:-

Bevel gears are the type of gears in which the two shafts happen to intersect. The gear faces which are tooth bearing are conical in shape. They are generally mounted on shafts which are 90 degrees apart but they can be made to work at other angles as well. The bevel gears are classified into the following types on the basis of pitch surfaces and shaft angles:

* > Mitre Gears: These types of gears are similar to each other ie. they have the same pitch angles and contain the same number of teeth. The shaft axes intersect at 90 degrees angle.

* > Angular bevel gears: When two bevel gears connect at any angle apart from 90 degrees.

* > Crown bevel gears: When the two shaft axes intersect at an angle greater than 90 and one of the bevel gears have a pitch angle of 90 degrees they are known as crown bevel gears.

* > Internal bevel gears: In these type of gears the teeth on the gears is cut on the inside area of the pitch cone.

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Question # 41

What is position of views in First Angle Projection?

Answer:-

In first angle projection the top view is positioned below the front view with the left side view of the object to the right side of the front view.

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Question # 42



Tell me what are the method of development?

Answer:-

- * 1. Parallel Line Development: It is used for patterns of prisms and cylinders.
- * 2. Radial Line Development: This is used for surfaces of regular tapering forms such as pyramids and cones.
- * 3. Triangulation Development: It is used when the connecting surface is neither prismatic nor pyramidal such as developing warped and double curved surfaces.

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Question # 43

Tell us how can the reaction of support of a frame be evaluated?

Answer:-

Generally roller or hinged support are used to support the frames. The conditions of equilibrium are used to determine the reaction support of a frame. The condition of equilibrium takes place when the sum of the horizontal and vertical forces sum equal to zero. The system must form a state of equilibrium even after considering the external loads and the reactions at the supports. For equilibrium to be prevalent in the system the following conditions are required to be in occurrence:

- * > Summation of $V = 0$. This implies that the summation of all the forces in the vertical direction results to zero.
- * > Summation of $H = 0$. This implies that the total of all the forces acting in horizontal direction is also zero.
- * > Summation of $M = 0$. The sum of all the moment of forces around a point must be zero.

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Question # 44

Tell us what are considerations taken into account while creating a piston head?

Answer:-

The piston head is designed on the basis of the following considerations:

- * > The crown should have enough strength to absorb the explosion pressure inside the engine cylinder.
- * > The head must always dissipate the heat of the explosion as quickly as possible to the engine walls. The thickness of the head is calculated on the basis of another formula which takes into consideration the heat flowing through the head, the conductivity factor of the material. The temperature at the center and edges of the head.
- * > The thickness of the piston head is calculated on the basis of the Grashoff's formula which takes into consideration the maximum gas pressure of an explosion, the permissible bending and the outside diameter of the piston.

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Question # 45

What are the principle views of an orthographic projection?

Answer:-

- * (a) Front view or Elevation
- * (b) Top view or Plan
- * (c) Side view

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Question # 46

Tell me what is meant by Oblique projection?

Answer:-

It is the one view projection where the projectors may be at any angle except 90 degree with the plane of projection, but 45 degree projectors are generally used because projectors at 45 degree with plane of projection all the edges of the cube are in their true lengths in the oblique projection.

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Question # 47

Tell me why is a pictorial drawing shaded?

Answer:-

To make the appearance of a pictorial drawing more natural.

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Question # 48

Tell me what do you mean by Pictorial Drawing?

Answer:-

It is a graphic language of engineers which represents a real thing by means of picture view.

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Question # 49

Do you know what is the plane of projection?

Answer:-

It is the plane on which the projection of the object is taken.

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Question # 50

Tell me what is meant by projection of an object?

**Answer:-**

Representation of an object on paper is called projection of an object.

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Question # 51

What is Ellipse?

Answer:-

It is a plane curve formed by a point moving so that the sum of its distances from two fixed points (foci) is constant and equal to major axis.

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Question # 52

Explain me what are the production drawings?

Answer:-

Production drawings are the drawings which are required for the fabrication of any product.

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Question # 53

Do you know why is it necessary to show the sectional view of an object?

Answer:-

Because it shows clearly the internal shape of an object or interior details of a part can easily shown.

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Question # 54

Tell me what is a functional dimension?

Answer:-

This is expressed directly on the drawing which is essential to the function of the product.

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Question # 55

What is Parabola?

Answer:-

Parabola is a curve which is generated by a point moving along a path equidistant from a point (focus) and a straight line (directrix).

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Question # 56

Explain what are Phantom Lines?

Answer:-

These are thin lines composed of long dashes with pair of short dashes. Phantom Lines used to show adjacent parts, alternate positions and the lines of motion.

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Question # 57

Tell me what is an involute?

Answer:-

Involute is a spiral curve made by a point on a perfectly taut string as it unwinds from around a shape such as a circle or polygon.

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Question # 58

Do you know what is the position of views in Third Angle Projection?

Answer:-

The top view appears above the front view with right side of the object to the right of the front view in third angle projection.

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Question # 59

Tell us how are thin materials shown in sectional drawing?

Answer:-

Thin materials such as sheets, gaskets and electrical sections are shown solid in section and adjoining parts should be separated by a small space.

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Question # 60

Tell me how are screw threads specified?



Answer:-

It should be specify pitch and dimension with tolerances and also the distance to the end of full(parallel)threads.

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Question # 61

Tell me what is Perspective projection?

Answer:-

A perspective drawing is one which more nearly present an object as seen in an actual photograph or as it appears to the eye of the observer.

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Question # 62

Tell me what is meant by assembly drawings?

Answer:-

Drawing which shows how two or parts are assembled and identifies all the pieces which form the assembly is called assembly drawings.

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Question # 63

Do you know what is an Isometric drawing?

Answer:-

This is drawn by using three axis. One axis is drawn vertically and the other two are at an angle of 30 degree (right and left) to the horizontal.

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Question # 64

What is Hyperbola?

Answer:-

It is a curve which is generated by point moving so that the differences of the distances from any point of the curve to two fixed points(foci),is a constant equal to the transverse axis of the hyperbola.

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Question # 65

Tell me what is the main advantage of chain dimensioning?

Answer:-

Chain dimensioning can be used where the possible accumulation of tolerance does not cause danger to the functional requirement of the part.

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