UNIVERSIDADE DA BEIRA INTERIOR

COURSE:..... MESTRADO INTEGRADO EM ENGENHARIA AERONÁUTICA – 4º ANO
SUBJECT:..... FABRICAÇÃO E MANUTENÇÃO DE AERONAVES – 10384
TEST:..... 2
ACADEMIC YEAR: 2013/2014
DATE:..... 20-01-2014

The test contains 35 multiple choice questions, each one counting 6 marks. The total number of marks is 210. The test should be completed in 2 hours. You should answer in the test sheets by selecting the correct option.

Good Work

Name: Student's number:

Answer each of the following questions, indicating the correct option of those provided.

01 - Explain what is aeronautical manufacturing?

A - Set of activities related to production which implies any type of aeronautical application.
B - Set of articulated and organized activities of engineering, logistics, quality and production which, based on design specifications, include the manufacturing of aeronautical components. ✓
C - Production includes all activities of analysis, selection and implementation of most efficient technologies and production processes in combining and transforming the production factors (inputs) for maximizing the goods and services related with the aeronautical product.
D - Any manufacturing activity related to some extent with aircraft.

02 - Identify the types of activities related to the Aeronautical Production Life-Cycle and are non-recurring activities.

A - Conceptual studies, preliminary studies, development, prototyping, process definition, industrialization optimization, series production.
B - Conceptual studies, preliminary studies, development, prototyping, production, process definition, industrialization optimization. ✓
C - Process definition, industrialization optimization, series production.
D - Industrialization optimization, series production.

03 - What is *Built to Spec*?

A - Group of activities that include the manufacturing of something according to specifications.
B - Development of aeronautical specifications.
C - Optimization process and specification of the industrialization.
D - Manufacturing of components including the previous development of the component. ✓

04 - What is *Built to Print*?

A - Manufacturing of printers or any other related equipment.
B - Manufacturing according to a specification external to the manufacturing unit including industrialization and the whole process of series production. ✓
C - Development, industrialization and series production.
D - Engineering and development of the industrialization processes.

05 - Identify from the following the list that best defines the overall manufacturing process:

A - Pre-industrialization, Industrialization and Series Production. ✓

B - Inspection and Maintenance.

C - Budgeting, Production Planning and Contract Negotiation.

D - Engineering, Special Process Definition, Manufacturing and Quality.

06 - Identify the main tasks of the Project Management.

A - To define, transmit and manage the project tasks.

B - To ensure the execution of the project towards the final objective.

C - To ensure the project completes according to the contract and within the time and budget. ✓

D - To manage the industrialization process.

07 - What is an ERP system?

A - It is a modular system aimed at managing, planning and executing in an integrated manner the activities of a production unit. ✓

B - It is a system to manage times and resources.

C - It is a management system to verify production times and optimize the industrialization.

D - It is an integrated and optimized manufacturing system for aeronautics.

08 - Which of the following metal manufacturing technologies are not *Shaping Processes*?

A - Shot peening. ✓

B - Casting and moulding.

C - Deformation.

D - Material removal.

09 - Brazing is a technology for

A - mechanical coupling.

B - permanent joints. ✓

C - surface protection.

D - improving the properties.

10 - Painting is

A - an inorganic treatment for surface protection.

B - surface cleaning method.

C - an organic treatment for surface protection. ✓

D - treatment for improving the mechanical properties.

11 - Which of the following steps is not considered as a Logistics activity?

A - Purchases.

B - Suppliers analysis.

C - Stock management.

D - Employee evaluation. ✓

12 - Consider the differences between the aeronautical manufacturing in the beginning of aviation and that implemented today. Which would you consider is the most important change?

A - Cost increase.

B - Implementation of traceability techniques. ✓

C - Automation.

D - Mass production.

13 - What is the main performance indicator and differentiator in the aerospace market since 2000?

A - Productivity.

B - Cost management.

C - Cost.

D - Customer satisfaction. ✓

14 - Which activity does not occur in the pre-industrialization process.

A - Budgeting.
B - Production Planning.
C - Contract and Negotiation.
D - Logistics. ✓

15 - What is meant by "Green Aircraft" during production?

A - A green coloured aircraft.
B - An environment-friendly aeronautical system.
C - Any aircraft or aeronautical prototype which uses bio-fuels.
D - Aircraft where only the structure is assembled and all interiors and systems are missing. ✓

16 - A PMC is:

A - a polyester matrix composite.
B - a polyethylene matrix composite.
C - a polymer matrix composite. ✓

17 - In a curing process at room temperature (about 20ºC) a standard epoxy resin reaches its maximum mechanical properties after:

A - 12 hours.
B - 24 hours.
C - one to two weeks. ✓

18 - In order to speed up the curing of a resin one can:

A - add a little more hardener.
B - increase the pressure in the curing process.
C - increase the temperature in the curing process. ✓

19 - The advantage of the composite construction in aeronautics is reflected in:

A - a minimal influence of the manufacturing processes on the final mechanical properties together with a high ratio of mechanical properties to density of the parts.
B - the possibility of producing different shapes with an optimized structural composition. ✓
C - a good resistance to extreme temperatures and lack of corrosion.

20 - The addition of glass micro-balloons to a resin

A - decreases its density. ✓
B - increases its density.
C - rapidly makes it thixotropic.

21 - The relative density of a resin is:

A - 1.75.
B - 1.2. ✓
C - 1.65.

22 - By adding various loads, in appropriate proportions, to an epoxy resin system one can obtain a glue

A - for structural bonding. ✓
B - with low density but with poor characteristics.
C - that can be used only as a filler substitute.

23 - In general, the manufacturing of a polymeric matrix composite component involves the following steps:

A - resin impregnation, lay-up and consolidation.
B - resin impregnation, lay-up and solidification.
C - resin impregnation, lay-up, consolidation and solidification. ✓

24 - How can one increase the *glass temperature* of a resin?

A - With the curing process (controlled temperature increase). ✓
B - With the curing process (controlled pressure increase).
C - With the curing process (humidity increase by immersion).

25 - An epoxy resin is a polymer of the type:

A - thermoplastic.

B - thermoset. ✓

C - isoplastic.

26 - Why is it recommended that a composite aircraft is painted in white?

A - Because it eases the reflection of radar waves.

B - Because it helps to keep the temperature of the structure as low as possible. ✓

C - Because it is an international requirement.

27 - To ensure a good bonding with epoxy resin the surface to join must be

A - glossy and as smooth as possible.

B - matt with some roughness. ✓

C - The surface finishing has no effect on the bonding.

28 - The selection of wood for aeronautical applications is based on defects and criteria:

A - mechanical, thermal and density.

B - mechanical, humidity and density. ✓

C - mechanical and humidity.

29 - The percentage humidity in the wood

A - does not significantly affect its mechanical properties.

B - has only a significant effect only the density.

C - above 15% has a significant influence on its mechanical properties. ✓

30 - It is better to have a wooden spar cap made

A - in a single solid part.

B - from several bonded foils. ✓

C - There is no relevant difference.

31 - In order for a wooden board to be fit for aeronautical applications the maximum allowed deviation in the alignment of its fibres is

A - 7.5%.✓

B - 10%.

C - 15%.

32 - In aeronautics the type of solid wooden most utilized is

A - Oak.

B - Pine. ✓

C - Teak.

33 - If a wooden board is too short for a given application,

A - one must select a longer board.

B - one can join 2 or more boards with 10/1 chamfers in its width.

C - one can join 2 or more boards with 20/1 chamfers in its thickness. ✓

34 - The repair of a wooden component in an aircraft (spar, skin, ...)

A - does not increase the mass of the aircraft if well executed. ✓

B - requires the substitution of the complete component.

C - must be executed with a composite reinforcement patch.

35 - In a wooden, composite or mixed wing structure, it is necessary to

A - allow for holes to drain any condensation residuals and to balance the internal pressure with atmospheric pressure. ✓

B - verify that there are no holes to avoid moisture to get in the structure.

C - allow for a single hole in the lowest part of the wing to drain any condensation residuals.

THE END