Answers Exam 3211-II

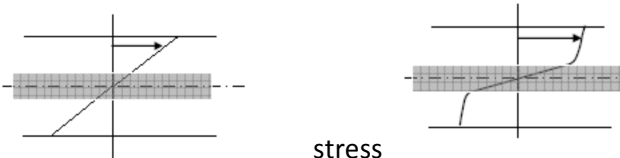## MULTIPLE CHOICE QUESTIONS

1C **- Stiffness because this determines the accuracy of the assembled (sub)structure**
Size is fixed (by design), and floor area and price can be optimized

2C **- Waste = all activities that do not contribute to the value of the product**
So it is more than (A) materials, scrap and leftovers, (B) activities that support the production or (D) not favoured by the shareholders

3A **- Curve .. decrease in man hours per aircraft with increasing serial number**
Not: (B) the level of skills of the work force …; (C) the routine of an individual worker .. or (D) the amount of training of the work force

4D **- Polymer should have a high viscosity: No, for impregnation a low viscosity is required.**
The other alternatives are correct. A. "mixing of fibres"; B. prepreg: fibres and resin are mixed in proper ratio; C. impregnation before (filament winding) and after (RTM) shaping

5D **- Hand lay-up is no proper process for thermoplastics (not drapable at Room Temperature)**
All other alternatives are correct: A - heat required to form them like metals; B - viscosity too high for injection; C – co-woven and comingled yarn suitable for winding.

6D **- Stiffness of the metal alloy is not affected by a heat treatment**
All other effects are possible: changes in A- yield stress and ductility; B – formability; C - warpage

7D **- The increase (dimensionally) of the mould to compensate for shrinkage**
This is a factual question. All other options are incorrect.

8B **- Line 2. After an extra effort after the modification, the learning effect makes sure that the impact of the modification is decreasing with time. Line goes to the original learning curve.**
Line 1 doesn't show learning effect for the modification and lines 3 and 4 indicate that Modifications imply less effort.

9A **- On the contrary. The bigger the parts the more difficult the application of HtH**
The other alternatives are correct: B – Meccano is also a HtH type set; C – HtH doesn't need drilling at assembly stations; D – due to close tolerances Coeff. of Therm. Exp. becomes important, therefore conditioned workshops.

10D **- Quality control by NDT is a necessary step but does not "change" the product**
like the other activities (tape laying, curing, and trimming) do.

11D **None of the answers (A, B or C) is correct**
- In each alternative there is a non-chip removing process: A- friction stir welding; B – punching and pulltrusion; C - stamping

12B **- To reduce the forming force** (reduced at high temp. – at RT very high forces are needed)
A – correct microstructure can also be obtained by heat treatments; C – limit formability is wrong; D – large parts, due to high forces required, even at high temp. the part size is limited

13B - **For both VARTM and VI the vacuum is the driving force for the resin injection**
driving force for VARTM is the pressure (the vacuum is needed to obtain voidfree products)
All other answers are correct.

14D - The false answer is: **One of the previous answers (a, b or c) is not correct**
All three alternatives A, B and C are correct, that makes answer D (implying one of them is not correct) to be the false answer

15B   - .. **can be used to estimate <u>some</u> mechanical properties of composites**
A – has to do with mixing ratio during manufacture; C – is only valid in specific situations; D – RoM cannot be applied to all properties (i.e. properties involving plasticity).

16D   - failures in a <u>metal</u> are .. **Bearing failure, rivet shear out, rivet shear**
Mistakes in the other alternatives: A – delamination (composite failure); B – peel failure (composite failure); C – shrinkage cracking (failure during casting)

17D   - **no option because of required small tolerances** (large section may have tolerances of a few millimetres; bonding need tolerances of less than 0.25/0.5 mm)
Other options: A – tick adherents require tapering of the joint; B – joint strength is calculated using average shear stress; C – bath tub curve stems from the flexibility of the adherents

18B   - **The virtual sectioning of the aircraft for assembly purposes** (as used during design)
Structural breakdown is not A - the cutting of the aircraft during scrapping; C- has nothing to do with an accident; D – nor is it sectioning for maintenance

19C   - **All costs related to the aircraft program**
(this includes investment and development costs, costs of manufacturing all aircraft up to the break-even point, costs for financing, and other costs to produce the aircraft). The other alternatives give only a part of the costs for the calculation of the BEP.

20A   - **primarily aiming at reducing waste** by "cleaning up" the work place
Other alternatives are false. B – can be used at any work place, C – six-sigma is a different tool; D – is not aimed at reducing cycle time.

<u>OPEN QUESTIONS</u>

21a   strain   stress

21b.   The "fibre" where <u>the stress</u> is zero *(only in some occasions the strain is zero too)*
21c.   The bending moment is triangular (non-constant), so is the radius
21d.   The maximum bending moment moves through the plate: every cross-section encounters the same bending moment

22a   batch = <u>group</u> of <u>identical</u> products/components – <u>processed</u> at the same time/<u>as one group</u>
22b.   In the figure one can indicate: batch size, trigger moment for a new batch, moment of replenishment, minimum & maximum stock size, decrease of stock in time (production rate)
22c.   Delay time between ordering of a new batch and the completion of the new batch

23a.   different materials/size/risk share/accessibility/maintainability/operational reasons/….
23b.   2D-3D transition/different materials/production share/rigid-flexible transition/…
23c.   joining materials like rivets and adhesive/local thickness increase to compensate for stress concentrations/ eccentricities/…

Grade = Number of points : 10 (rounded off to the nearest 0.5)