1. The words retrofit and refurbishment are often used synonymously. Which of the following statements refers to refurbishment rather than retrofit?
   a. return to the original condition
   b. reduce the energy consumption
   c. make changes to the building fabric
   d. make changes to the environmental conditions in the building

2. Which statement does not reflect the role of the retrofit coordinator?
   a. a qualified expert who can manage a retrofit project from start to finish
   b. carry out all the works involved in a retrofit
   c. assure the quality of the design and installation
   d. manage the risks involved in the retrofit process

3. Which of the following is unlikely to be carried out in the Retrofit Coordinator's initial assessment?
   a. evaluation of improvement options for fabric elements
   b. assessment of building defects such as leaks and damp
   c. assessment of heritage status of building
   d. assessment of on-site constraints e.g. access, drains etc.

4. Sequencing is critical for a successful retrofit. The impact of poor sequencing can be:
   a. poor air tightness
   b. poor continuity of insulation
   c. weather penetration
   d. all of the above

5. Tool box talks are a useful way to help staff carry out a good quality installation. What skills are most commonly the subject of tool box talks?
   a. screeding
   b. air tightness techniques
   c. thermography
   d. all of the above

6. What word is used to describe the heat gains from people and animals within a dwelling?
a. Biological
b. Incidental
c. Natural
d. Metabolic

7. What do the initials SAP stand for?
   a. Standard Assessment Protocol
   b. Simplified Assessment Procedure
   c. Standard Assessment Procedure
   d. Standard Assessment Provider

8. The SAP methodology uses the concept of Standard Occupancy to determine the number of occupants in a dwelling. Which of the following statements is FALSE:
   a. is based on the total floor area of a dwelling
   b. may not reflect the ‘real world’ occupancy
   c. allows comparison of similar properties for SAP scores
   d. can be used to design hot water systems

9. When assessing a property for retrofit a variety of tests can be carried out on the building fabric. Which one of the following is classed as an invasive test?
   a. Air pressure testing
   b. Absorption testing (i.e. Carsten cups)
   c. Borescope
   d. Thermal imaging

10. When dealing with a Listed Building, which of the following statements is TRUE?
    a. It is a criminal act to damage a Listed Building
    b. The decision on what work can be done to a Listed Building lies with the Department for Communities and Local Government
    c. Grade 3 buildings are of special scientific interest
    d. the rules for what work is permitted apply to all listed buildings

11. One of the principles of Building Fabric Retrofit is to retain the thermal capacity. Select from the following one correct reason for doing this.
    a. so that the internal surfaces are more robust
    b. so that people are forced to insulate externally
    c. so that summertime temperatures are reduced
    d. so that the dwelling will heat up more quickly
12. Which insulation material is most likely to be supplied in a rigid board

   a. mineral fibre  
   b. cellulose fibre  
   c. polystyrene  
   d. sheep’s wool

13. External wall insulation has certain disadvantages. Which of the following statements about EWI is incorrect?

   a. it can need planning permission  
   b. it is often difficult to deal with the junction between wall and roof  
   c. it often means dealing with downpipes, electrical and gas supplies, SVPs etc  
   d. it can only be applied to masonry buildings

14. ETICS stands for which of the following:

   a. Enhanced Thermal Insulation Composite Systems  
   b. External Thermal Insulation Composite Systems  
   c. Enhanced Thermal Imaging Camera Systems  
   d. External Thermal Insulation for Corporate Sustainability

15. Using the loft space for storage often can conflict with installing insulation. Which of the following is not a solution to maintaining storage space in lofts?

   a. installing a new floor above the insulation  
   b. installing insulation between and over the ceiling joists  
   c. insulating at rafter level  
   d. insulating below the ceiling

16. Which of the following is not a good strategy to avoid overheating in dwellings?

   a. shading west facing windows  
   b. maintain thermal mass with EWI  
   c. shading north facing windows  
   d. using low energy lights and appliances
17. Which of these IWI product is hygroscopic?

a. PIR
b. XPS
c. EPS
d. Wood Fibre

18. Select one correct statement about heat pumps

a. A GSHP has to have a bore hole for the evaporator loop
b. An ASHP can only be used with fan convectors
c. Heat pumps are well suited to supplying heat at low temperature
d. The power rating of a heat pump has little effect on its performance

19. The area of a flat plate solar panel is often related to the number of bedrooms in the dwelling. What area per bedroom is appropriate?

a. 0.1m²
b. 0.5 m²
c. 1m²
d. 1.5 m²

20. Identify the incorrect statement. Combi boilers are not recommended:

a. In houses with more than two bathrooms
b. In dwellings with a very low heat load
c. When there is a plan to install a solar thermal hot water system
d. Where several hot water outlets are very far apart

21. Which of the following is NOT a reason for introducing fresh air into dwellings?

a. to reduce humidity levels
b. to help the fabric breath
c. to dilute air borne particulates
d. to supply air for fuel burning appliances

22. In a typical dwelling which activity is likely to generate the most moisture?

a. clothes drying
b. cooking
c. bathing
d. dish washing
23. At which level of air permeability would you consider mechanical ventilation to be essential?
   a. less than 5 m3/m2h @ 50 Pa
   b. less than 3 m3/m2h @ 50 Pa
   c. less than 1 m3/m2h @ 50 Pa
   d. all of the above

24. Which of the following is not a common unit for measuring ventilation rates?
   a. litres per second
   b. cubic meters per hour
   c. parts per million
   d. air changes per hour

25. Which of the following statements about MEV is incorrect?
   a. MEV stands for mechanical exhaust ventilation
   b. Flow rates in MEV systems can be boosted with occupancy sensors
   c. The position of air inlets in MEV systems requires careful thought to avoid cold draughts
   d. Flow rates in MEV systems can be boosted with humidity sensors

26. Select one correct statement. A hygroscopic material will:
   a. absorb and release water vapour
   b. not allow water to be absorbed, water will sit on the surface
   c. generally be made from plastic
   d. all of the above

27. Creating an air space behind IWI which is ventilated to outside is sometimes recommended. Select one incorrect statement about this practice
   a. it increases the insulation value of the wall
   b. it can remove any moisture that passes through the insulation
   c. there is a danger that the outside air will by-pass the insulation
   d. if timber studs are used to create the air space these will constitute thermal bridges

28. The U value of a construction is a measure of:
   a. thermal capacity
   b. thermal transmittance
   c. vapour resistance
d. thermal resistance

29. Identify one Incorrect statement from the following:

a. internal wall insulation (IWI) is usually disruptive for the occupants
b. IWI carries the risk of interstitial condensation
c. IWI must incorporate a vapour barrier to prevent interstitial condensation
d. reducing thermal bridges can be difficult with IWI

30. Which of the following are attributes of thermal bridging?

a. local condensation
b. increased heat loss
c. mould growth
d. all of the above

31. If IWI systems are installed between floor and ceiling, the timber intermediate floor void needs consideration. Select one incorrect statement about the treatment of this floor void:

a. the area of external wall in the intermediate floor zone is insignificant compared to the rest of the external wall and can be ignored
b. any air leakage around the joist ends will short circuit the IWI
c. condensation may occur on the timber joists causing them to decay
d. condensation and mould growth may occur on the uninsulated wall

32. Which of the following is most likely to suffer from thermal bypass?

a. insulated dry lining with an air space on the cold side
b. full fill cavity wall insulation
c. wall insulation in a timber frame between plasterboard and fibreboard layers
d. all of the above

33. Why is it important not to seal the internal or external surfaces of walls without damp-proof courses?

a. because otherwise the wall may never dry out and this would cause more damage in the long term
b. because vapour permeable materials will be better insulants
c. because it is important to keep the moisture in the wall
d. because a vapour permeable construction will help to ventilate the building
34. A traditional building is defined as a property built before:

   a. 1900  
   b. 1919  
   c. 1932  
   d. 1946

35. Which of the following is not likely to be a characteristic of traditional buildings?

   a. no damp proof barrier  
   b. listed building status  
   c. double glazing  
   d. solid walls

36. A rigorous commissioning programme is something the Retrofit Coordinator should oversee. The ventilation system is particularly in need of careful commissioning. Which of the following items might a Retrofit Coordinator be able to assess before the ventilation system is commissioned?

   a. air flow rates  
   b. fan power  
   c. noise  
   d. air leakage from ducts

37. What do you understand by the 'performance gap'?

   a. the difference between predicted and actual energy performance  
   b. gaps around poorly fitted insulation materials  
   c. gaps in the insulation layer caused by thermal bridges such as internal walls  
   d. gaps around boiler flues

38. The thermal conductivity of a material is a measure of the rate of heat transfer through a given thickness of the material for every degree temperature difference. What are the units of conductivity?

   a. W/K  
   b. W/m^2K  
   c. W/mK  
   d. none of the above

39. There are many techniques that can be used to evaluate a retrofit project. Some are simple, some more complicated and costly. Which of the following would you consider to be the most expensive evaluation technique?
a. fan pressurisation tests
b. checking meter readings
c. a co-heating test
d. occupant interviews

40. Uncontrolled ventilation can be caused by the stack effect. Identify one incorrect statement about the stack effect.

a. in warm weather the stack effect is the dominant force controlling infiltration
b. the stack effect causes the heat loss through cracks and gaps caused by the buoyancy of warm internal air
c. the stack effect is due to the fact that warm air inside the house is less dense than the cold air outside so it tends to rise
d. the stack effect and the wind effect are the drivers for heat losses by infiltration

41. The main limitation of the Glaser method of condensation risk analysis is:

a. the inside and outside temperatures are fixed
b. it only deals with vapour diffusion
c. the vapour diffusion characteristics of materials are not sufficiently well understood
d. all of the above

42. What simulation method is applicable to assess the moisture performance of exposed solid brick walls?

a. Glaser method
b. dew point calculations
c. hygrothermal simulation (HAM)
d. U value calculation

43. The amount of solar radiation passing through a window is not dependent on

a. the solar radiation falling on the glass
b. the g value of the window
c. the colour of the internal surfaces
d. the area of the window

44. What proportion of the UK greenhouse gas emissions is associated with domestic energy use?

a. 20% - 25%
b. 25% - 30%
c. 30% – 35%
d. 35% - 40%

45. Which of the following provides a summary of the criteria that determine whether a household is in fuel poverty?

a. Low income and high total energy costs
b. Low income or high total energy costs
c. Low income and high heating costs
d. SAP energy rating band F or G

46. What is the commonly quoted typical proportion of an older dwelling’s fuel consumption that is due to space heating?

a. 30%
b. 40%
c. 50%
d. 60%

47. Which of the following is not a reason why air tightness is important?

a. To reduce ventilation heat loss
b. To reduce thermal bridging
c. To ensure mechanical ventilation systems can work effectively
d. To improve thermal comfort

48. A U-value of 0.15 W/m2K is defined as the maximum for external walls to meet which of the following standards?

a. Building Regulations Part L1A
b. Building Regulations Part L1B
c. Good Practice Standard
d. Passivhaus EnerPHit Standard

49. Air pressure testing is a useful investigative technique when assessing dwellings for retrofit. Which of the following statements is FALSE?

a. Testing can be combined with thermal imaging
b. Testing can be undertaken before, during and after retrofit
c. Testing must be undertaken to demonstrate compliance with the guidance in Approved Document L1B of the current Building Regulations
d. Testing helps identify leaks in the building fabric
50. Which of the following statements is FALSE?

When developing a whole house plan for retrofit:

a. an RdSAP survey contains sufficient data to plan the retrofit
b. It is important to understand the motivations of the owners
c. It is vital to record all data from the site visit so it can be referred to a later date
d. all planning and development restrictions must be understood