RHS LEVEL 3 ADVANCED/DIPLOMA IN HORTICULTURE
WRITTEN EXAMINATION

10:00am Wednesday 8th July 2009

MODULE D

Outdoor Plant Production
Protected Plant Production

Section A – Short Answer Questions

Candidate Number:……

Candidate Name:……..

Centre Number/Name:……..

IMPORTANT – Please read carefully before commencing.

i) The duration of the papers in Module **D** is **2 hours**.
ii) Answer **ALL** questions in Section **A**.
iii) **ALL** questions in Section **A** carry equal marks.
iv) Write your answers legibly in the spaces provided.
v) Use metric measurements **ONLY**.
vi) Where plant names are required, they should include genus, species and where appropriate cultivar.

ANSWER ALL QUESTIONS

MARKS

Q1 State **TWO** advantages and **TWO** limitations of growing trees in containers, as compared to field grown production. **2**

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Q2 State **ONE NAMED** spring and **ONE NAMED** summer outdoor cut flower crop. **2**

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Q3 State **FOUR** conditions that must be met by a grower in order to qualify for organic status. **2**

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Q4 State **FOUR** potential advantages to the consumer associated with organic crops. **2**

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Please see over/…..

ANSWER ALL QUESTIONS

MARKS

Q5 Describe **ONE** harvesting system used for bare root transplants. **2**

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Q6 State the main EU (European Union) grading criteria for a **NAMED** vegetable crop. **2**

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Q7 State **FOUR** factors to be considered when equipping a packhouse to deal with nursery stock. **2**

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Q8 Identify **FOUR** design features of a **NAMED** protective structure which contribute to the efficiency of the structure. **2**

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Please turn over/…..

ANSWER ALL QUESTIONS

MARKS

Q9 Explain the difference between supplementary lighting and photoperiodic lighting in glasshouse crop production. **2**

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Q10 Identify **FOUR** methods available to irrigate pot plants on a bench. **2**

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MODULE D

Outdoor Plant Production
Protected Plant Production

Sections B & C - Structured Questions

IMPORTANT – Please read carefully before commencing.

i) The duration of the papers in Module **D** is **2 hours**.
ii) Answer **TWO** questions from Section **B** and **ONE** question from Section **C**.
iii) **ALL** questions carry equal marks.
iv) Write your answers legibly in the answer booklets provided.
v) Use metric measurements **ONLY**.
vi) Where plant names are required, they should include genus, species and where appropriate cultivar.

Please turn over/…..

Section B – Outdoor Plant Production

Answer TWO questions from this section

MARKS

Q11 Describe the production of a **NAMED** fruit crop under **EACH** of the following headings:

i) cultivar selection; **4**
ii) propagation; **4**
iii) planting and aftercare; **6**
iv) harvesting and storage. **6**

Q12 a) List and describe the field equipment and machinery available to grow a **NAMED** vegetable crop. **10**

b) List and describe the field equipment and machinery available to harvest a **NAMED** vegetable crop. **10**

Q13 Describe the production of a **NAMED** climber under **EACH** of the following headings:

i) propagation method; **5**
ii) potting and support; **5**
iii) irrigation and nutrition; **5**
iv) pests and diseases. **5**

Q14 Explain, using **NAMED** crop examples, how **EACH** of the following will affect final yield:

i) sub-soiling; **5**
ii) undercutting; **5**
iii) pollination groups; **5**
iv) ethylene-reduced storage. **5**

Please see over/…..

Section C – Protected Plant Production

Answer ONE question only from this section

MARKS

Q15 Explain, how **EACH** of the following can be used to assist **NAMED** crops grown under protection:

i)	blackouts and day length manipulation;	**5**
ii)	heating and ventilation;	**5**
iii)	carbon dioxide enrichment;	**5**
iv)	thermal screen.	**5**

Q16 Describe the production of a **NAMED** pot plant under **EACH** of the following headings:

i)	propagation and establishment;	**5**
ii)	crop development and maintenance;	**5**
iii)	control of pests and diseases;	**5**
iv)	marketing.	**5**

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MODULE D

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Candidates Registered	**49**		**Total Candidates Passed**	37	92.50%
Candidates Entered	40	81.63%	Passed with Commendation	12	30.00%
Candidates Absent	5	10.21%	Passed	25	62.50%
Candidates Deferred	4	8.16%	Failed	3	7.50%
Candidates Withdrawn	0				

Section A – Short Answer Questions

Q1 State **TWO** advantages and **TWO** limitations of growing trees in containers, as compared to field grown production.

A good understanding was shown of the topic area. Higher marks were awarded to candidates who were specific in their answers. Comments which received lower marks were 'easy to grow' and 'irrigation is difficult'. These are not specific and are very general comments which show limited understanding of the topic.

Q2 State **ONE NAMED** spring and **ONE NAMED** summer outdoor cut flower crop.

Good answers were recorded by the majority of candidates. To obtain full marks candidates need to record the full latin name of the example crop.

Q3 State **FOUR** conditions that must be met by a grower in order to qualify for organic status.

Good answers were recorded. It however must be remembered that many organic controls use natural chemicals which quickly break down in the environment into organic substances. Many candidates recorded that chemicals are not used which is not correct.

Q4 State **FOUR** potential advantages to the consumer associated with organic crops.

Good answers were recorded. Some candidates however recorded information which did not directly relate to the question eg. Less air miles, locally grown, will contain more nutrients - there is some debate on this last point at present.

Q5 Describe **ONE** harvesting system used for bare root transplants.

Very general answers were recorded. In order to obtain full marks candidates must describe the harvesting system and relate it to a crop. Answers in most cases did not relate the harvesting system with a bare root transplant.

Q6 State the main EU (European Union) grading criteria for a **NAMED** vegetable crop.

A poorly answered question. Very general comments were made which in most cases did not relate to a named crop. The examiner was looking for the grading system of Extra Class, Class I, Class II and Class III with the criteria recorded for these grades.

Q7 State **FOUR** factors to be considered when equipping a packhouse to deal with nursery stock.

Some very good answers with useful information were recorded. Lower marks were awarded to candidates who made very general comments which were difficult to relate directly to a packhouse. An example is that the packhouse should have electricity.

Q8 Identify **FOUR** design features of a **NAMED** protective structure which contribute to the efficiency of the structure.

A poorly answered question. Candidates often did not relate the design feature to the named protective structure. Answers were very general and were of construction detail ie. should have roof vents, rather than the design feature ie. sloping sides to greenhouses to absorb more winter light.

Q9 Explain the difference between supplementary lighting and photoperiodic lighting in glasshouse crop production.

Very good answers were recorded which demonstrated a clear understanding of the topic area. Good examples of the crops used for the two lighting methods were given.

Q10 Identify **FOUR** methods available to irrigate pot plants on a bench.

Very good answers were recorded. Good examples of irrigation systems which were suitable for pot plants on a bench were given.

Structured Questions

Section B – Outdoor Plant Production

Q11 Describe the production of a **NAMED** fruit crop under **EACH** of the following headings:

i) cultivar selection;
ii) propagation;
iii) planting and aftercare;
iv) harvesting and storage.

- Many candidates did not show in their answers a comprehensive knowledge of cultivar selection. Many answers named and described ONE cultivar only and did not go on to mention key features such as flavour, season of use, culinary/dessert, time of cropping, continuity of supply.
- Candidates failed to fully describe the propagation of (usually apples), by chip budding onto rootstocks MM106 or M27 in August or grafting in winter. Diagrams were either poorly drawn or omitted from their answer altogether.
- Planting and aftercare was sometimes unrelated to the named crop, few candidates were able to give accurate planting distances within and between rows, method of planting was poorly described and timing inappropriate, some candidates describing container growing of fruit (apples) which was not asked for.
- Pruning was rarely accurately described, depth and type of mulch/fertilizer application were generally good.
- Staking and tying rarely accurately described, irrigation mentioned.
- Harvesting and storage was quite well understood by most candidates who answered this question.

Q12 a) List and describe the field equipment and machinery available to grow a **NAMED** vegetable crop.

b) List and describe the field equipment and machinery available to harvest a **NAMED** vegetable crop.

- Not a popular question.
- Candidates named a vegetable crop, listed and basically described its use for growing a vegetable crop, but rarely gave a comprehensive answer, sometimes confusing part a) with part b).
- Not one of the candidates' answers accurately described the machinery available to harvest a vegetable crop, omitting size, cost and versatility.
- Some answers repeated information given in parts a) and b).

Q13 Describe the production of a **NAMED** climber under **EACH** of the following headings:

i) propagation method;
ii) potting and support;
iii) irrigation and nutrition;
iv) pests and diseases.

- Most candidates named a suitable climber, but some were poor examples for example *Hedera helix* but without giving a cultivar name; several answers described raising plants from seed; marks - were awarded because the question did not state the climber had to be propagated by vegetative methods.
- Most answers were average to good. Most candidates were able to show a basic knowledge of how to produce a crop of climbing plants. Few answers were comprehensive enough to demonstrate that the candidate had a detailed knowledge of the topic area.
- Most candidates were able to describe the propagation of their chosen plant, few drawings were produced and of those that did, many were poorly drawn.
- Pot size and composts used were reasonably well understood, as was staking and support.
- A detailed knowledge of feeding and watering was not evident in most answers most recording the use of Osmocote, few mentioned the type of irrigation methods.
- Pests and diseases were well understood, some however were inappropriate for the climber they had selected and lost marks as a consequence.

Q14 Explain, using **NAMED** crop examples, how **EACH** of the following will affect final yield:

i) sub-soiling;
ii) undercutting;
iii) pollination groups;
iv) ethylene-reduced storage.

- Most candidates were able to give suitable examples of crops to answer the question but in a few cases related one crop to the question as a whole which made it difficult to answer accurately.
- Some candidates confused double digging with sub-soiling, but did mention the benefits that it improved aeration and drainage, which assisted root crops which are able to penetrate deeper into the soil and improve quality without fanging.
- Undercutting was well-understood and most candidates related it to nursery stock, mentioning severing of the tap-root, encouraging the development of fibrous roots which made transplanting and establishment more successful.
- Pollination groups were related mainly to apples, and most candidates mentioned that cultivars in the same or contiguous groups should be planted together. Few mentioned the ‘Cox related factor’ when selecting cultivars, biennial bearers or influence on cropping of incomplete

fertilisation. Most candidates mentioned triploid cultivars such as ‘Bramley’s Seedling’ and the fact that two other compatible cultivars were required to ensure a crop on all THREE trees.

- Ethylene–reduced storage was reasonably well explained by most candidates. Candidates were able to explain the effect on flower crops, not to store flowering and non-flowering crops in the same area, and the effect of ethylene on ripening. Not all candidates mentioned the use of scrubber fans to remove ethylene from the atmosphere.

Section C – Protected Plant Production

Q15 Explain, how **EACH** of the following can be used to assist **NAMED** crops grown under protection:

i) blackouts and day length manipulation;
ii) heating and ventilation;
iii) carbon dioxide enrichment;
iv) thermal screen.

i) Blackouts and day length manipulation.

This was generally well understood with most candidates able to provide examples of short day plants. Some candidates were very longwinded in their explanations with few specific facts. Night length was in the most part understood as being the critical factor but few candidates had a very clear understanding of the equipment needed to manipulate this in order to either stimulate vegetative growth or flowering. How this control related to time of the year was even less well understood with few candidates making the connection clear.

ii) Heating and Ventilation

The maintenance of a specific temperature regime to promote healthy growth was in most cases understood however the reasons why and the significance of very low temperatures or high temperatures was less well documented or explained. Connections of temperature with relative humidity and the practical implications to the plant or crop were not well explained.

Ventilation was not very well answered with few if any candidates including the maintenance of ambient carbon dioxide as a reason for adequate ventilation. Relationships with heating and relative humidity and the subsequent effect on plant pathogens was usually included but not explained very well.

iii) Carbon Dioxide Enrichment.

This was not answered very well. Many candidates had no facts in terms of ambient levels, possible enrichment and enrichment methods. Few explained clearly the influence of Carbon Dioxide on Photosynthesis and how carbon dioxide can be the limiting factor assuming if the other requirements are present.

iv) Thermal Screens

Some candidates described how thermal screens were primarily for shading crops. Those who understood had little knowledge of how a screen would be used in practice although most gave the retention of heat as being the primary function.

Q16 Describe the production of a **NAMED** pot plant under **EACH** of the following headings:

i) propagation and establishment;
ii) crop development and maintenance;
iii) control of pests and diseases;
iv) marketing.

Describe the production of a named pot plant under each of the following headings:

i) Propagation and Establishment

Not many candidates provided a full botanical name correctly written as an example. Propagation methods were often rather vague with few facts to support the description. Phrases were recorded, for example “additional heat will be required”, rather than providing a specific temperature range. Composts were described as propagation media but without detail of the constituent parts making up the compost.

ii) Crop development and maintenance.

Some of the more obvious aspects of plant care were overlooked. Plant spacing, stopping and plant support where relevant were often not included. Aspects of irrigation and nutrition were generally well answered but again the specific irrigation system to be used was often not included.

iii) Control of pests and diseases

Identification of possible pests and disease was good. Control methods using both chemical and biological were often recommended to good effect. The symptoms of the plant problem and their effect on the plant however were often very brief and again lacked detail. Some candidates confused physiological disorders with pest and disease problems.

iv) Marketing

Some candidates struggled with this section of the question. Many overlooked the suitable stage of the plant for marketing. Grading criteria and methods of packaging were poorly answered. It was clear where candidates had had first hand experience of marketing plants, good answers were achieved.