DR PANJABRAO DESHMUKH KRISHI VIDYAPEETH,AKOLA
COLLEGE OF AGRICULTURE , NAGPUR
SEMESTER END EXAMINATION
(Model answer paper)

Semester	**:**	**IVth(New)**			**Academic year**	**:**	**2020-2021**	
Course no	**:**	**ELE BOT-242**	**Course Title**	**:**	**Micropropogation techniques**			
Credits	**:**	**3 (1+2)**						
Day & Date	**:**	**17/6/2021**	**Time**	**:**	**12.00-1.00 (1 hr)**	**Total marks**	**:**	**40**

Note: 1. Solve **any 4**questions from **Section "A"**
2. Solve **any 6** questions from **Section "B"**
3. All questions are compulsory from **Section "C"**
4. Send the PDF file of answer sheet on the mail id of respective course teacher

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		SECTION "A"
		Write the answer in 4-5 sentences only. Each question carries 4 marks
Q.1		**Write the application of callus culture** 1) Nutritional requirements of plants 2) Cell and organ differentiation 3) Development of suspension and protoplast cultures. 4) Somaclonal variations 5) Genetic transformations 6) Production of secondary metabolites and their regulations
Q.2		**Write the stages of micropropogation** Stage 0 :- Selection of mother plant and its maintenance Stage I :- Initiation and maintenance of cultures Stage II :- Multiplication of shoots or rapid somatic embryo formation Stage III :- In vitro rooting of shoots and /or germination of somatic embryo Stage IV :- Hardening / Acclimatization of plantlet
Q.3		**Write about meristem culture** Many plant species are infected with pathogens, viruses, bacteria, fungi, mycoplasma and nematodes that cause systemic diseases. Although these diseases do not always result in the death of plants, they reduce the quality and yield of plants. The plants infected with bacteria and fungi frequently respond to chemical treatment by bactericides and fungicides. However, it is very difficult to cure the virus-infected plants. Further, viral disease are easily transferred in seed- propagated as well as vegetatively propagated plant species. Plant breeder are always interested to develop disease-free plants, particularly viral disease-free plants. This have become a reality through tissue cultures. In general, the apical meristems of the pathogen infected and disease harbouring plants are either free or carry a low concentration of viruses, for the following reasons:- 1) Absence of vascular tissue in the meristems through which viruses readily move in the plant body. 2) Rapidly dividing meristematic cells with high metabolic activity do not allow viruses to multiply. 3) Virus replication is inhibited by a high concentration of endogenous auxin in shoot apices. Tissue culture techniques employing meristem-tips are successfully used for the production of disease-free plants, caused by several pathogens-viruses, bacteria, fungi, mycoplasmas.
Q.4		**Write about somatic embrogenesis** Somatic embryogenesis is the process of a single cell or a group of cells initiating the developmental pathway that leads to reproducible regeneration of non-zygotic embryos

		capable of germinating to form complete plants. A somatic embryo is a bipolar structures and arises from a single cell and has no connection with the cultured explant / callus and as a result is easily separable from it. Somatic embryos can be obtained either directly from cultured explants initiated by pre-embryogenic determined cells (PEDCs) or indirectly from callus initiated by induced embryogenic determined cells (IEDCs). Somatic embryos generally originate from single cells which divide to form a group of meristematic cells. This multicellular group becomes isolated by breaking cytoplasmic connections with the other cells around it and subsequently by cutinization of the outer walls of this differentiating cell mass. The cell of meristematic mass continue to divide to give rise to globular (round ball shaped), heart shaped, torpedo and cotyledonary stages.
Q.5		**Give any five achievemnts of somaclonal variation** Over a dozen varieties have been developed through the exploitation of somaclonal variation:- 1) Ono variety of sugarcane is a Fiji disease resistant somaclone of the susceptible cultivar "Pindar", it was identified by screening of plants regenerated from unselected calli. Ono also shows an yield advantage over Pindar and has been cultivated to a limited extent in Fiji. 2) Skirvin and Janicl (1976) developed an improved scented Gernium variety named "velvet Rose" which is a somaclone of Rober's Lemon Rose, the new variety has twice the chromosome number of the parent variety. This is believed to be the first commercial cultivar originated through somaclonal variation. 3) A sweet potato cultivar "scarlet:" was selected from shoot-tip cultured derived clones. Scarlet is comparable to the parent cultivar in yield and disease resistance, but shows darker and more stable skin colour, which is a desirable quality traits. 4) A somaclonal variant of Citronella java a medicinal plant has been released as Bio-13 for commercial cultivation by CIMAP (Central Institute for Medicinal and aromatic plants, Lucknow). Bio-13 yields 37% more oil and 39% more Citronella than the control varieties. 5) A somaclonal variant of the B.juncea variety. Varuna has been released for commercial cultivation as "Pusa Jai Kisan". The new variety has bolder seeds and some yield advantage over the parent variety Varuna. 6) Lathyrus BioL212- a new variety of Lathyrussativus seeds with a low content of neurotoxin has been developed through somaclonal variations.
		SECTION "B"
		Write the answer in one sentences only. Each question carries 2 marks
Q.6	a	**Cryopreservation** It is a non lethal storage of biological material at ultra low temperature (-196 degree celcius) in liquid nitrogen.
	b	**Define micropropogation techniques** Is an artificial methods for rapid multiplication of plants in a short duration using tissue culture techniques.
	c	**Write the name of three secondary metabolites** Alkaloids , terpenoides, phenols, hormones
	d	**Give the types of cell culture** 1. Single cell culture 2. Suspension culture
	e	**Define Caulogenesis** In the process of oragan formation soots are produced from small tissue is known as caulogenesis

	f	**Write the application of anther culture** 1. Development of homozygous lines 2. Analytical breeding 3. Selection of mutation 4. Production of mail lines 5. Production of transgenic plant		
	g	**Classification of embryo** 1. Zygotic 2. Non zygotic Adventitious embryo, somatic embryo, parthenogenic embryo, androgenic embryo		
		SECTION "C"		
		Choose the correct option each question carry 1 mark		
Q.7	1	Who developed the concept of in vitro culture.		
	a	Stephan Hales	b	**Haberladt**
	c	Snow	d	White
	2	Who give the theory of totipotency		
	a	**Schleiden& Schwann**	b	Justus Von Liebig
	c	Murashige and skoog	d	Nitsch
	3	Who coined the term biotechnology		
	a	Haberladt	b	**Karl Ereky**
	c	Murashige and skoog	d	Skoog
	4	First haploid plants were produced from pollen grains of Datura		
	a	**S.G.Guha&S.C.Maheshwari**	b	Bourgin and Nitsch
	c	Kasha and Kao	d	Jacob and Monod
	5	Temperature required for cryopreservation in degree celcius		
	a	0	b	**-196**
	c	-100	d	-10
	6	Which hormone used for cell division		
	a	**Auxin**	b	Cytokinine
	c	Ethylene	d	Gibberellins
	7	Identify cytokinine		
	a	**Zeatin**	b	IBA
	c	IAA	d	NAA
	8	Use of tissue culture for micropropagation was first initiated by		
	a	**G.Morel**	b	Maheshwari&Guha
	c	Haberladt	d	Debergh and Maene
	9	Leaf roll of potato eliminated by using technique		
	a	**Meristem tip culture**	b	Callus culture
	c	Anther culture	d	Axillary bud
	10	Nurse culture techniques used for		
	a	Anther culture	b	**Pollen culture**
	c	Embryo culture	d	Ovule culture
	11	Interspecific hybrid produced by using		
	a	Cell culture	b	**Protoplast culture**
	c	Meristem culture	d	Bud culture
	12	Which technique used to overcome seed sterility problem		

	a	**Embryo rescue**	b	Somatic hybridization
	c	Meristem culture	d	Cell culture

Signature of course teacher	Signature of Professor of Botany
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