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Roll No. ....

~~SIXTH~~ SEMESTER - VII

B. Tech (E&C)

SUPPLEMENATRY EXAMINATION

Feb.2019

**EC405 MICROWAVE ENGINEERING**

TIME: 3Hrs

Maximum Marks: 40

Note:

- 1) Question No. 1 is compulsory. Attempt any FOUR out of remaining questions.
- 2) Assume suitable missing data.

**Q. 1. Write short notes on the followings :-**

**(2 x 5 = 10 Marks)**

- (a) What are the required conditions for maximum efficiency of two cavity klystron?
- (b) How are microwave measurements different from low frequency measurement?
- (c) Define s-parameters and derive the zero, unity property of s-matrix.
- (d) Why waveguide twists and bends are constructed in this way that the direction of propagated energy changes gradually?
- (e) Explain the working of isolator using ferrite. Mention their typical application.

**Q2.(a) Compare Transferred Electron Devices with Avalanche Transit Time Devices. (3 Marks)**

- (b) The input power to a 20 dB attenuator is 100mW. Find output power and the power absorbed by the attenuator. (3Marks)
- (c) What is velocity modulation? How is current modulation obtained in two cavity klystron? (4 Marks)

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Q3. (a) Describe the negative resistance effect of GUN diode using two-valley model. (3 Marks)

(b) Compare operation of reflex klystron with two cavity klystron. Derive formula for minimum required repellar voltage of reflex klystron. (4 Marks)

(c) An X band directional coupler has a coupling coefficient of 10dB. What will be the output power in the main branch if the input power is 20mW? (3 Marks)

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Q4. (a) Explain Tunnelling effect. Compare principle of PIN diode with Tunnel diode (4Marks)

(b) Why Hybrid tee is known as Magic tee and write its properties. (3 Marks)

(c) What are the advantages of parametric amplifier? Explain concept of parametric Up and Down Converters. (3 Marks)

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Q5. (a) Explain working principle of cylindrical magnetron. Derive formulas for cut-off voltage and magnetic flux intensity. (7 Marks)

(b) For an IMPATT diode  $v_d$  (carrier drift velocity) =  $2.5 \times 10^7$  cm/s,  $L$  (drift region length) =  $5 \mu\text{m}$  and  $\eta$  (efficiency) = 25 %. Calculate resonant frequency. (3Marks)