

15/05/2025 BE EXTC SEM-VIII C-SCHEME RF DESIGN QP CODE: 10083716

Time: 3 Hours

Marks: 80

**Note:**

1. Question No.1 is compulsory.
2. Attempt any three from the remaining questions.
3. Assume suitable data if applicable.
4. Figures on the right hand side indicate full marks.

Q1: Solve any four

- |   |          |
|---|----------|
| a) What is meant by electromagnetic compatibility?                        | <b>5</b> |
| b) Explain 1 dB compression in power amplifier designing                  | <b>5</b> |
| c) State and explain the term Unilateral Figure of Merit                  | <b>5</b> |
| d) State the conditions to generate oscillations for two port oscillator. | <b>5</b> |
| e) Explain multi point ground systems                                     | <b>5</b> |

Q2: A) Design a composite low pass filter by image parameter method for the **10**

Following specifications

$$Z_0 = 50\Omega, f_c = 50 \text{ MHz}, f_\infty = 52 \text{ MHz}$$

B) Give the significance of each section in Image parameter method of filter **10**

Design.

Q3: A) A microwave transistor has the following S parameters at 10 GHz with 50Ω **10**

Source and reference impedance

$$S_{11} = 0.45 \angle 150^\circ, S_{12} = 0.01 \angle -10^\circ, S_{21} = 2.05 \angle 10^\circ, S_{22} = 0.40 \angle -150^\circ$$

The load impedance is 30Ω. Find out i) power gain ii) available power gain

B) Design a microwave amplifier using a GaAs FET to operate at 6 GHz with **10**

maximum transducer power gain. The transistor S parameters at a linear bias point

 $V_{ds} = 4V$  and  $I_{ds} = 0.5 I_{dss}$  are

$$S_{11} = 0.641 \angle -171.3^\circ, S_{12} = 0.057 \angle 16.3^\circ, S_{21} = 2.058 \angle 28.5^\circ, S_{22} = 0.572 \angle -95.7^\circ$$

- Q4: A) List and explain the power amplifier performance parameters **10**  
B) Compare various types of Diode and FET Mixers **10**
- Q5: A) Write short note on CISPR and FCC standard **10**  
B) Explain Kuroda's identity and Richard's Transformation. **10**
- Q6: A) Explain Bonding and Shielding in EMC **10**  
B) What is phase noise? How it is represented? **10**

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**Duration: 3 Hours**

**[Max. Marks: 80]**

- N.B.:** (1) Question No 1 is Compulsory.  
(2) Attempt any three questions out of the remaining five.  
(3) All questions carry equal marks.  
(4) Assume suitable data, if required and state it clearly.

- 1 Attempt any FOUR [20]**
- a Compare WLAN, WPAN, WWAN w.r.t. coverage and applications.
  - b Explain the three phases in planning and design of a Wireless Network.
  - c State the characteristics of WBAN.
  - d Illustrate the architecture of wireless networks.
  - e State and explain IoT characteristics.
- 2 a Explain the factors influencing Wireless Sensor Network design. [10]**  
**b Calculate the uplink cell load factor and number of voice users for a WCDMA [10]**  
system using following data:  
Information Rate  $R_i = 12.2$  Kbps, Chip Rate = 3.84 Mcps, required  $E_b/N_t = 4$  dB, Required inference margin = 3 dB, Inference factor due to other cell = 0.5, Channel activity factor = 0.65.
- 3 a Explain Hidden Node and Exposed Node problem in wireless LANs with [10]**  
neat diagrams.  
**b Write a short note on Vehicular Network Architecture. [10]**
- 4 a Illustrate network establishment in Bluetooth. Explain each mode of [10]**  
operation.  
**b Explain the features of 6LoWPAN? List out its advantages, disadvantages [10]**  
and Applications.
- 5 a Describe the architecture of Sensor Node. Differentiate between wireless [10]**  
sensor network and wireless ad hoc networks.  
**b Illustrate architecture components of RFID. Discuss any one practical [10]**  
application of RFID.
- 6 a Discuss architecture of IoT with any one example. Explain [10]**  
M2M communication.  
**b Explain the IEEE802.16 architecture with a neat diagram. [10]**

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Time: 3 Hours

Max Marks: 80

N.B : 1. Question number 1 is compulsory

2. Solve any Three questions from the remaining Five questions.

3. Draw neat sketches wherever required.

Q1 Solve any Four

- 1 a) Explain why presence of cladding is not essential for signal transmission. Then what are the benefits of providing cladding? (5)
- b) Compare Optical Isolator with Coupler. (5)
- c) Differentiate between LED and LASER light sources. (5)
- d) Explain the concept of Fiber Bragg Grating. Give its applications (5)
- e) Briefly explain about the optical access network. (5)

Q2 a) Derive an expression for Link Power Budget analysis of an optical fiber. (8)

Q2 b) Explain OTDR working principle in detail. Mention its applications. (7)

Q2 c) Explain briefly about fiber optic color code and its significance. (5)

Q3 a) What is an optical amplifier. Compare different types of optical amplifiers. (10)

Q3 b) Explain classification of Optical fibers based on the number of modes guided and refractive index profile. Elaborate core & cladding dimensions with the help of diagrams.(10)

Q4 a) Explain in detail structure of SONET/SDH network. (10)

Q4 b) If a multimode step index fiber having the core refractive index of 1.5, cladding refractive index of 1.38, core radius of 25  $\mu\text{m}$  operates at a wavelength of 1300 nm. Calculate – (10)

- (i) Numerical Aperture.
- (ii) Normalized frequency
- (iii) Solid acceptance angle.
- (iv) Total no. of modes entering the fiber.

Q5.a) Explain in detail working principle and characteristics of APD and compare its working with PIN diode? (10)

Q5 b) List down the methods of fiber fabrication. Explain modified chemical vapour deposition (MCVD) method in detail with a neat diagram. (10)

Q6 Write short notes on ( Any TWO):- (20)

- i) OTDM
- ii) WDM network and architecture
- iii) Passive optical network
- iv) Optical safety

21/05/2025 BE EXTC SEM-VIII C-SCHEME DBM QP CODE: 10083903

**Duration: 3 hours**

**[Max Marks:80]**

- N.B. : (1) Question No 1 is Compulsory.  
(2) Attempt any three questions out of the remaining five.  
(3) All questions carry equal marks.  
(4) Assume suitable data, if required and state it clearly.

- 1 Attempt **any FOUR** [20]
- a Explain Internet of Things- driver for digital business.
  - b Explain different factors that affect consumer behavior
  - c Describe the need of security in e-commerce
  - d Explain different types of e-business
  - e Explain building blocks of mobile commerce .
  - f Discuss use of Cloud computing for e-Business.
- 2 a Explain Drivers of digital business- [10]  
Big Data & Analytics, Mobile, Social media.
- b Explain Opportunities and Challenges in Digital Business. [10]
- 3 a What do you mean by digital business infrastructure? Name the different [10]  
hardware and software that are used in the e-infrastructure.
- b Describe the Components of E-SCM [10]
- 4 a Describe different security attacks. Also explain any one encryption and [10]  
decryption technique.
- b Describe the use of firewalls and their types. [10]
- 5 a What is Information System? Explain its Components? [10]
- b Explain the risk and list the steps to manage the risk in the e-business [10]
- 6 a Discuss various Legal, Ethics and Societal impacts of E-commerce [10]
- b Explain selling and buying in private e-markets with respect to business to [10]  
business E-commerce.
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19/05/2025 BE EXTC SEM-VIII C-SCHEME SNSC QP CODE: 10083207

**Duration: 3 hours**

**[Max Marks: 80]**

- N.B.: (1) Question No 1 is Compulsory.  
(2) Attempt any three questions out of the remaining five.  
(3) All questions carry equal marks.  
(4) Assume suitable data, if required and state it clearly.

- 1 **Attempt any FOUR** [20]
- a What is the effect of atmospheric drag? How to mitigate it? [5]
  - b List various frequency bands used in satellite communication. Mention advantages and disadvantages of 14/12 GHz band used in satellite communication [5]
  - c How to select Launching sites? Where is India's Launching pad? [5]
  - d How the reliability analysis is done in case of Nano satellite? [5]
  - e Explain power system used in Nano satellite. [5]
- 2 a Write short note on: i) Input back off and output back off [10]  
ii) Limits of visibility and sun transit outage
- b Explain three axis stabilization with suitable diagram. Mention its limitations. [10]
- 3 a Draw and explain Receive only type earth station. What do you mean by redundant earth station? [10]
- b Explain the propulsion system used in satellite. Specify which liquid and solid propulsion is used. [10]
- 4 a At room temperature the noise factor of a lossy network is equal to its power loss. YES/NO. Justify. [10]
- LNA is connected to a receiver which has a noise figure of 12 dB. The gain of the LNA is 40 dB, and its noise temperature is 120 K. Calculate the overall noise temperature referred to the LNA input.
- b An uplink operates at 14 GHz, and the flux density required to saturate the transponder is 120 dB ( $W/m^2$ ). The free-space loss is 207 dB, and the other propagation losses amount to 2 dB. Calculate the earth-station [EIRP] required for saturation, assuming clear-sky conditions. Assume [RFL] is negligible. [10]

- 5 a Explain TT &C with suitable diagram. What is its significance? Explain this with example. [10]
- b Explain functions and design considerations of deployment mechanisms. List critical elements in deployment mechanism. [10]
- 6 a Explain scientific payload with suitable diagram. Which type of orbit you will use for this type of payload? Justify your answer [10]
- b List and explain various Active thermal control systems for Nano satellite. Which one you select for your satellite? Why? [10]