

Seventh Semester B. Tech. (Electronics and Communication Engineering) Examination

OPTICAL FIBER COMMUNICATION

Time : 3 Hours]

[Max. Marks : 60]

Instructions to Candidates :—

- (1) All questions are compulsory.
- (2) Due credit will be given to neatness.

1. Y Describe with the aid of ray diagram single mode step index fiber and multimode step index fiber. 10(CO2,3)

2. (a) Explain the various types of dispersions occurring in optical fibers. Derive the expression for material dispersion parameter. 5(CO3)

(b) A graded index-fiber with a parabolic refractive index profile, supports a propagation of 742 guided modes, NA for air is 0.3, core radius is 70 μm . Determine :

(a) The wavelength of light propagating. X

(b) Maximum diameter of fiber that gives single mode operation at the same mode of fiber. $d = ?$ 5(CO2,3)

3. (a) Explain the significance of 1.3 μm wavelength. Also, Explain Intramodal Dispersion. 5(CO4)

(b) A p-i-n photodiode has quantum efficiency of 0.5 at wavelength of 0.9 μm . Calculate :

(i) Received optical power if the mean photocurrent is 1 μA .

(ii) The corresponding number of received photons per second at this wavelength. $\gamma e^- ?$ 5(CO4)

4. (a) Define quantum Efficiency and Responsivity of a photo detectors. Derive the relation between them. 5(CO4)

(b) The quantum efficiency of particular silicon RAPD is 80% for the detection of radiation at a wavelength of 0.9 micrometer. When the incident optical power is $0.5 \mu\text{W}$, the output current is $11 \mu\text{A}$. Determine the multiplication factor of the photodiode. 5(CO3,4)

5. O X (a) Describe with the neat diagram the back scatter method (OTDR) of attenuation measurement in optical fibre. 5(CO1,4)

(b) Describe the cut-back method for measuring total transmission loss of fiber link. Explain why it is necessary to match the spot-size and numerical aperture of the incident beam and the fiber. 5(CO3)

6. O (a) Explain the mechanism of WDM and Passive DWDM. 5(CO5)

O (b) Discuss Point to point link design and rise time budget. 5(CO5)

2027

Course Code : HUT 498-1

GVHW/RW-23/1096

Seventh Semester B. Tech. (Open Elective – Electronics and Communication Engineering) Examination

TECHNICAL COMMUNICATION

Time : 3 Hours]

[Max. Marks : 60

Instructions to Candidates :—

- (1) All questions carry marks as indicated against them.
- (2) Due credit will be given to neatness and adequate dimensions.
- (3) Assume suitable data and illustrate answers with neat sketches wherever necessary.

1. (i) Write on any Two of the followings :

- (a) Methods to achieve conciseness.
- (b) Guidelines for gender neutral language.
- (c) Accuracy as an objective of technical communication.
- (d) Stages in writing process.
- (e) Guidelines to write to multicultural audience.

10(CO1)

2. From the Job Description given below (sourced from Naukri.com) please write an email applying for this job :

Dear Job Seekers,

- We have openings for Electronics and Communication Engineer Fresher|Trainee. An electronics engineer is responsible for designing, developing and testing electronic systems, components and devices.
- Role – Electronics and Communication Engineer Fresher| Trainee.
- Experience – Fresher.
- Job Location – Work from home (Remote).
- Eligibility – B-Tech. / B. E. Electronics and Communication Engineering / EEE / ECE / ETC.
- Flexible working hours.

GVHW/RW-23/1096

Contd.

Here are the key responsibilities :

- Designing electronic systems.
- Testing and troubleshooting.
- Research and development.
- Prototyping and manufacturing support.

Qualifications and Skills :

- Bachelor's or Master's degree in electrical or electronics engineering or a related field.
- Strong knowledge of electronics principles, circuit design and signal processing.
- Proficiency in using CAD software for circuit design and simulation.
- Excellent communication and teamwork skills to collaborate effectively with interdisciplinary teams.
- Attention to detail, organizational skills and the ability to manage multiple projects simultaneously.

Industry Type : Electronic Components / Semiconductors.

Employment Type : Full Time, Permanent.

Education : UG : B. Tech. / B. E. in Electronics / Telecommunication.

Key Skills : B. Tech. ECE, Electronics Engineering, MATLAB. 10(CO2)

3. (i) Identify whether the following sentences have a comma splice. Correct and rewrite the ones with error :

- (a) The clouds were dark, we thought it would rain.
- (b) I bought a coat, however, it did not fit.
- (c) Sunita likes fruit; she doesn't like vegetables.
- (d) Hema, and Maninder are married.

4(CO3)

(ii) Do as Directed :

- (a) The percentage of employees who called in sick and the number of employees who left their jobs within two years ____ (are/is) reflective of the level of job satisfaction. (*Rewrite the sentence by picking the correct word given in the brackets to establish the subject-verb agreement*)

1(CO3)

Here are the key responsibilities :

- Designing electronic systems.
- Testing and troubleshooting.
- Research and development.
- Prototyping and manufacturing support.

Qualifications and Skills :

- Bachelor's or Master's degree in electrical or electronics engineering or a related field.
- Strong knowledge of electronics principles, circuit design and signal processing.
- Proficiency in using CAD software for circuit design and simulation.
- Excellent communication and teamwork skills to collaborate effectively with interdisciplinary teams.
- Attention to detail, organizational skills and the ability to manage multiple projects simultaneously.

Industry Type : Electronic Components / Semiconductors.

Employment Type : Full Time, Permanent.

Education : UG : B. Tech. / B. E. in Electronics / Telecommunication.

Key Skills : B. Tech. ECE, Electronics Engineering, MATLAB. 10(CO2)

3. (i) Identify whether the following sentences have a comma splice. Correct and rewrite the ones with error :

- (a) The clouds were dark, we thought it would rain.
- (b) I bought a coat, however, it did not fit.
- (c) Sunita likes fruit; she doesn't like vegetables.
- (d) Hema, and Maninder are married.

4(CO3)

(ii) Do as Directed :

- (a) The percentage of employees who called in sick and the number of employees who left their jobs within two years _____ (are/is) reflective of the level of job satisfaction. (*Rewrite the sentence by picking the correct word given in the brackets to establish the subject-verb agreement*)

1(CO3)

(b) $\frac{1}{2}$ of the class was not available for the survey. Thus, the survey was shifted to the 1st Monday of October.

(Rewrite the sentence by correcting the errors in mechanics)

2(CO3)

(c) At the start of school, Dora was afraid of her new teacher. Mrs. Davis seemed nice, but she had so many rules for the class to follow. It would scare someone to pieces. As the school year continued, Dora began to understand the teachers' rules and how she came up with the rules. The rules were there so that students would be respectful of themselves and each other. By the end of the year, Dora thought that Mrs. Davis was the best teacher; she ever had!

(Rewrite the paragraph by correcting the errors in punctuations and mechanics)

3(CO3)

4. Write a progress report of your seventh semester project using real or hypothetical data and information. Use the correct format of a progress report. 10(CO4)

5. Assume that you are part of a students' club of RCOEM and your club is going to conduct a college level event. Create a flier for the same by using the guidelines to create a flier. 10(CO5)

6. From the abstract (sourced from Research Gate) given below, answer the questions given after the abstract :

(1) Multispectral sensors onboard Remotely Piloted Aircraft systems (RPAs) can be used for mapping and identifying weed species and preventing crop yield losses. The objective of this study was to identify and quantify weed species in soybean using high-resolution images obtained by an RPA. Soybean fields were photographed 33 times every 100 ha. Weed flora in 384 sampling areas was surveyed by aerial imaging in approximately 60.000 ha. Results on analysis of the community structure of the observed a total of 16 plant families and 52 species. Species from Asteraceae and Poaceae were the most numerous. Results of principal component analysis showed that the percentage of infestation and the number of species were positively correlated to the first component. The areas with the highest percentage of infestation had the highest diversity of species. However, the percentage of infestation and

the number of species observed were not correlated with the area size. The survey of weeds by aerial imagery was efficient for identifying, quantifying and mapping weeds in commercial agricultural areas and can be used in other studies and for the purposes of management in commercial areas.

- (a) Give minimum five and maximum six keywords from this abstract. 3(CO6)
- (b) What would be the correct title for this paper based on the abstract ? 3(CO6)

(2) Explain the components of a discussion section of a proposal. 4(CO6)



Headings
content
~~title~~, call of
clerkship

Proposal

Recommend what can
be done next,
solutions.

Problems encountered
abundance, STC.

Quantification of weed species in soyaben by an RPA and aerial
imagergy in CAA.

Proposal

Head, Date,
to, from, sub,
Info-obj,
& Prob, hope
of auth, invited

Look, learn

Dis - trouble, rem
Complexive
Conc - accomp
burden

2023

Course Code : ECT 451-2

GVHW/RW-23/1025

Seventh Semester B. Tech. (Electronics and Communication Engineering) Examination

MICROWAVE THEORY AND TECHNIQUES

Time : 3 Hours]

[Max. Marks : 60

Instructions to Candidates :—

- (1) All questions are compulsory.
- (2) All questions carry marks as indicated against them.
- (3) Due credit will be given to neatness and adequate dimensions.
- (4) Assume suitable data and illustrate answers with neat sketches wherever necessary.

1. (a) Outline a short history of Microwave Engineering Development. 5(CO1)
(b) Translate the First Five IEEE Microwave Bands in terms of its wavelength. 5(CO1)
2. (a) Summarize Planar type Transmission Lines. 6(CO2)
(b) In a unmatched transmission line, the total power incident on Port 1 is 5 W, whereas 2.2 W is reflected back. Power delivered to the load is 2 W at Port 2. Solve for (in dB) :
 - (i) Attenuation Loss. $E_t - E_r/E_t$
 - (ii) Reflection Loss. $E_r/E_t - E_r$
 - (iii) Insertion Loss. E_t/E_t4(CO2)
3. (a) Recall application of Faraday Rotation in Ferrites using the working of Gyrator. 5(CO4)
(b) A signal of 32 W is fed into one of the collinear ports of a loss-less H-Plane Tee junction. Discover the powers in the remaining ports when others are terminated by means of matched load. 5(CO4)

GVHW/RW-23/1025

Contd.

4. (a) A Circular MSA is to be designed at 2.45 GHz on a substrate having $\epsilon_r = 2.55$, $h = 1.66$ mm, $\tan\delta = 0.0012$. Predict the radius of a circular antenna and feed point location for 50Ω impedance matching. 6(CO3)
- (b) Outline Periodic Structures in transmission lines. 4(CO3)
5. (a) Illustrate Antenna Gain measurement setup in anechoic chamber with block diagram. 6(CO5)
- (b) Two identical 30 dB directional coupler are used to sample incident and reflected power in a waveguide with $VSWR = 2$. The output of the coupler sampling incident power is 4.5 mW. Estimate the value of reflected power. 4(CO5)
6. (a) Distinguish between Continuous Wave Doppler and Pulsed RADAR. 5(CO1)
- (b) Estimate the range of a RADAR system which operates at 3 cm with a peak pulse power of 600 KW, if its antenna is 5 m^2 , minimum detectable signal is 10^{-13} W and the cross sectional area of the target is 20 m^2 . 5(CO1)



2023

Seventh Semester B. Tech. (Electronics and Communication Engineering) Examination

ENGINEERING ECONOMICS

Time : 3 Hours]

[Max. Marks : 60

Instructions to Candidates :—

- (1) All questions carry marks as indicated against them.
- (2) Due credit will be given for neatness.
- (3) Assume suitable data wherever necessary.

1. A new technology leads to a decrease in the cost of production for a particular product.
How does this technological change affect the equilibrium price and quantity in the market ?
10(CO1)

2. Imagine you are in the market for a new smartphone. You have narrowed down your options to two models from different brands. Each model offers various features and comes at a different price point. Demonstrate the rational decision-making process you would likely go through when choosing between the two smartphone models.
10(CO2)

OR

3. A technology company is considering developing a new smartphone with advanced features. Describe the role of engineers in the new product development process, including, R and D, quality assurance testing, etc.
10(CO2)

4. You are a financial analyst evaluating the financial health of two companies, Company A and Company B. Both companies operate in the technology sector and have similar levels of total revenue. As part of your analysis, you need to determine why operating revenues are typically considered a more reliable indicator of a company's ongoing financial health than non-operating revenues.
10(CO3)

5. Econoville is a fictional country that is currently grappling with high inflation rates. Imagine you are the lead economist advising the government of Econoville. Evaluate the different effective remedial measure that can be implemented to control inflation in the country.

10(CO4)

6. Demonstrate the different Elements of Income Statement using suitable example.

10(CO5)

OR

7. Write the Different methods of charging Depreciation.

10(CO5)

8. You are a financial consultant advising a young professional who has recently started earning a stable income and is interested in investing in the stock market. The individual is eager to understand how the stock market functions. So, you have to provide a comprehensive explanation of the primary functions of the stock market.

10(CO6)



Seventh Semester B. Tech. (Electronics and Communication Engineering) Examination

LONG TERM EVOLUTION TECHNOLOGIES

Time : 3 Hours]

[Max. Marks : 60

Instructions to Candidates :—

- (1) Solve all questions.
- (2) Draw the diagrams wherever necessary.

1. ~~a~~(a) Discuss 3GPP evolution toward an IP based flat LTE SAE architecture. 5(CO1)
2. ~~a~~(b) Give an account of multiple antenna techniques used in LTE. 5(CO2,3)
3. ~~a~~(a) What is the minimum and maximum data rate loss due to the cyclic prefix ?
What is the minimum theoretical loss if a shorter cyclic prefix could be used ? 5(CO3,4)
~~chay~~
~~a~~(b) Discuss the operation of OFDM transmitter and Receiver. 5(CO3,4)
4. ~~a~~(a) Draw the structure of the downlink resource grid and explain in brief. 5(CO2,3)
~~a~~(b) Discuss the problem of PAPR in LTE downlink. 5(CO2,3)
4. ~~a~~(a) Illustrate the radio interface protocol architecture and the SAPs between different layers of LTE. 5(CO4)
~~O(b)~~
~~draw~~
Statement : LTE supports 10 ms frames and 1 ms sub-frames.
Describe the above statement with suitable diagram(s) and appropriate justification. 5(CO1,3)

5. ~~(a)~~ Illustrate with suitable diagram the mobility management over S1 Interface.
5(CO4)
- ~~(b)~~ To efficiently support the varying QoS requirements of different IP applications, LTE uses the concept of a bearer as the central element of QoS control. Elaborate the statement with suitable diagram and explanation.
5(CO3,4)
6. How LTE-A technology is different than LTE and its predecessors ?
10(CO5)

