

ACAD-27 a)	Shri Ramdeobaba College of Engineering and Management, Nagpur -440013	Iss. No.: 01, Rev. No.: 00 Date of Rev: 01/01/2018
Ref. Clause(s): 9.1		
Department: EC	Semester : VII Shift: Both Course Code: ECT452-1 Course Name: Optical Fiber Communication (Program Elective -4)	Page: 01/01
Programme: B-Tech	Test: 2	Date of Exam: 26/10/2023
Max Marks: 15	Session: 2023-24	Time: 3:00 to 4:00 pm

Instructions: All questions are compulsory.

Question No.	Questions	Marks	CO	EO
1	<p>Explain with neat diagram <u>Reach through avalanche photodiode</u> and justify how it is differ from <u>P-I-N diode</u> and <u>PN diode</u>.</p> <p>OR</p> <p>A p-i-n photodiode gives one electron-hole pair for three incident photons at a wavelength of 0.8 micrometer. If all the electrons are collected; calculate</p> <p>(a) Quantum efficiency of the device $\eta = \frac{R}{P} \times 10^3$ (b) Maximum possible band gap energy $E_g = h\nu$ (c) Mean output photocurrent when the received optical power is 10^{-7} W.</p> $R = \eta P_0$ $R = \frac{n e^2}{n_c} I$	(05)	CO4	L2
2	<p>Outline the common <u>LED</u> structures for optical fiber communication. What is a <u>surface emitting device</u>. Briefly give advantages and drawbacks of the LED in comparison with the injection laser for use as source in optical communication.</p> <p>OR</p> <p>Gallium arsenide injection laser has longitudinal modes emitting at a wavelength of 0.85 micrometer. These modes are separated in frequency by 275 GHz. Find the length of the optical cavity and the number of longitudinal modes emitted. The refractive index of the gallium arsenide is 3.6</p>	(05)	CO4	L2
3	<p>Write a short notes on (Any Two)</p> <p>a) Fiber optics cutoff wavelength measurements b) Field Measurements (Optical time domain reflectometry OTDR) c) Bending loss and Fiber attenuation Measurements</p>	(05)	CO2,3	L2

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Ref. Clause(s): 9.1			
Department: EC	Semester : VII Course Code: ECT452-1 Course Name: Optical Fiber Communication	Shift: Both	Page: 01/01
Programme: BE	Test: 1		Date of Exam: 06/09/2023
Max Marks: 15	Session: 2023-24		Time: 2:30- 3:30 pm

Instructions: All questions are compulsory.

Question No.	Questions	Marks	CO	EO
1 ✓	Define Numerical aperture (NA). Derive the expression for NA for step index fiber and graded <u>index</u> fiber.	(05)	CO2,3	L1
2 •	A multimode graded index fiber has an acceptance angle of 8 degree in air. Estimate the relative refractive index difference between the core axis and the cladding when <u>refractive index at the core axis is 1.52</u> OR A step index fiber has $n_1 = 1.44$ and $n_2 = 1.42$ respectively. Compute the acceptance angle in air for skew rays which changes direction by 150 degree at each reflection.	(05)	CO1,2	L3
3 ✓	What is dispersion in optical fibers and why does it occur? Also <u>how</u> dispersion limits the information carrying capacity of fiber?	(05)	CO2	L2

$$\begin{aligned} \theta_a &= 8^\circ \text{ degree} \\ n_1 &= 1.52 \quad n_2 = 1.42 \\ \Delta &= n_1 - n_2 = \frac{n_1 - n_2}{n_1} \\ \theta_a &= 8^\circ \\ \theta_a &= \sin^{-1}\left(\frac{NA}{n_1}\right) \\ NA &= \sqrt{n_1^2 - \sin^2 \theta_a} \end{aligned}$$

$$\begin{aligned} n_1 &= 1.44 \\ n_2 &= 1.42 \\ \Delta &= \frac{n_1 - n_2}{n_1} \\ \theta_a &= ? \\ 150^\circ & \quad NA = \sqrt{n_1^2 - \sin^2 \theta_a} \\ \text{Skew} &= 2 \times 75^\circ = 300^\circ \\ \theta_a &= \sin^{-1}\left(\frac{NA}{\text{corr}}\right) \end{aligned}$$

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Ref. Clause(s): 9.1		Date of Rev: 01/01/2018
Department: EC/Humanities	Semester : VII Section A and B Course Code: HUT498-1 (Open Elective) Course Name: Technical Communication	Page: 01/01
Programme: B.E.	Test: 2	Date of Exam: 27 th October 2023
Max Marks: 15	Session: 2023-24	Time: 3pm to 4pm

Instructions: All questions are compulsory

Question No.	Questions	Marks	CO
Q1.	Imagine a situation where you along with your team members are sent for a three-day training workshop on an emerging technology in Electronics and Communication. Identify and write the relevant report to your HoD on your return to the Department.	(05)	(CO4)
Q2.	<p>The following paragraph presents data on unemployment in India collected from https://www.macrotrends.net. The data, as on 31st December of each year, shows a trend from 1991. In 1991 the Unemployment Rate (%) was 6.737. In 1995 it went up to 7.014 and went further up in 2000 to 7.77. 2005 saw a further rise to 8.7 with a decline in 2010 to 8.319. In 2015 it went down further to 7.915. However, it increased in 2020 to 10.195 but saw a decline two years after that to 7.33.</p> <p>(a) Identify the type of graphic you will create to depict the above data. (b) Create the identified graphic by following all the guidelines.</p>	(06)	(CO5)
Q3.	Imagine that after the recent floods in Nagpur city, Nagpur Municipal Corporation has advertised for <i>Request for Proposals (RFP)</i> in the Hitavada on 2 nd October 2023 calling for proposals for effective non-technical or social solutions so that the impact can be minimized in the future. In response to the RFP write only the <u>Introduction section</u> of the proposal. Use the correct format for the same.	(04)	(CO6)

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Department: EC/Humanities	Semester : VII Shift: I and II Course Code: HUT498-1 (Open Elective) Course Name: Technical Communication	Page: 01/01
Programme: BE	Test: 1	Date of Exam: 4 th September 2023
Max Marks: 15	Session: 2023-24	Time: 11am to 12pm

Instructions: All questions are compulsory

Question No.	Questions	Marks	CO	EO
Q1. (a)	There are many leaves on the ground. (identify the expletive pattern and rewrite the sentence)	(06)	(CO1)	L2,L3, L4
(b)	He made an application for the position of Software Engineer. (Identify the camouflaged word, replace it, and rewrite the sentence) He applied for SE's position			
(c)	Early man used a system of gestures to communicate (rewrite by using gender neutral language)			
(d)	He reached the crime scene for the investigation of the cause. (rewrite by replacing the shun word).			
(e)	She met the Principle of the Collage to complaint about the lack of many facility in the canteen. (practise accuracy by identifying the errors and rewriting the sentence)			
(f)	Because of the fact that Chandrayan-3 mission was successful, India is in the elite space club. (rewrite the sentence by eliminating redundancies or wordy phrases)			
Q2.	Assume that you bought a mobile phone on a certain date from a certain store. A few days later it developed a defect and had to be sent to the service centre. However, even after repairs it malfunctioned again. Assume the necessary information/data and write an email.	(05)	(CO2)	L2,L3, L4, L5, L6
Q3. (a)	A car was broken into in main M last night	(01)	(CO3)	L2, L3, L4
(b)	Balram was a successful businessman/he built his business from scratch. (find the error in punctuation and rewrite with corrections)	(01)	(CO3)	L2, L3, L4
(c)	Sonia saw an injured dog lieing in the bushes. She told her team that their was a dog by pointing towards bushes. The team was able to locate the dog and rescued it. The breed of the dog was identified as german shepherd. (find the error in mechanics and rewrite with corrections)	(02)	(CO3)	L2, L3, L4

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Ref. Clause(s): 9.1		
Department: EC	Semester : VII Shift: I and II Course Code: 453-2 Course Name: Long Term Evolution Technologies	Page: 01/01
Programme: BE	Test: 1	Date of Exam: 06/09/2023
Max Marks: 15	Session: 2023-24	Time: 1 hour

Instructions: Solve all questions.

Question No.	Questions	Marks	CO	EO
1.	Statement: EPC (Evolved packet core) is designed not only to support new radio access networks such as LTE, but also provide interworking with legacy 2G GERAN and 3G UTRAN networks connected via SGSN. Justify the above statement with suitable diagram and appropriate explanation.	5	CO1, CO2	L2
2.	Demonstrate the elegance of multicarrier modulation in OFDM for Delay Spread, Inter symbol Interference.	5	CO2, CO4	L4
3.	Elaborate upon the objective of hierarchical channel structure and bearer system in LTE.	5	CO2 CO3	L3

OFDM=31, 321 6+1, 6-2+1+6-3, [10], 3+1, 3-5+1, Physical Resource Block (4)
 4+1, 4+2, 4-3, 4+4-1, 4+6-1, 4+6-2, 4+6-3, 3+6-1, 3+6-2, 3+6-3, Frame Structure=4
 3+6-5, 3+6-5, Numerical on channel BW, Data rate etc. (3, 4, 6)

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Department: EC	Semester : VII Shift: I and II Course Code: 453-2 Course Name: Long Term Evolution Technologies		Page: 01/01
Programme: BE	Test: 2		Date of Exam: 27/10/2023
Max Marks: 15	Session: 2023-24		Time: 1 hour

Instructions:

- Q1 and Q2 are compulsory. Choice is provided in Q3.
- Support your answers with neat diagrams wherever necessary.
- Assume suitable data wherever necessary.

Question No.	Questions	Marks	CO	EO
1	Calculate the Data rate for the following and comment on the result. a. An LTE channel having Bandwidth 20MHz, 16QAM modulation with the normal cyclic prefix. b. An LTE channel having Bandwidth 20MHz, 64QAM modulation with the normal cyclic prefix. c. An LTE channel having Bandwidth 10MHz, 16QAM modulation with the extended cyclic prefix. d. An LTE channel having Bandwidth 10MHz, 64QAM modulation with the extended cyclic prefix.	5	CO1, CO2, CO3, CO4 CO5	L4
2	Illustrate the concept of Mobility management over S1 Interface with neat diagram.	5	CO1	L2
3	Elucidate the concept of Carrier aggregation (CA) with an emphasis on RRC connection establishment between UE and Primary serving cell, as used in LTE advanced technology.	5	CO5	L3
	OR			
3	Elucidate the working of Coordinated multipoint (COMP) for coverage and capacity enhancement as used in LTE advanced technology.	5	CO5	L3

$$\textcircled{a} \quad \text{Time/sym} = \frac{1}{12 \times 15 \times 10^3} \approx 0.000056 \text{ sec}$$

$$\xrightarrow{\substack{1 \\ \text{Subc} \times \text{subspa}}} = 15 \text{ kHz}$$

$$R_s = \frac{1}{\text{Time}} = \approx 178571 \text{ sym/s}$$

extend

$$S = R_s \times \log_2(16) \approx 714,286 \text{ bits/sec}$$

$$\xrightarrow{\substack{1 \\ 0.0 \times 1.4}}$$

$$R = B \times S \approx 20 \times 10^6 \times 714,286 \approx 14,29 \text{ Mbps}$$

- B 13.33 Mbps
- C 5.06 Mbps
- D 4.62 Mbps

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Ref. Clause(s): 9.1		
Department: EC	Semester: VII Course Code: HUT452 Course Name: Engineering Economics	Page: 01/01
Programme: BE	Test: 1	Date of Exam: 2/9/23
Max Marks: 15	Session: 2023-24	Time: 2:30 PM-3:30 PM

Instructions: All the Questions are compulsory.

Question No.	Questions	Marks	CO	EO
• Q.1 P↑ D↑ Varity	In a situation where a bakery offers an exclusive type of bread with no near alternatives, what happens to the quantity of this bread demanded if the bakery decides to increase its price by 20%. Demonstrate the Elasticity of demand in this context.	5	CO1	L3
Q.2	Engineering economics involves applying economic principles to engineering projects and decisions. Analyse the <u>fundamental principles</u> that guides engineers in making well-informed decisions about projects, investments, and design choices that have economic implications.	5	CO2	L4
Q.3	Write a Detailed Note on <u>Revenue</u> .	5	CO3	L3

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Department: EC	Semester: VII Course Code: HUT452 Course Name: Engineering Economics	Page: 01/01
Programme: BE		Date of Exam: 28/10/23
Max Marks: 15	Test: 2 Session: 2023-24	Time: 12PM-01PM

Instructions: All the Questions are compulsory.

Q. No.	Questions	Marks	CO	EO												
Q.1	How industries are differentiated based on their degree and nature of competition for goods and services in different Market Structure? <i>all ms. perfect, oligo, mon.</i>	5	CO4 <i>mr</i>	L3												
Q.2	Aman Foods Company purchased a factory machine of Rs. 51,000 on January 1, 2015. The machine is expected to have a salvage value of <u>Rs. 6,000</u> at the end of its <u>5 years</u> useful life. During the useful life, the machine is expected to be used for <u>5,000 hours</u> . The machine was used as under:	5	CO5	L5												
	<table border="1"> <thead> <tr> <th>Years</th><th>Hours used</th></tr> </thead> <tbody> <tr> <td>2015</td><td>1,200</td></tr> <tr> <td>2016</td><td>800</td></tr> <tr> <td>2017</td><td>1,150</td></tr> <tr> <td>2018</td><td>850</td></tr> <tr> <td>2019</td><td>1,000</td></tr> </tbody> </table> Prepare Schedule of Depreciation on the basis of following methods 1) Units of Output Method & 2) Sum of Year Digit Method	Years	Hours used	2015	1,200	2016	800	2017	1,150	2018	850	2019	1,000			
Years	Hours used															
2015	1,200															
2016	800															
2017	1,150															
2018	850															
2019	1,000															
Q.3	Mr Ram is eager to understand how the stock market functions. Being a financial consultant, you have to provide a comprehensive explanation of the primary <u>functions of the stock market</u> .	5	CO6	L4												

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Ref. Clause(s): 9.1		
Department: EC	Semester : VII Shift: A&B Course Code: ECT451-2 Course Name: Microwave Theory and Techniques	Page: 01/01
Programme: BE	Test: 1	Date of Exam: 02/09/2023
Max Marks: 15	Session: 2023-24	Time: 11 am – 12 pm

Instructions:

- All Questions are Compulsory.
- All questions carry marks as indicated against them.
- Due credit will be given to neatness and adequate dimensions.
- Assume suitable data and illustrate answers with neat sketches wherever necessary.

Question No.	Questions	Marks	CO	EO
Q.1	Enlist the disadvantages of Microwave frequency.	3M	CO1	L1
* Q.2	Explain how Radio Frequency Bands are classified (with the help of frequency and wavelength).	4M	CO1	L2
Q.3	A two port network is known to have following scattering matrix $[S] = \begin{bmatrix} 0.15 \angle 0 & 0.85 \angle -45 \\ 0.85 \angle 45 & 0.20 \angle 0 \end{bmatrix}$ Determine if the network is reciprocal and loss less. If the port 2 is terminated with a matched load, what is Return Loss seen at Port 1?	4M	CO4	L3
* Q.4	Summarize about different propagation modes on Microwave transmission lines and wave guides.	4M	CO2	L2

+ cost of equip and install
+ occupy more space
+ QMI may occur
+ vary dielect proper
+ Inherently inefficiency of operating devices.

TEM \rightarrow TM, TE Coaxial
TEM stripline
TEM Microstri
TEO waveguide

02 ELF - 3-30 Hz
SLF - 30-300 Hz
ULF - 300-3 KHz
VLF - 3-30 KHz
LF -
MF -
HF - MHz
VHF -
UHF -
SHL -
EHL - GHz

in

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Ref. Clause(s): 9.1		
Department: EC	Semester : VII Shift: A&B Course Code: ECT451-2 Course Name: Microwave Theory and Techniques	Page: 01/01
Programme: BE	Test: 1	Date of Exam: 02/09/2023
Max Marks: 15	Session: 2023-24	Time: 11 am – 12 pm

Instructions:

- All Questions are Compulsory.
- All questions carry marks as indicated against them.
- Due credit will be given to neatness and adequate dimensions.
- Assume suitable data and illustrate answers with neat sketches wherever necessary.

Question No.	Questions	Marks	CO	EO
Q.1	Enlist the disadvantages of Microwave frequency.	3M	CO1	L1
* Q.2	Explain how Radio Frequency Bands are classified (with the help of frequency and wavelength).	4M	CO1	L2
Q.3	A two port network is known to have following scattering matrix $[S] = \begin{bmatrix} 0.15 L0 & 0.85 L - 45 \\ 0.85 L 45 & 0.20 L0 \end{bmatrix}$ Determine if the network is reciprocal and loss less. If the port 2 is terminated with a matched load, what is Return Loss seen at Port 1?	4M	CO4	L3
.Q4	Summarize about different propagation modes on Microwave transmission lines and wave guides.	4M	CO2	L2

Q1 + cost of equip and install
 + occupy more space
 + QMI may occur
 + vary direct proper
 + inherently inefficiency of operating devices.

Q2 TEM → TM, TE Coaxial
 TEM strip line
 TEM Microstri
 TEO waveguide

Q2 ELF - 3-30 Hz
 SLF - 30-300 Hz
 ULF - 300-3 KHz
 VLF - 3-30 KHz
 LF -
 MF -
 HF - MHz
 VHF -
 UHF -
 SHF -
 EHF - GHz

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Ref. Clause(s): 9.1		
Department: EC	Semester : VII Shift : A&B Course Code: ECT451-2 Course Name: Microwave Theory and Techniques	Page: 01/01
Programme: BTech	Test: 2	Date of Exam: 25/10/2023
Max Marks: 15	Session: 2023-24	Time: 03.00 – 04.00 PM

Instructions:

- Attempt total questions for Fifteen Marks
- All questions carry marks as indicated against them.
- Due credit will be given to neatness and adequate dimensions.
- Assume suitable data and illustrate answers with neat sketches wherever necessary.

Question No.	Questions	Marks	CO	EO
Q.1	Discuss the working Principle of Microwave Signal Attenuators? What are the different types of attenuators? - TEE, Balanced. Elaborate vane type attenuator in details	7M	CO4	L3
Q.2	Elaborate how segment of transmission lines can be used as a reactive element in Microwave Circuit Designs. Also explain periodic structures with use of reactive elements.	8M	CO3	L1
Q.3	What is Image frequency in Microwave Signal Receivers? Justify, How to eliminate Image frequency in Receivers? RF Amp. down up Calculate Image frequency for a receivers with $f_{RF} = 1$ MHz and IF = 455 KHz.	7M	CO3	L2
Q.4	Elaborate the types and setup employed to measure VSWR in microwave Engineering Laboratory.	5M	CO5	L2
Q.5	In impedance measurement for unknown load using slotted line structure, if minima shift left after connecting short circuit load, estimate the type of Unknown load connected earlier.	2M	CO5	L4
Q.6	What is RADAR? Derive the maximum range equation for RADAR, operating in ideal conditions?	3M	CO1	L3
Q.7	Estimate the range of a RADAR system which operates at 5 cm with a peak pulse power of 600 KW, if its antenna is 5 m ² , minimum detectable signal is 10 ⁻¹⁰ W and the cross sectional area of the target is 30 m ²	5M	CO5	L4

Q2 Periodic structures exhibit basic passband & stopband response that lead to the image parameter method of filter design.

TL as a Reactive element using imp TEF.

$$Z(t) = j\pi \quad \text{short-circuited}$$

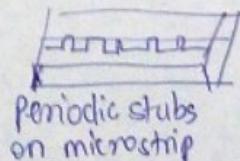
$$\frac{L+Y_0}{L-Y_0}$$

$$Z(1) = Z_0 \left\{ \begin{array}{l} Z_1 \cos \theta \\ + j Z_0 \sin \theta \end{array} \right. \\ \left. \begin{array}{l} j Z_1 \sin \theta \\ + Z_0 \cos \theta \end{array} \right\}$$

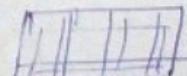
$$PWN - Z_0 = 0$$

$$Z(1) = j^{\infty} \text{ open}$$

CoTL loaded with reactive el.



Periodic stubs on microstrip



Periodic diaphragm in a waveguide