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| ACAD-27 a) | Shri Ramdeobaba College of Engineering and Management, Nagpur -440013 | Iss. No.: 01, Rev. No.: 00 |
| Ref. Clause(s): 9.1 | | Date of Rev: 01/01/2018 |
| 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 how dispersion limits the information carrying capacity of fiber? | (05) | CO2 | L2 |

$\theta \text{ angle} = 8^\circ$
 $n_1 = 1.52$
 $n_2 = 1$
 $\Delta = \frac{n_1 - n_2}{n_1} = \dots$
 $\theta_a = 8$
 $NA = \sin \theta_a$
 $NA = \sqrt{2\Delta}$

$n_1 = 1.44$
 $n_2 = 1.42$
 $\Delta = \frac{n_1 - n_2}{n_1}$
 $\theta_a = ?$
 150°
 $NA = n_1 \sqrt{2\Delta}$
 $Skew = 2 \times \theta = 300^\circ$
 $\theta_a = \sin^{-1} \left(\frac{NA}{\cos \theta} \right)$

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| ACAD-27 (a) | Shri Ramdeobaba College of Engineering and Management, Nagpur -440013 | Iss. No.: 01, Rev. No.: 00 |
| 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. | 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. (a) Identify the type of graphic you will create to depict the above data. (b) Create the identified graphic by following all the guidelines. | (06) | (CO5) |
| Q3. | Imagine that after the recent floods in Nagpur city, Nagpur Municipal Corporation has advertised for <i>Request for Proposals</i> (RFP) 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 Introduction section of the proposal. Use the correct format for the same. | (04) | (CO6) |

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| Ref. Clause(s): 9.1 | | Date of Rev: 01/01/2018 |
| Department: EC/Humanities | Semester : VII Course Code: HUT498-1 (Open Elective) Course Name: Technical Communication | Shift: I and II 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) | ^{Many} 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} Someone broke into a car in the main market last night. (Change the voice. Hint: scientific writing) | (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 | | Date of Rev: 01/01/2018 |
| Department: EC | Semester : VII Course Code: 453-2 Course Name: Long Term Evolution Technologies | Shift: I and II 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 - 3.1, 3.2, 6.1, 6.2 till 6.3, 10, 3.4, 3.5, Physical Resource Block (4)
 4.1, 4.2, 4.3, 4.4, 4.6.1, 4.6.2, 4.6.3, 3.6.1, 3.6.2, 3.6.3, Numerical on channel BW, data rate etc. (9, 4, 6) Frame structure

Random access
 Adv & Dis of OFDM
 Timing sync
 diff b/w SC-FDMA & OFDM

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| Ref. Clause(s): 9.1 | | Date of Rev: 01/01/2018 |
| Department: EC | Semester : VII Course Code: 453-2 Course Name: Long Term Evolution Technologies | Shift: I and II Page: 01/01 |
| Programme: BE | Test: 2 | Date of Exam: 27/10/2023 |
| Max Marks: 15 | Session: 2023-24 | Time: 1 hour |

Instructions:

1. Q1 and Q2 are compulsory. Choice is provided in Q3.
2. Support your answers with neat diagrams wherever necessary.
3. 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. 12.5 b. An LTE channel having Bandwidth 20MHz, 64QAM modulation with the normal cyclic prefix. 6.5 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 |

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

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

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

$$\frac{\text{extend}}{1} = 0.0 \times 1.2$$

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

$$R = B \times S \approx 20 \times 10^6 \times 714,286 \approx 14.29 \text{ Mbps}$$

b) 13.33 Mbps

c) 5.06 Mbps

d) 4.62 Mbps

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| Ref. Clause(s): 9.1 | | Date of Rev: 01/01/2018 |
| 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 PT OT Unitary | 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 that guides engineers in making well-informed decisions about projects, investments, and design choices that have economic implications.</u> | 5 | CO2 | L4 |
| Q.3 | Write a Detailed Note on <u>Revenue.</u> | 5 | CO3 | L3 |

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| Ref. Clause(s): 9.1 | | Date of Rev: 01/01/2018 |
| Department: EC | Semester: VII Course Code: HUT452 Course Name: Engineering Economics | Page: 01/01 |
| Programme: BE | Test: 2 | Date of Exam: 28/10/23 |
| Max Marks: 15 | 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, old, plan</i> | 5 | CO4 | 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 Rs. 6,000 at the end of its 5 years useful life. During the useful life, the machine is expected to be used for 5,000 hours. The machine was used as under: <table border="1" style="margin-left: 40px;"> <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> <p>Prepare Schedule of Depreciation on the basis of following methods 1) Units of Output Method & 2) Sum of Year Digit Method</p> | Years | Hours used | 2015 | 1,200 | 2016 | 800 | 2017 | 1,150 | 2018 | 850 | 2019 | 1,000 | 5 | CO5 | L5 |
| 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</u> of the <u>stock market</u> . | 5 | CO6 | L4 | | | | | | | | | | | | |

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| Ref. Clause(s): 9.1 | | Date of Rev: 01/01/2018 |
| 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 |

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 $[S] = \begin{bmatrix} 0.15 \angle 0 & 0.85 \angle -45^\circ \\ 0.85 \angle 45 & 0.20 \angle 0 \end{bmatrix}$ 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
 + EMI may occur
 + vary direct proper
 + inherently inefficiency of operating devices.

TEM → TM, TE coaxial
 TEM stripline
 TEM Microstri
 TEO waveguide

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

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| 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 $[S] = \begin{bmatrix} 0.15 \angle 0^\circ & 0.85 \angle -45^\circ \\ 0.85 \angle 45^\circ & 0.20 \angle 0^\circ \end{bmatrix}$ 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? $\sqrt{4}$ | 4M | CO4 | L3 |
| Q.4 | Summarize about different propagation modes on Microwave transmission lines and wave guides. | 4M | CO2 | L2 |

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

Q4 TEM \rightarrow TM, TE Coaxial
TEM stripline
TEM Microstrip
TEG waveguide

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

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| Ref. Clause(s): 9.1 | | Date of Rev: 01/01/2018 |
| Department: EC | Semester : VII Shift : A&B Course Code: ECT451-2 Course Name: Microwave Theory and Techniques | Page: 01/01 |
| Programme: B.Tech. | Test: 2 | Date of Exam: 25/10/2023 |
| Max Marks: 15 | Session: 2023-24 | Time: 03.00 - 04.00 PM |

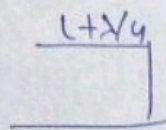
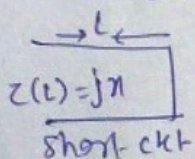
Instructions:

- 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 $f_{RF} = 1 \text{ MHz}$ and $IF = 455 \text{ KHz}$. | 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 responses that lead to the image parameter method of filter design.

TL as a Reactive element using imp TEQ.



$$PW - z_0 = 0$$

$$z(l) = j^{\infty} \text{ open}$$

$$z(l) = z_0 \left\{ \begin{array}{l} z_l \cos \beta l \\ + j z_0 \sin \beta l \end{array} \right\} \frac{z_0 \cos \beta l + j z_l \sin \beta l}{z_0 \cos \beta l + j z_l \sin \beta l}$$

CO TL loaded with reactive el.

