MALLA REDDY ENGINEERING COLLEGE
(AUTONOMOUS)
Maisammaguda, Dhullapally, Secunderabad-500100
Department of Physics

The Board of Studies meeting for Physics is held on 16-07-2020 in the conference hall, Malla Reddy Engineering College (Autonomous).

The following members have attended to review on matters such as Course Schema and Syllabus of MR20 regulations and other points as per agenda.

S. No	Name of the Member	Designation & Official Address	Category	Signature
1	Dr. Anji Reddy Polu	Assoc. Prof. & HOD, Department of Physics, MREC(A)	Chairman - BOS	
2	Dr. K. Vijaya Kumar	Prof. of Physics, Department of Humanities & Sciences, JNTUH CES.	University Nominee	Attended online
3	Dr. S. Narender Reddy	Professor, Department of Physics, University College of Science, OU, Hyderabad.	Subject Expert (outside the Parent University)	Attended online
4	Dr. Venkataiah Gorige	Assistant Professor, School of Physics, University of Hyderabad, Hyderabad.	Subject Expert (outside the Parent University)	Attended online
5	Dr. P. S. R. Prasad	Senior Principal Scientist, CSIR-NGRI, Hyderabad.	Industry Expert	Attended online
6	Dr. V. Dhanunjana Chari	Assoc. Prof., MREC(A)	Faculty Member	
7	Mr. Kesava Vamsi Krishna V	Assoc. Prof., MREC(A)	Faculty Member	16/7/2020
8	Dr. P Siva Kumar	Asst. Prof., MREC(A)	Faculty Member	
9	Mrs. M V Shruthi	Asst. Prof., SCETW	Alumni	Attended online

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(Autonomous)

Maisammaguda, Dulapally, Secunderabad – 500 100

Department of Physics

To
The Director,
MREC (A),
Secunderabad – 500100.

Sir,

Sub: Request to approve the constitution of BOS – Dept. of Physics for the Academic Year 2020-21.

The following are the proposed Board-of-Studies members for the Department of Physics for the AY 2020-21. Request you to approve the same.

S. No.	Name of the Member	Designation & Official Address	Subject Specialization	Contact Number	Category
1	Dr. P. Anji Reddy	Assoc. Prof. & HOD, Department of Physics, MREC(A)	Physics	9502158663	Chairman- BOS
2	Dr. K. Vijay Kumar	Professor of Physics, Coordinator, AAC, JNTUH	Physics	9000203797	University Nominee (Nominated by the Vice Chancellor, JNTUH, Hyderabad)
3	Dr. S. Narender Reddy	Professor, Department of Physics, UCS, OU, Hyderabad.	Physics	9949055469	Subject Expert (outside the Parent University)
4	Dr. Venkataiah Gorige	Asst. Prof., School of Physics, University of Hyderabad, Hyderabad.	Physics	9866141602	Subject Expert (outside the Parent University)
5	Dr. P. S. R. Prasad	Senior Principal Scientist, CSIR-NGRI, Hyderabad.	Physics	9603741754	Industry Expert
6	Dr. V. Dhanunjana Chari	Assoc. Prof., MREC(A)	Physics	9848210241	Faculty Member
7	Mr. Kesava Vamsi Krishna	Assoc. Prof., MREC(A)	Physics	9030234705	Faculty Member
8	Dr. P. Siva Kumar	Asst. Prof., MREC(A)	Physics	7036445893	Faculty Member
9	Mrs. M V Shruthi	Asst. Prof., SCETW	EEE	7057582545	Alumni

Yours Sincerely,

13/07/2020

Chairman BOS – Physics

Malla Reddy Engg. College (A) 500 100

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Department of Physics

16-07-2020

Board of Studies meeting held on 16.07.2020 at 10:30 AM

The Board of Studies meeting for the Department of Physics is convened on 16.07.2020 at 10:30 AM in th conference hall, Mall Reddy Engineering College (Autonomous), Hyderabad.

The Agenda of the meeting is as follows.

AGENDA

1. Action Taken Report (ATR) on previous BoS Meeting held on 7th December, 2019.
2. Discussion and finalization of Physics syllabus (both theory and lab) for MR20 regulations.
3. Suggestion and review of panel of Paper setters, and examiners for both theory and practical examinations that will be submitted for the approval of Academic council.
4. Delegation of power to the Chairman-BOS, for the inclusion and exclusion of any item as per requirements, based on recommendations of the internal committee.
5. Approval of any other item with the permission of the Chairman.

Chairman - BoS Physics
(Dr. P. Anji Reddy)

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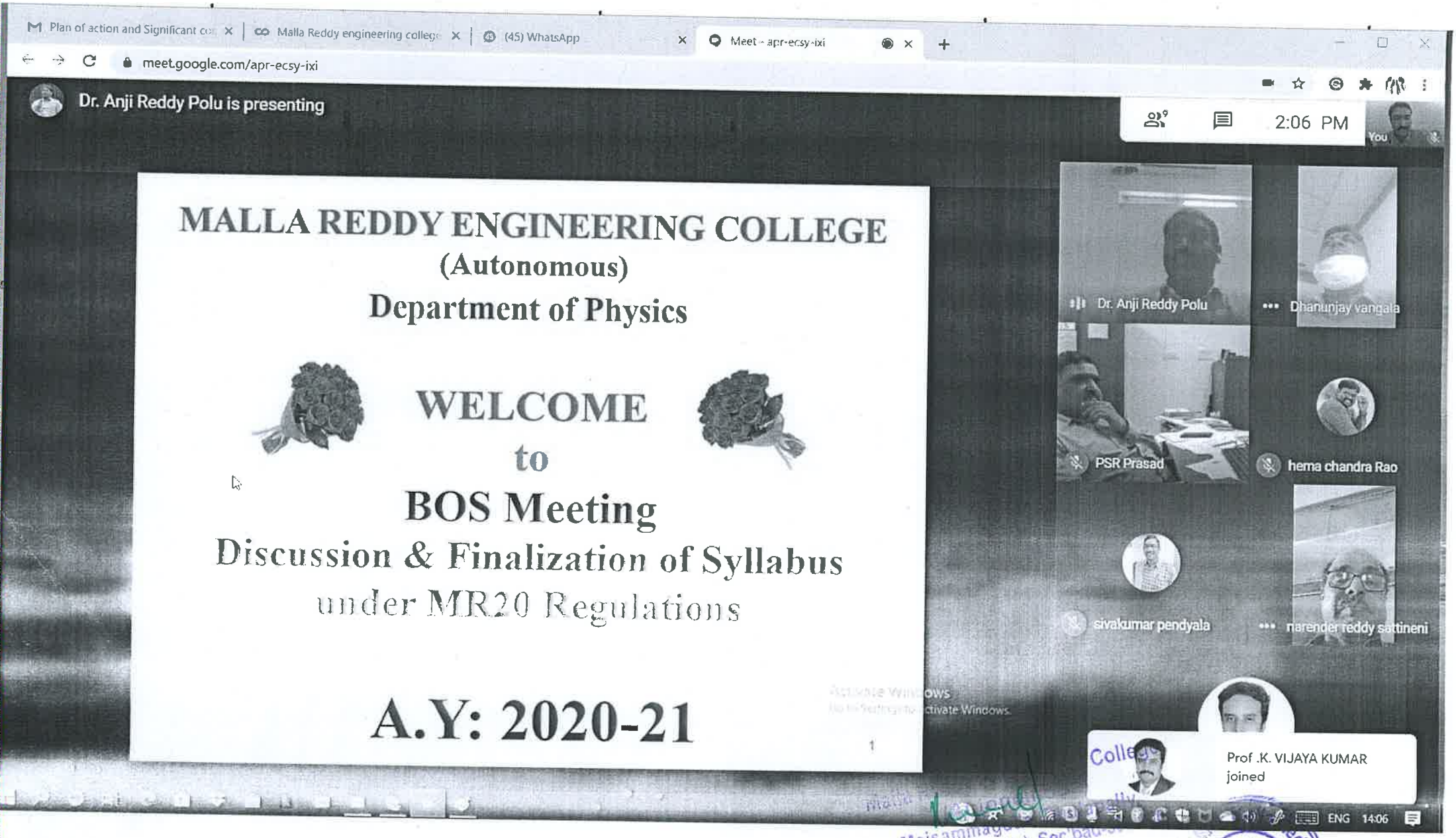
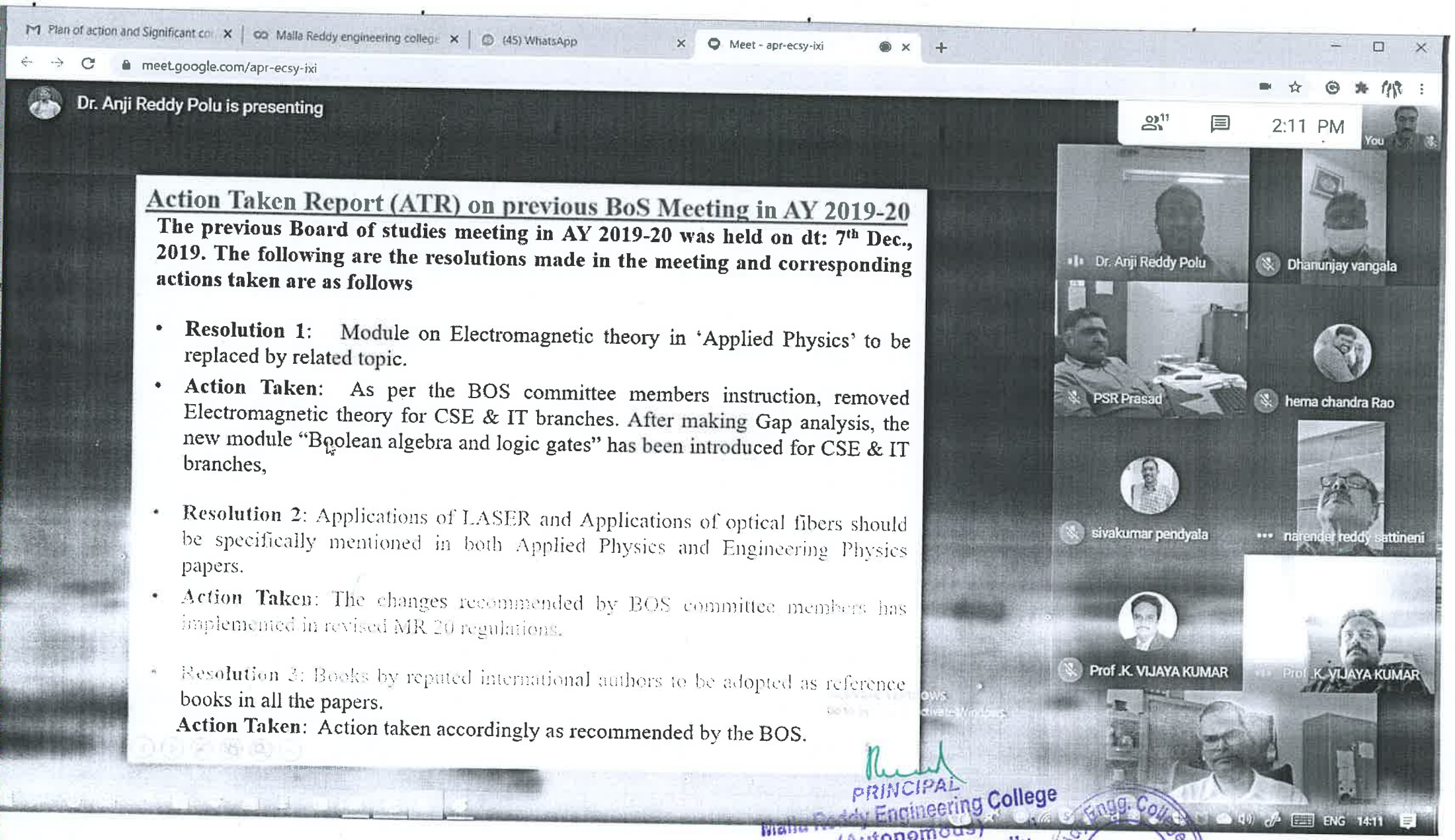

Plan of action and Significant co
Malla Reddy engineering college
(45) WhatsApp
Meet - apr-ecsy-ixi
meet.google.com/apr-ecsy-ixi
Dr. Anji Reddy Polu is presenting
2:06 PM
You
MALLA REDDY ENGINEERING COLLEGE
(Autonomous)
Department of Physics
WELCOME
to
BOS Meeting
Discussion & Finalization of Syllabus
under MR20 Regulations
A.Y: 2020-21
Dr. Anji Reddy Polu
Dhanunjay vangala
PSR Prasad
hema chandra Rao
sivakumar pendyala
narender reddy sattineni
Prof .K. VIJAYA KUMAR
joined
ENG
14:06



Action Taken Report (ATR) on previous BoS Meeting in AY 2019-20

The previous Board of studies meeting in AY 2019-20 was held on dt: 7th Dec., 2019. The following are the resolutions made in the meeting and corresponding actions taken are as follows

- **Resolution 1:** Module on Electromagnetic theory in 'Applied Physics' to be replaced by related topic.
- **Action Taken:** As per the BOS committee members instruction, removed Electromagnetic theory for CSE & IT branches. After making Gap analysis, the new module "Boolean algebra and logic gates" has been introduced for CSE & IT branches,

- **Resolution 2:** Applications of LASER and Applications of optical fibers should be specifically mentioned in both Applied Physics and Engineering Physics papers.
- **Action Taken:** The changes recommended by BOS committee members has implemented in revised MR 20 regulations.

- **Resolution 3:** Books by reputed international authors to be adopted as reference books in all the papers.

Action Taken: Action taken accordingly as recommended by the BOS.

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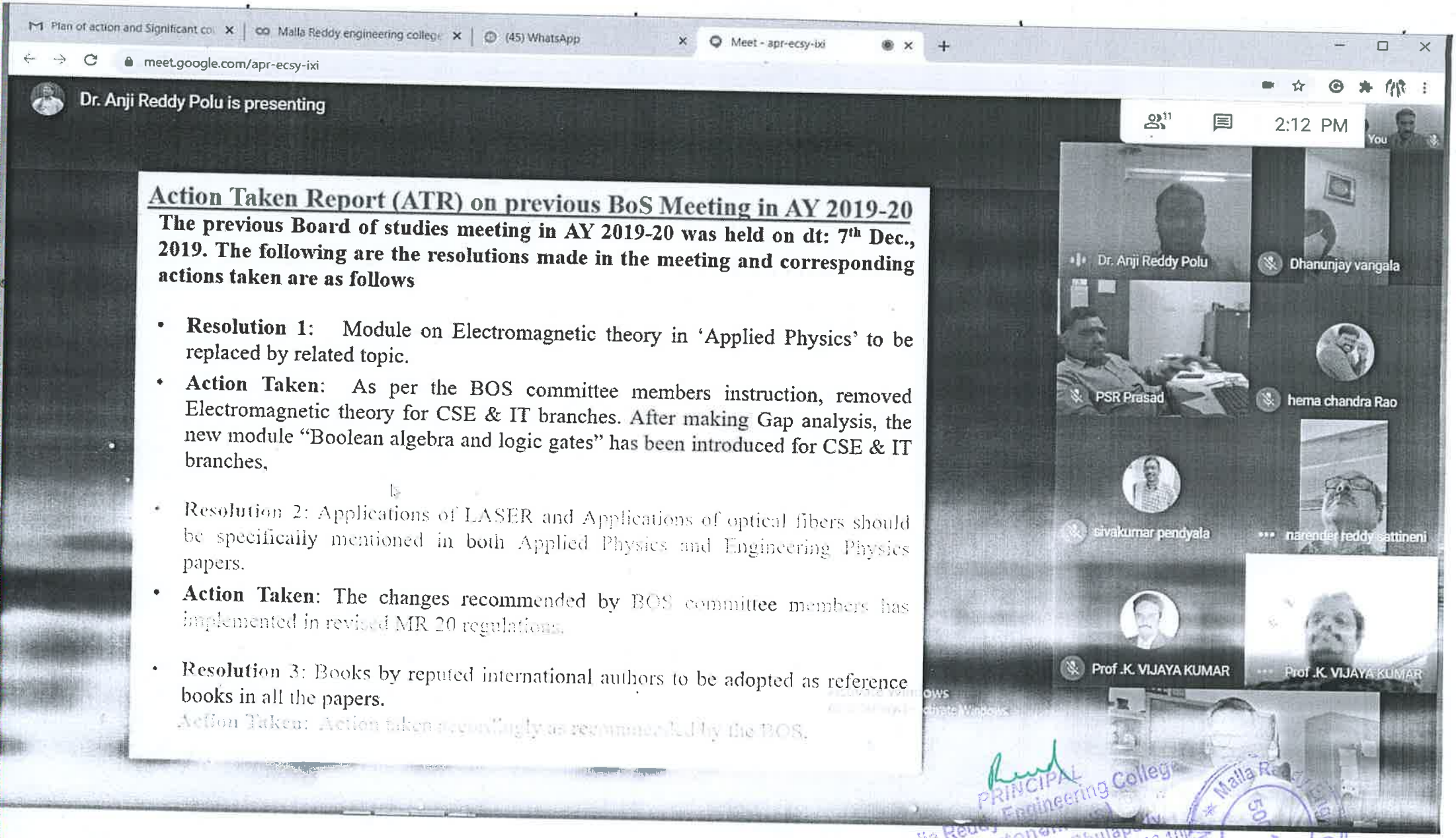

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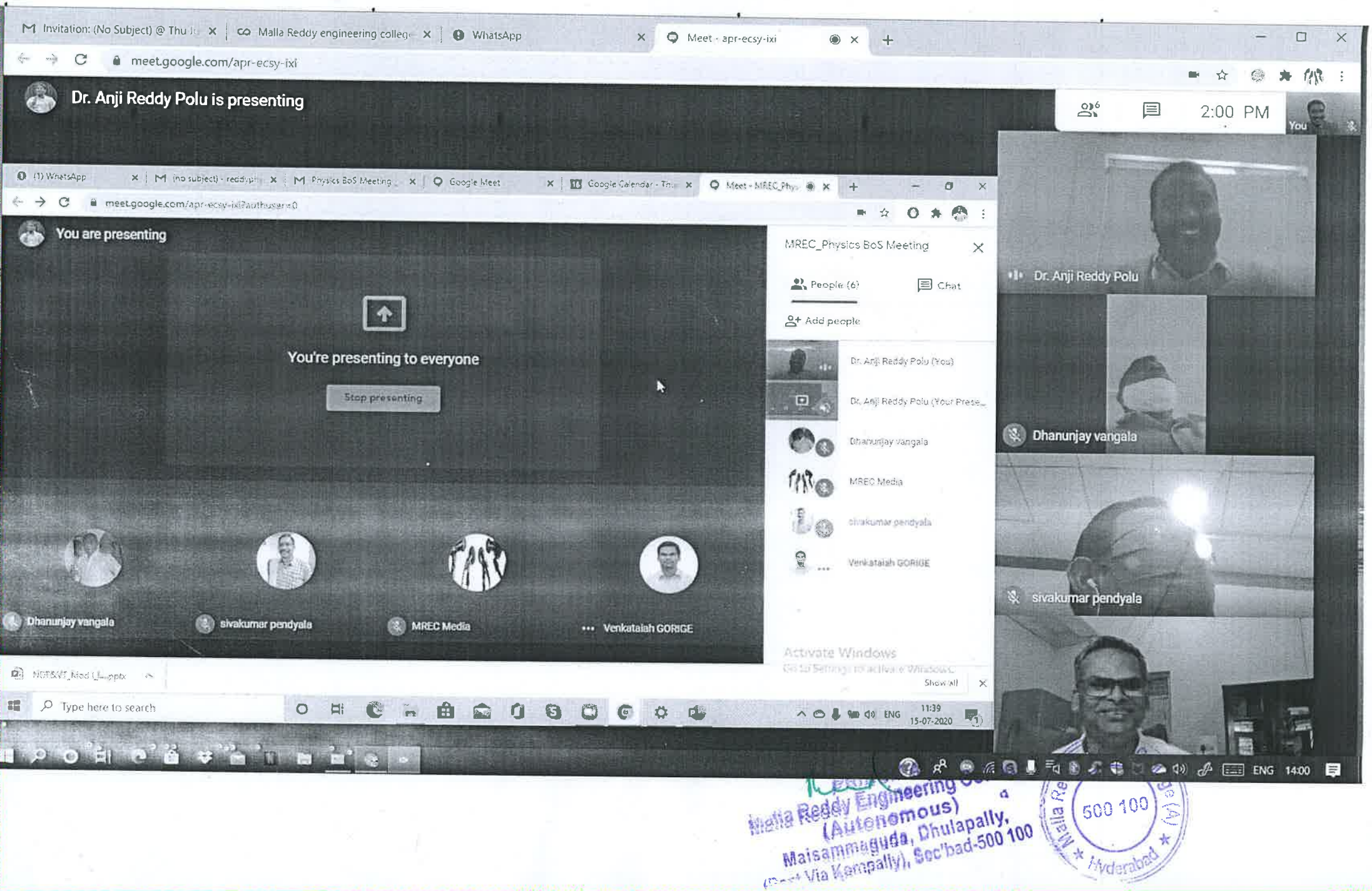

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Hyderabad

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Maisammaguda, Dhulapally, Secunderabad - 500 100

July 16, 2020

BoS - Physics meeting

Minutes

Owing to the prevailing COVID19 pandemic, the BoS meeting is conducted in online mode using 'Google meet' platform. All the members of the BoS (both external and internal) attended the online meeting. Dr. P. Anji Reddy, HoD, Physics and Chairman, BoS - Physics welcomed all the members to the meeting. He started his presentation with the agenda of the meeting. The minutes of the meeting are:

1. The Action Taken Report for the previous BoS meeting is submitted and approved by the members.
2. The following three theory papers are prescribed for the I B. Tech. students

S.No.	Title of the theory paper	Prescribed	
		for the branches	in the semester
1	**Semiconductor Physics**	CSE, IT, CSE (AI & ML), CSE (Cyber Security), CSE (IoT) and CSE (Data Sciences)	I Semester
2	Engineering Physics	CE, ME and Min. Engineering	II Semester
3	Applied Physics	EEE and ECE	II Semester

3. The following two practical papers are prescribed for the I B. Tech. students

S.No.	Title of the practical paper	Prescribed	
		for the branches	in the semester
1	Applied Physics lab	CSE, IT, CSE (AI & ML), CSE (Cyber Security), CSE (IoT) and CSE (Data Sciences)	I Semester
2	Engineering Physics lab	CE, ME and Min. Engineering	II Semester
3	Applied Physics lab	EEE and ECE	II Semester

4. The following three open electives are prescribed

S.No.	Title of the Open Elective
1	Advanced Physics for Engineers
2	Nano materials
3	NDT & Vacuum Technology

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5. The members of the BoS recommended the following changes in the syllabus:
   - **Semiconductor Physics**
     i. Quantum Physics to be replaced with Quantum mechanics.
     ii. The topic 'Elemental semiconductors and Compound semiconductors' should be inserted at the beginning of the first part of the Module titled Semiconductor Physics, prior to the topic Intrinsic and Extrinsic semiconductors'.
     iii. The topic 'Ruby LASER' should be introduced in the LASER chapter besides He - Ne LASER and Semiconductor LASER.
     iv. Applications of LASER, Losses in optical fibers and Applications of optical fibers should be specifically mentioned.
     v. Any one simple method of Fabrication of optical fibers should be introduced in the 'Optical fibers' chapter.
     vi. 'Boolean algebra and logic gates' chapter should be renamed as 'Introduction to Digital Electronics'
     vii. XOR gate should be appended to other logic gates.
     viii. Level of integration to be reframed.
     ix. The words 'various branches of Engineering' should be appended at the end in the Course objective.
     x. The course outcome number 04 should be rewritten as 'explain the working of 3 LASERs'.
   - Applied Physics
     i. All the related recommendations made in 'Semiconductor Physics' paper are applicable here.
   - Engineering Physics
     i. Specific applications of Ultrasonics should be introduced.
     ii. Homojunction Semiconductor diode LASER should be introduced in LASER chapter.
     iii. Applications of LASER, Losses in optical fibers and Applications of optical fibers should be specifically mentioned.
     iv. The topic 'Determination of dielectric constant' should be introduced in the chapter 'Dielectric properties'.
     v. The topic 'Types of nano materials' should be introduced at the beginning in the chapter 'Nano materials'
   - The proposed syllabus for Applied Physics lab is approved by the members.
   - **Members recommended the following two experiments in 'Engineering Physics lab'**
     i. Ultrasonic interferometer
     ii. Determination of wavelength of LASER using Diffraction grating
   - The proposed syllabus for the three open electives is approved.
6. Members recommended the panel of examiners for paper setting and evaluation.
7. Members suggested to make MoU with ARCI so that the students who opt for the open elective 'Nano materials' can be taken to field trip to ARCI in order to observe various characterization techniques' facilities available there.

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Chairman - BoS Physics
(Dr. P. Anji Reddy)

ction Taken Report (ATR) on previous BoS Meeting in AY 2020-21

Semiconductor Physics

esolution 1: Quantum Physics to be replaced with Quantum mechanics.

ction Taken: As per the BOS committee member's instruction, Quantum Physics module is replaced with Quantum mechanics for the CSE and IT branches.

Resolution 2: The topic 'Elemental semiconductors and Compound semiconductors' should be inserted at the beginning of the first part of the Module titled Semiconductor Physics, prior to the topic Intrinsic and Extrinsic semiconductors'.

Action Taken: According to BOS resolution, the 'Elemental and compound semiconductors' was inserted at the first topic of the module entitled "Semiconductor Physics".

Resolution 3: The topic 'Ruby LASER' should be introduced in the LASER chapter besides He - Ne LASER and Semiconductor LASER.

Action Taken: The changes recommended by BOS committee members has implemented in revised MR 20 regulations.

Resolution 4: Applications of LASER, Losses in optical fibers and Applications of optical fibers should be specifically mentioned.

Action Taken: Yes, Implemented and updated the 'Laser and Optical fiber' module based on BOS committee suggestions.

Resolution 5: 'Boolean algebra and logic gates' chapter should be renamed as 'Introduction to Digital Electronics'

Action Taken: Yes, renamed the 'Boolean algebra and logic gates' chapter as "Introduction to Digital Electronics" based on the recommendations from the BOS members.

Resolution 6: XOR gate should be appended to other logic gates.

Action Taken: Action taken accordingly as per the recommendations by the BOS members.

Resolution 7: Level of integration to be reframed.

Action Taken: Yes, Reframed the 'Level of Integration' topic in "Introduction to digital Electronics" module based on the recommendations of BOS Committee.

Resolution 8: The words 'various branches of Engineering' should be appended at the end in the Course objective.

Action Taken: Action taken accordingly as recommended by the BOS Committee.

Resolution 9: The course outcome number 04 should be rewritten as 'explain the working of 3 LASERs'.

Action Taken: Yes, Updated the Course outcome number 04 accordingly based on BOS Committee recommendations.

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- ***Applied Physics***

Resolution 1: All the related recommendations made in 'Semiconductor Physics' paper are applicable here.
Action Taken: As per the BOS committee recommendations, Implemented in Applied physics too.

- ***Engineering Physics***

Resolution 1: Specific applications of Ultrasonics should be introduced.
Action Taken: Action taken accordingly as recommended by the BOS Committee.

Resolution 2: Homo junction Semiconductor diode LASER should be introduced in LASER chapter.
Action Taken: Yes, Introduced the 'Homo junction Semiconductor diode LASER' in "LASERS and OPTICAL FIBER" module as per the BOS Instructions.

Resolution 3: Applications of LASER, Losses in optical fibers and Applications of optical fibers should be specifically mentioned.
Action Taken: Yes, Implemented and updated the 'Laser and Optical fiber' module based on BOS committee suggestions.

Resolution 4: The topic 'Determination of dielectric constant' should be introduced in the chapter 'Dielectric properties'.
Action Taken: As per the BOS committee recommendations, introduced the topic 'Determination of dielectric constant' in "Dielectric properties" module.

Resolution 5: The topic 'Types of nano materials' should be introduced at the beginning in the chapter 'Nano materials'
Action Taken: The changes recommended by BOS committee members in Engineering Physics have been implemented in revised MR 20 regulations.

- ***Applied Physics Lab***

The proposed syllabus for Applied Physics lab is approved by the members.

- ***Engineering Physics Lab***

Resolution 1: Ultrasonic interferometer
Action Taken: Yes, Introduced the Ultrasonic Interferometer experiment as a demonstration in Engineering Physics lab.

Resolution 2: Determination of wavelength of LASER using Diffraction grating.
Action Taken: Action taken accordingly as recommended by the BOS Committee.

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Physics HOD <phyhod@mrec.ac.in>

Approval for Modified final Syllabus _ BoS meeting _ MREC (A) - Reg.

12 messages

Physics HOD <phyhod@mrec.ac.in>
To: "Dr.K.VIJAYA KUMAR" <kvkphd@gmail.com> Tue, Aug 25, 2020 at 10:22 PM

Dear Sir,
I am Dr. Anji Reddy Polu, HoD, Department of Physics, Malla Reddy Engineering College (A). The syllabus has been modified as per your suggestions in BoS held on 16th July 2020. In this pandemic situation it is difficult to take signatures on hard copies of syllabus due to COVID-19. We are requesting you to send reply mail with approval. Here I am attaching syllabus copies of both theory and lab along with minutes of meeting.

Thanking You Sir

Thanks & Regards
Dr. Anji Reddy Polu
M.Sc., Ph.D. (Central Uni.), Post Doc (South Korea)
HOD, Dept of Physics
Malla Reddy Engineering College (Autonomous)
Hyderabad

4 attachments

20200716_Minutes of the BoS - Physics meeting.docx
19K

MR20_Open Electives Approved Syllabus_v1.0_01 Aug 2020.doc
83K

MR20_Physics Lab Approved syllabus.doc
66K

MR20_Physics Theory Approved syllabus v1.0_01 Aug 2020.doc
101K

Physics HOD <phyhod@mrec.ac.in>
To: snreddy_sattineni2000 <snreddy_sattineni2000@yahoo.com> Tue, Aug 25, 2020 at 10:23 PM

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4 attachments

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83K

MR20_Physics Lab Approved syllabus.doc
66K

MR20_Physics Theory Approved syllabus v1.0_01 Aug 2020.doc
101K

Physics HOD <phyhod@mrec.ac.in>
To: Venkataiah Gorige <vgsp@uohyd.ac.in>, gvenkataiah@gmail.com Tue, Aug 25, 2020 at 10:25 PM

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4 attachments

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MR20_Physics Lab Approved syllabus.doc
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MR20_Physics Theory Approved syllabus v1.0_01 Aug 2020.doc
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Physics HOD <phyhod@mrec.ac.in>
To: PSR Prasad <prasad.psr@gmail.com>
Tue, Aug 25, 2020 at 10:25 PM

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4 attachments

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MR20_Physics Lab Approved syllabus.doc
66K

MR20_Physics Theory Approved syllabus v1.0_01 Aug 2020.doc
101K

PSR Prasad <prasad.psr@gmail.com>
To: Physics HOD <phyhod@mrec.ac.in>
Wed, Aug 26, 2020 at 9:45 AM

approved
[Quoted text hidden]

Physics HOD <phyhod@mrec.ac.in>
To: PSR Prasad <prasad.psr@gmail.com>
Tue, Aug 25, 2020 at 10:54 PM

Thank you Sir
Thanks & Regards
Dr. Anji Reddy Polu
M.Sc., Ph.D. (Central Uni.), Post Doc (South Korea)
HOD, Dept of Physics
Malla Reddy Engineering College (Autonomous)
Hyderabad

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Dr.K.VIJAYA KUMAR <kvkphd@gmail.com>
To: Physics HOD <phyhod@mrec.ac.in>
Thu, Aug 27, 2020 at 11:42 AM

Approved

With Regards

Dr. K. Vijaya Kumar
M. Sc., Ph. D., PGDELT, PGDCL&IPR
Professor of Physics &
Coordinator, Directorate of University Academic Audit Cell
Jawaharlal Nehru Technological University Hyderabad
500 085, Telangana State, India

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Physics HOD <phyhod@mrec.ac.in> Thu, Aug 27, 2020 at 11:47 PM
To: "Dr.K.VIJAYA KUMAR" <kvkphd@gmail.com>

Thank you sir
[Quoted text hidden]

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narender reddy <snreddy_sattineni2000@yahoo.com> Sun, Aug 30, 2020 at 11:10 PM
To: Physics HOD <phyhod@mrec.ac.in>

To
Dear Anji Reddy
HOD Physics

Sub: Approval of the Physics syllabus for B.Tech I year -Reg.

I have gone through the modified syllabii of physics for different branches of B.Tech. I Year as per the recommendations made in the board of studies meeting held on 16th July 2020. Hence, It is deemed to be approved in the present pandemic situation.

With regards

S. N . REDDY
(Prof. S. Narender Reddy)

[Quoted text hidden]

Venkataiah GORIGE <gvenkataiah@gmail.com> Mon, Aug 31, 2020 at 9:49 AM
To: Physics HOD <phyhod@mrec.ac.in>

Dear Dr. Anji Reddy garu,

Sorry for the late reply. I herewith approve the syllabus and minutes.

With regards
Venkataiah Gorige
[Quoted text hidden]

Physics HOD <phyhod@mrec.ac.in> Mon, Aug 31, 2020 at 9:56 AM
To: Venkataiah GORIGE <gvenkataiah@gmail.com>

Thank you sir.
[Quoted text hidden]

Physics HOD <phyhod@mrec.ac.in> Mon, Aug 31, 2020 at 9:57 AM
To: narender reddy <snreddy_sattineni2000@yahoo.com>

Thank you sir.
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Date: 16.07.2020

ORDER

The Board-of-Studies Physics for the academic year 2020-21 to 2021-22 have been reconstituted as some of the previous members relived from the institute.

S. No.	Name of the Member	Designation & Official Address	Subject Specialization	Contact Number	Category
1	Dr. Anji Reddy Polu	Assoc. Prof. & HOD, Department of Physics, MREC(A)	Physics	9502158663	Chairman- BOS
2	Dr. K. Vijay Kumar	Assoc. Prof. of Physics, Department of Humanities & Sciences, JNTUH CES.	Physics	9000203797	University Nominee (Nominated by the Vice Chancellor, JNTUH, Hyderabad)
3	Dr. S. Narender Reddy	Professor, Department of Physics, UCS, OU, Hyderabad.	Physics	9949055469	Subject Expert (outside the Parent University)
4	Dr. Venkataiah Gorige	Asst. Prof., School of Physics, University of Hyderabad, Hyderabad.	Physics	9866141602	Subject Expert (outside the Parent University)
5	Dr. P. S. R. Prasad	Senior Principal Scientist, CSIR-NGRI, Hyderabad.	Physics	9603741754	Industry Expert
6	Dr. V. Dhanunjana Chari	Assoc. Prof., MREC(A)	Physics	9848210241	Faculty Member
7	Mr. Kesava Vamsi Krishna	Assoc. Prof., MREC(A)	Physics	9030234705	Faculty Member
8	Dr. P. Siva Kumar	Asst. Prof., MREC(A)	Physics	9640092205	Faculty Member
9	Mrs. M V Shruthi	Asst. Prof., SCETW	EEE	7057582545	Alumni

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Principal
Dr. A. Raveendra
Malla Reddy Engineering College
(Autonomous)

Malla Reddy Engg. College Hyderabad 500 100

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: A0B14	ADVANCED PHYSICS FOR ENGINEERS (*Open Elective*)	L	T	P
Credits: 3		3	-	-

Prerequisites: Fundamentals of Physics

Course Objectives:

- The objective of this course is to make the students familiar with the recent advanced concepts in physics.

Module I: Special Theory of Relativity **[9 Periods]**

Introduction, Concept of theory of relativity; Frames of reference-Inertial, non-inertial; Galilean transformation equations; Michelson-Morley experiment; Einstein theory of relativity; Lorentz transformation of space and time, Length contraction, Time dilation, Variation of mass with velocity; Relativistic relation between energy and momentum.

Module II: Holography **[9 Periods]**

Introduction, Basic principle; Construction and Reconstruction of Hologram; Properties of Hologram; Types of Holograms; Applications- Holographic Interferometry, Acoustic Holography, Holographic Microscopy.

Module III: Thin films Synthesis and Characterization

A: Synthesis **[6 Periods]**

- Introduction; Deposition techniques-Pulsed Laser Deposition (PLD), Spray Pyrolysis; Nucleation and growth of the thin films; properties (Mechanical, Electrical, Magnetic and Optical).

B: Characterization **[6 Periods]**

X-Ray Photoelectron Spectroscopy (XPS); Energy Dispersive X-Ray Analysis (EDAX); Principles and applications of X-Ray Diffraction; Electron Diffraction; Atomic Force Microscopy.

Module IV: Photonic Crystals **[9 Periods]**

Important features of photonic crystals; Presence of photonic band gap; anomalous group velocity dispersion; Micro cavity; effects in Photonic Crystals; fabrication of photonic Crystals; Dielectric mirrors and interference filters; PBC based LEDs; Photonic crystal fibers (PCFs); Photonic crystal sensing.

Module V: Solar cell Physics **[9 Periods]**

Single, poly and amorphous silicon; GaAs, CdS, Cu_2S, CdTe; Origin of photovoltaic effect; Homo and hetero junction, working principle of solar cell; Evaluation of Solar cell parameters, I-V, C-V and C-f characteristics.

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Course Outcomes:

At the end of the course, students will be able to

1. Understand the concepts of special theory of relativity.
2. Analyze the basic concepts of Holography and applications.
3. Acquire the knowledge on synthesis methods of thin films and their characterization techniques.
4. Develop basic knowledge on the photonic crystals.
5. Apply the basic concepts of solar cell physics.

Text books:

1. R K Gaur and SL Gupta, "**Engineering Physics" Dhanpat Rai Publications, 8th revised Edition**, 2006.
2. R Brendel, "Thin-film crystalline silicon solar cells: Physics and technology", Wiley-VCH, 2003.
3. B K Pandey and S Chaturvedi, "**Engineering Physics" Cengage Learning India,** Revised Edition, 2014.

Reference Books:

1. R F Bun shah, "**Hand Book of Technologies for Films and coating", Noyes** publishers, 1st Edition, 1996.
2. B E A Saleh and A C Tech, ***"Fundamentals of Photonics", John Wiley and Sons,*** New York, 1st Edition, 1993.
3. K L Chopra and S R Das, "**Thin film Solar Cells", Plenum press,** 1st Edition 1983.
4. K Vijaya Kumar, T Sreekanth and S Chandralingam, "**Engineering Physics"** S Chand and Co., 1st Edition, 2008.

e-Resources:

1. http://physics.mq.edu.au/~jcresser/Phys378/LectureNotes/SpecialRelativityNotes.pdf
2. http://www.kfupm.edu.sa/centers/CENT/AnalyticsReports/KFUPM-TFSC-Dec20.pdf

Journals:

1. https://www.journals.elsevier.com/solar-energy-materials-and-solar-cells.
2. https://www.journals.elsevier.com/journal-of-alloys-and-compounds.
3. http://aip.scitation.org/journal/apl.

NPTEL Videos:

1. http://nptel.ac.in/courses/115101011.
2. http://nptel.ac.in/courses/117103066/11.
3. https://www.youtube.com/watch?v=JygZofoFNfE.

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2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: A0B15	Nano Materials (*Open Elective*)	L	T	P
Credits: 3		3	-	-

Prerequisites: Fundamentals of Physics

Course Objective:

The objective is to provide different methods of synthesis and characterization of nanomaterials.

Module I: Physical Methods **[9 periods]**

Bottom-up approach and Top-down approach; Inert gas condensation; Arc Discharge; lasers ablation; laser pyrolysis; ball milling; molecular beam epitaxial and electro deposition.

Module II: Chemical methods **[8 periods]**

Nanocrystals by chemical reduction; photochemical synthesis; electrochemical synthesis.

Module III: Thermal Methods & Surface Characterization

A: Thermal Methods **[7 periods]**

Thermolysis route – spray pyrolysis; sol-gel method; solvothermal and hydrothermal routes; solution combustion synthesis; CVD method.

B: Surface Characterization **[7 periods]**

Scanning electron microscopy (SEM); Transmission electron microscopy (TEM) and Photo luminescence Spectroscopy.

Module IV:

Compositional and structural Characterization techniques **[9 periods]**

X-Ray Photoelectron Spectroscopy (XPS); Energy Dispersive X-Ray Analysis (EDAX); Principles and applications of X-Ray Diffraction; Electron Diffraction and Electron probe microanalysis (EPMA).

Module V: Properties and Applications of Nanomaterials **[8 periods]**

Carbon Nano Tube (CNT) – Single-Wall Carbon Nano Tube (SWCNT), Multi-wall carbon Nano tube (MWCNT); Activated carbon, Fullerene, Graphene, Quantum wire and Quantum dots.

Course Outcomes:

At the end of the course, students will be able to

1. Understand the different physical methods of synthesis of nano materials.
2. List out the different chemical methods of synthesis of nano materials.
3. Analyze the different thermal methods of synthesis of nanomaterials and to learn different surface characterization techniques.
4. Acquire the different compositional and structural characterization techniques.
5. Develop basic knowledge on the properties and applications of few nanomaterials.

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Text Books:

1. C N R Rao, A Muller and A K Cheetham, **"The chemistry of Nanomaterials: Synthesis, Properties and Applications"** John Wiley, First Edition, 2004
2. Hari Singh Nalwa, **"Nanostructured Materials and Nanotechnology"**, Academic Press, First Edition, 2002.

Reference Books:

1. Charles P Poole Jr **"Introduction to Nanotechnology"**, John Willey & Sons, 1st Edition, 2003.
2. C Dupas, P Houdy, M Lahmani, Nanoscience: **"Nanotechnologies and Nanophysics"**, Springer-Verlag Berlin Heidelberg, 1st Edition, 2007.
3. T Pradeep, **"NANO: The Essentials: Understanding Nanoscience and Nanotechnology"**, Tata McGraw-HillPublishing Company Limited, Revised Edition, 2007.
4. Z L Wang, **"Characterization of Nanophase Materials"** Wiley-VCH, 1st Edition, 2000.
5. K Vijaya Kumar, T Sreekanth and S Chandralingam, **"Engineering Physics" S** Chand and Co., 1st Edition, 2008.

e-Resources:

1. http://nptel.ac.in/courses/103103033/module9/lecture1.pdf.
2. http://courses.washington.edu/overney/NME498_Material/NME498_Lectures/Lecture4-Overney-NP-Synthesis.pdf.
3. https://www.ttu.ee/public/m/Mehaanikateaduskond/Instituudid/Materjalitehnika_instituut/MT X9100/Lecture11_Synthesis.pdf.

Journals:

1. http://www.materialstoday.com/nanomaterials/journals.
2. https://www.journals.elsevier.com/nanoimpact.
3. http://www.springer.com/materials/nanotechnology/journal/12274.

NPTEL Videos:

1. http://nptel.ac.in/courses/118104008/
2. http://nptel.ac.in/courses/118102003/

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: A0B16	NDT AND VACUUM TECHNOLOGY (*Open Elective*)	L	T	P
Credits: 3		3	-	-

Prerequisites: Fundamental knowledge of the concepts in Physics

Course Objective:

The objective is to provide a basic level of understanding on Non-destructive testing and Vacuum technology.

Module I: Introduction to Non-destructive testing **[4 periods]**

Introduction; Objectives of Non-destructive testing; Types of defects – Cracking, Spalling, Staining, Construction and Design defects, Honey combing, Dusting, Blistering, Rain damage.

Module II: Methods of Non-destructive Testing **[9 Periods]**

Liquid penetrant testing; Magnetic particle testing; Eddy current Testing; Ultrasonic Inspection method; Radiographic testing.

Module III: Introduction to Vacuum Technology and Flow meters

A: Introduction to Vacuum Technology **[5 Periods]**

Definition of vacuum, Degrees of vacuum and their ranges; Review of Kinetic theory of gases; Definitions of Mean free path, particle flux, mono layer formation time, pressure; Flow regimes, Knudsen's and Reynold's numbers; Throughput, mass flow and conductance.

B: Flow meters **[4 Periods]**

Molar flow, Mass flow and throughput; Rota meters and chokes;

Module IV: Pressure gauges **[6 Periods]**

Classification - Direct and indirect gauges; Indirect gauges – Pirani gauge, Thermocouple gauge, Ionization gauge - hot cathode gauge, Penning gauge.

Module V: Vacuum Pumps **[6 Periods]**

Introduction, Pumping speed; Rotary vane pump; Turbo molecular pump; Diffusion pumps.

Course Outcomes:

At the end of the course, student will be able to

1. Distinguish different types of defects
2. Compare and contrast different non destructive testing techniques
3. Get acquainted with the parameters that distinguish different levels of vacuum
4. Explain the way different gauges can be used for pressure measurement
5. Analyse the functioning of different vacuum pumps

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Text Books:

1. B K Pandey, S Chaturvedi, **"Engineering Physics"**, Cengage learning, 1st Edition, 2014.
2. John. F. O'Hanlon, **"A User's guide to Vacuum technology"**, Wiley, 3rd Edition, 2003.
3. Pramod K. Naik, **"Vacuum - Science, Technology and applications"**, CRC Press, 2018.

Reference Books:

1. M R Srinivasan, **"Physics for Engineers"**, New Age international, 1st reprint, 2007.
2. Avadhanlu, Ksheerasagar, **"A text book of Engineering Physics"**, S. Chand & Co., Reprint, 2010.
3. Dorothy Hoffman, Bawa singh, John H Thomas, **"Hand Book of Vacuum Science and Technology"**, Academic Press, 1998.

e-Resources:

1. http://www.enfm.net/catalog/catalog/enfm-usa.pdf
2. https://www.twi-global.com/technical-knowledge/faqs/what-is-non-destructive-testing

Journals:

1. https://www.journals.elsevier.com/ndt-and-e-international
2. https://www.journals.elsevier.com/vacuum

NPTEL Videos:

1. https://nptel.ac.in/courses/113/106/113106070/
2. https://www.youtube.com/watch?v=rjeq2eP3GK4
3. https://www.youtube.com/watch?v=nLohZYiiHuc
4. https://www.youtube.com/watch?v=Vuqk-Ag7xV4

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2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: A0B11	Applied Physics Lab (Common for CSE, CSE (AI & ML), CSE (Cyb. Sec.), CSE (IoT), CSE (Data Science), IT, ECE and EEE)	L	T	P
Credits: 1		-	-	2

Course objectives:

The main objective of this course is to provide the necessary exposure to the practical aspects, which is an essential component for learning science.

List of Experiments:

1 **Planck's constant**
To determine Planck's constant using Photo electric effect.
2 **Energy band –gap of a semiconductor**
To determine the energy band gap of a semiconductor.
3 **V-I and P-I characteristics of light emitting diode**
Plot V-I and P-I characteristics of light emitting diode.
4 **Laser diode**
To study the Characteristics of Laser diode.
5 **Solar Cell**
To study the V-I Characteristics of solar cell.
6 **LCR Circuit**
To determination of resonant frequency, bandwidth and quality factor of RLC circuit.
7 **Numerical Aperture of an Optical fiber**
To determine the Numerical aperture of the given fiber.
8 **Bending Loss of a Fiber**
To determine the bending loss of the given fiber.
9 **Light Dependent Resistance (LDR)**
To determine the characteristics of a LDR.
10 **Stewart and Gee's experiment**
Determination of Magnetic field along the axis of current carrying circular coil.
11 **B-H Curve**
To study the magnetization of ferromagnetic material in presence of magnetic field.
12 **Sonometer**
To verify the frequency of AC Supply.
13. Construction of fundamental logic gates using discrete components and verification of truth tables
14. Verification of truth tables of fundamental logic gates using ICs
15. Construction of fundamental logic gates using universal logic gates.

Course Outcomes:

At the end of the course, students will able to
1. Develop skills to impart practical knowledge in real time solution.
2. Understand principle, concept, working, application and comparison of results with theoretical calculations.
3. Design new instruments with practical knowledge.
4. Understand measurement technology.
5. Use new instruments and real time applications in engineering studies.

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2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: A0B13	Engineering Physics Lab (Common to ME, CE and Min. E)	L	T	P
Credits: 1		-	-	2

Course objectives:

The main objective of this course is to provide the necessary exposure to the practical aspects, which is an essential component for learning science.

List of Experiments:

1 **Melde's Experiment – Longitudinal and Transverse modes**
To determine frequency of electrically maintain Tuning fork using Melde's apparatus.
2 **RLC series circuit**
To determination of resonant frequency, bandwidth and quality factor.
3 **Ultrasonic Interferometer**
To determine the velocity of ultrasonic sound through different liquid media..
4 **Numerical Aperture of an Optical Fiber**
To determine the Numerical aperture of the given fiber.
5 **Bending loss of the given fiber.**
To determine the bending loss of the given fiber.
6 **Diffraction grating**
To determine the wavelength of LASER using Diffraction grating.
7 **B-H Curve**
To study the Magnetization of Ferro magnetic material in presence of magnetic field.
8 **Dispersive Power**
To determine the dispersive power of glass prism.
9 **LASER**
To determination of pitch of the screw gauge using LASER.
10 **Torsional Pendulum**
Determine the rigidity Modulus of given Wire.
11 **Sonometer**
To verify the frequency of AC power Supply.
12. **NDT** – Magnetic particle testing

Course Outcomes:

At the end of the course, students will be able to

1. Develop skills to impart practical knowledge in real time solution.
2. Understand principle, concept, working, application and comparison of results with theoretical calculations.
3. Design new instruments with practical knowledge.
4. Understand measurement technology
5. Use new instruments and real time applications in engineering studies.

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2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: A0B09	Semiconductor Physics (Common for CSE, CSE (AI & ML), CSE (Cyb. Sec.), CSE (IoT), CSE (Data Science) and IT)	L	T	P
Credits: 4		3	1	-

Prerequisites: Fundamentals of Physics

Course Objectives:
The main objective of this course is to provide an adequate exposure and develop insight about the basic principles of quantum mechanics and semiconductor physics along with their possible applications in various branches of engineering.

Module – I: Quantum mechanics **[8 Periods]**
Introduction, Discussion on Black body radiation spectrum; Louis de Broglie's concept of matter waves; Davisson and Germer experiment; G P Thomson Experiment; Schrodinger's time independent wave equation; Physical significance and properties of wave function; Heisenberg's uncertainty principle - Why an electron cannot exist inside the nucleus?; Particle in one dimensional infinite potential well.

Module – II: Band theory of solids **[8 Periods]**
Qualitative discussion of Classical free electron theory; Qualitative treatment of Fermi - Dirac distribution function; Qualitative discussion of Quantum free electron theory; Density of energy states; Bloch theorem; Qualitative treatment of Kronig - Penney model; E Vs k relationship; Origin of energy band gap; Classification of materials into Conductors, Semi conductors and insulators; Concept of Effective mass.

Module –III: Semiconductor Physics **[13 Periods]**
A: Elemental and compound semiconductors; Intrinsic and Extrinsic Semiconductors; Expression for carrier concentration in intrinsic and extrinsic semiconductors; Qualitative treatment of Fermi energy level in Intrinsic and extrinsic semiconductors.

B: Direct and indirect band gap semiconductors; Carrier generation and Recombination; Drift and Diffusion; Equation of Continuity; P-N Junction diode - Formation & V-I Characteristics; LED - Construction and Working Principle; Solar Cell - Construction & I-V Characteristics.

Module – IV **[12 Periods]**
LASER: Introduction, Characteristics of LASER; Absorption, Spontaneous and Stimulated emission; Einstein's coefficients derivation; Population inversion; Pumping mechanisms; Basic components of a LASER system; three and four level LASER systems; Ruby LASER, He-Ne LASER, Semiconductor diode LASER (Homo junction and hetero junction); Applications of LASER - Computers, Medical, Military.

Optical Fibers: Introduction to Optical fibers; Total Internal Reflection; Acceptance angle and acceptance cone, Numerical aperture; types of optical fibers; Losses in optical fibers - absorption losses, scattering losses and bending losses; Applications of optical fibers - Communications, Level Sensor, LASER angioplasty.

Module – V: Introduction to Digital Electronics **[9 Periods]**
Different types of number systems, Binary logics; Boolean algebra - Basic theorems and properties of Boolean algebra; Boolean functions; logic gates – construction and working of AND, OR, NOT, NAND, NOR and XOR using discrete components.
Integrated circuits: Levels of integration - SSI, MSI, LSI and VLSI; basic IC logic gates - AND, OR, NOT, NAND, NOR and XOR.

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.Course Outcomes:

At the end of the course, student will be able to

1. Explain the dual nature of the matter and evaluate the energy of a particle trapped in 1D infinite potential well.
2. Classify the materials into conductors, semiconductors and insulators based on the outcomes of Kronig - Penney model.
3. Analyze the working of semiconductor devices like PN junction diode, LED and Solar cell.
4. Explain the working of three LASERs.
5. Explain the applications of LASER and optical fibers.
6. Describe the Boolean algebra and examine various logic gates.

Text Books:

1. K Vijaya Kumar, S Chandralingam, "Modern Engineering Physics'' Volume I & II, S. Chand, 1st Edition, 2017.
2. Jasprit Singh, "Semiconductor Optoelectronics: Physics and Technology", McGraw-Hill, 1995.
3. Morris Mano, "Digital Design", Prentice - Hall, 1995.

Reference Books:

1. P K Palanisamy, **"Engineering Physics"**, SciTech Publication, 4th Edition, 2014.
2. B K Pandey and S. Chaturvedi, "**Engineering Physics**" Cengage Learning India Revised Edition, 2014.
3. P Horowitz and W. Hill, "The Art of Electronics" Cambridge University Press, 3rd edition, 2015.
4. D K Bhattacharya, Poonam Tandon, "**Engineering Physics**", Oxford University Press, 1st Edition, 2015.
5. P Bhattacharya, "**Semiconductor Optoelectronic Devices**", Prenticehall of India,1997

e-RESOURCES

1. https://www.researchgate.net/publication/259574083_Lecture_Notes_on_Engineering_Physics
2. https://www.researchgate.net/publication/292607115_Applied_Physics
3. https://www.livescience.com/33816-quantum-mechanics-explanation.html

Journals :

1. http://www.springer.com/physics/theoretical%2C+mathematical+%26+computational+physics/journal/40094
2. http://www.springer.com/physics/journal/340

NPTEL VIDEOS:

1. http://nptel.ac.in/courses/113104012/
2. https://www.youtube.com/watch?v=9seDKvbaoHU&list=PLzJaFd3A7DZse2tQ2qUFChSiCj7jBidO0&index=29
3. https://www.youtube.com/watch?v=4a0FbQdH3dY

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2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
		L	T	P
Code: A0B10	Applied Physics (Common for ECE and EEE)	3	1	-
Credits: 4				

Prerequisites: Fundamentals of Physics

Course Objectives:
The main objective of this course is to provide an adequate exposure and develop insight about the basic principles of quantum mechanics, semiconductor physics and EM theory along with their possible applications.

Module – I: Quantum mechanics **[8 Periods]**
Introduction, Discussion on Black body radiation spectrum; Louis de Broglie's concept of matter waves; Davisson and Germer experiment; G P Thomson Experiment; Schrodinger's time independent wave equation; Physical significance and properties of wave function; Heisenberg's uncertainty principle - Why an electron cannot exist inside the nucleus?; Particle in one dimensional infinite potential well.

Module – II: Band theory of solids **[8 Periods]**
Qualitative discussion of Classical free electron theory; Qualitative treatment of Fermi - Dirac distribution function; Qualitative discussion of Quantum free electron theory; Density of energy states; Bloch theorem; Qualitative treatment of Kronig - Penney model; E Vs k relationship; Origin of energy band gap; Classification of materials into Conductors, Semi conductors and insulators; Concept of Effective mass.

Module –III: Semiconductor Physics **[13 Periods]**
A: Elemental and compound semiconductors; Intrinsic and Extrinsic Semiconductors; Expression for carrier concentration in intrinsic and extrinsic semiconductors; Qualitative treatment of Fermi energy level in Intrinsic and extrinsic semiconductors.

B: Direct and indirect band gap semiconductors; Carrier generation and Recombination; Drift and Diffusion; Equation of Continuity; P-N Junction diode - Formation & V-I Characteristics; LED - Construction and Working Principle; Solar Cell - Construction & I-V Characteristics.

Module – IV **[12 Periods]**
LASER: Introduction, Characteristics of LASER; Absorption, Spontaneous and Stimulated emission; Einstein's coefficients derivation; Population inversion; Pumping mechanisms; Basic components of a LASER system; three and four level LASER systems; Ruby LASER, He-Ne LASER, Semiconductor diode LASER (Homo junction and hetero junction); Applications of LASER - Computers, Medical, Military.

Optical Fibers: Introduction to Optical fibers; Total Internal Reflection; Acceptance angle and acceptance cone, Numerical aperture; types of optical fibers; Losses in optical fibers - absorption losses, scattering losses and bending losses; Applications of optical fibers - Communications, Level Sensor, LASER angioplasty.

Module – V: Electromagnetic Theory **[10 Periods]**
Gradient of Scalar field; Divergence and Curl of Vector field and their Physical Significance; Gauss's Law of electrostatics and Gauss law of magnetostatics; Ampere's law and its modification; Faraday's law of electromagnetic induction; Induced E.M.F in a conductor; Lenz's Law; Maxwell equations in differential form; wave equation for free space.

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Course Outcomes:

At the end of the course, student will be able to

1. Explain the dual nature of the matter and evaluate the energy of a particle trapped in 1D infinite potential well.
2. Classify the materials into conductors, semiconductors and insulators based on the outcomes of Kronig - Penney model.
3. Analyze the working of semiconductor devices like PN junction diode, LED and Solar cell.
4. Explain the working of three LASERs.
5. Explain the applications of LASER and optical fibers.
6. Apply the basic knowledge of electromagnetic principles on different applications in electromagnetic devices.

Text Books:

1. K Vijaya Kumar, S Chandralingam, "Modern Engineering Physics'' Volume I & II, S. Chand, 1st Edition, 2017.
2. Jasprit Singh, "Semiconductor Optoelectronics: Physics and Technology", McGraw-Hill, 1995.
3. B K Pandey and S. Chaturvedi, "**Engineering Physics**" Cengage Learning India Revised Edition, 2014.

Reference Books:

1. P K Palanisamy, **"Engineering Physics"**, SciTech Publication, 4th Edition, 2014.
2. R K Gaur and SL Gupta, "**Engineering Physics**" Dhanpat Rai Publications, Eighth Revised Edition, 2006.
3. D K Bhattacharya, Poonam Tandon, "**Engineering Physics**", Oxford University Press, 1st Edition, 2015.
4. P. Bhattacharya, "**Semiconductor Optoelectronic Devices**", Prentice hall of India,1997.
5. S J Adams, "Electromagnetic Theory", Adams Press, 2013.

e-RESOURCES

1. https://www.researchgate.net/publication/259574083_Lecture_Notes_on_Engineering_Physics
2. https://www.livescience.com/33816-quantum-mechanics-explanation.html
3. https://nptel.ac.in/courses/115/102/115102025/

Journals :

1. http://www.springer.com/physics/theoretical%2C+mathematical+%26+computational+physics/journal/40094
2. http://www.springer.com/physics/journal/340

NPTEL VIDEOS:

1. http://nptel.ac.in/courses/113104012/
2. https://www.youtube.com/watch?v=9seDKvbaoHU&list=PLzJaFd3A7DZse2tQ2qUFChSiCj7jBidO0&index=29
3. https://nptel.ac.in/courses/108/108/108108122/
4. https://nptel.ac.in/courses/115/101/115101005/

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2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: A0B12	Engineering Physics (Common for ME, CE and M Eng.)	L	T	P
Credits: 4		3	1	-

Prerequisites: Fundamentals of Physics

Course Objectives:

The main objective of this course is to provide the basic physics principles, would help engineers to understand the tools and techniques used in the industry and provide the necessary foundations for inculcating innovative approaches. This would create awareness about the vital role played by science and engineering in the development of new technologies.

Module – I: Waves and Oscillations **[10 Periods]**

Simple harmonic Oscillator; damped harmonic oscillator; types of damping – heavy, critical and light damping; energy decay in a damped harmonic oscillator; relaxation time, quality factor; Forced harmonic Oscillator; electrical and mechanical analogy for a simple oscillator.

Module – II **[12 Periods]**

Acoustics: Introduction, Reverberation and Reverberation time; Basic requirements of acoustically good hall; Absorption coefficient, Jaeger's method for derivation of Sabine's formula; factors affecting the architectural acoustics and their remedies.

Ultrasonics: Introduction, Production of Ultrasonic Waves - Piezo Electric Effect, Inverse piezo electric effect, Piezo-Electric crystal Method, Magnetostriction effect, Magnetostriction Method; Detection of Ultrasonic waves - Piezo Electric detector, Kundt's tube method, Sensitive Flame method and Thermal Detection Method; Applications of Ultrasonics - Medical, SONAR, Ultrasonic drilling and welding,

Module – III: LASERs and Optical Fibers **[10 Periods]**

LASER: Introduction, Characteristics of LASER; Absorption, spontaneous and Stimulated emission; Einstein's coefficients Derivation; population inversion; pumping mechanisms; Basic components of a laser system; three and four level laser systems; Ruby LASER; He-Ne LASER; Semiconductor diode LASER (Homo junction); Applications of LASER - Computers, Medical, Military.

Optical Fibers: Introduction to Optical fibers, total internal reflection; Acceptance angle, and acceptance cone; numerical aperture; types of optical fibers; Losses in optical fibers - absorption losses, scattering losses and bending losses; Applications of optical fibers - Communications, Level Sensor, LASER angioplasty.

Module – IV **[10 Periods]**

Non-destructive Testing: Introduction; Objectives of Non-destructive testing; Types of defects – Cracking, Spalling, Staining, Construction and Design defects, Honey combing, Dusting, Blistering, Rain damage; Methods of Non-destructive testing – Liquid penetrant testing, Magnetic particle testing, Ultrasonic inspection method and Radiography testing.

Module – V **[10 Periods]**

Dielectric Properties: Electric dipole, Dipole moment, Dielectric constant, Polarizability, Electric Susceptibility, Displacement Vector; Determination of dielectric constant by resonance method; Electronic, Ionic and Orientation Polarizations and Calculation of Polarizabilities Electronic and ionic; Internal field (qualitative treatment); Clausius-mossotti equation; Applications of Dielectric materials.

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Nanomaterials: Introduction to nanomaterials, Types of nano materials; factors affecting the properties of nano materials - surface area to volume ratio and Quantum confinement effect; Properties of nano materials; Synthesis of nanomaterials - Sol-gel and Chemical vapour deposition method; Applications of Nanomaterials.

Course Outcomes:

At the end of the course, student will be able to

1. Distinguish free, damped and forced vibrations.
2. Using the knowledge of acoustics in designing acoustically important buildings and ultrasonics for designing materials.
3. Understand the concepts and applications of LASER and Optical fibers.
4. Apply the knowledge of Ultrasonic to understand non-destructive testing.
5. Understand the importance of dielectric and nanomaterials and their properties.

Text Books:

1. M N Avadhanulu, P G Kshirsagar, "**A Textbook of Engineering Physics**", Revised Edition 2014.
2. K Vijaya Kumar, S Chandralingam, "**Modern Engineering Physics**'' Volume I & II, S. Chand, 1st Edition, 2017.
3. B K Pandey and S. Chaturvedi, "**Engineering Physics**" Cengage Learning India Revised Edition, 2014.

References:

1. P K Palanisamy, "**Engineering Physics**", 4th Edition, SciTech Publications, 2014.
2. G Prasad and Bhimashankaram, "**Engineering Physics**", B S Publications, 3rd Edition, 2008.
3. M.K.Verma, "Introduction to Mechanics", Universities Press.
4. Ajoy Ghatak, "Optics", McGraw-Hill Education, 2012

e-RESOURCES

1. http://www.gistrayagada.ac.in/gist_diploma/PHYSICS-StudyMaterial.pdf
2. http://www.faadooengineers.com/threads/3300-Applied-Physics-Ebooks-pdf-free-download?s=1b6cb6b1de4e7152298bd9d60156cd11

Journals:

1. http://aip.scitation.org/journal/jap
2. http://www.springer.com/physics/journal/340

NPTEL VIDEOS:

1. http://nptel.ac.in/courses/115106061/13
2. https://nptel.ac.in/courses/115/106/115106119/

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