



CURRICULUM -2020

(C-20)

3 YEAR (REGULAR)

DIPLOMA IN MINING ENGINEERING

**STATE BOARD OF TECHNICAL EDUCATION AND TRAINING
Andhra Pradesh :: AMARAVATI**

CURRICULUM -2020
(C-20)
FOR DIPLOMA COURSES IN ANDHRA PRADESH CURRICULUM- C 20

PREAMBLE

The proposed programme intends to develop a skilled technician to support the industries both nationally or globally. It also helps to kindle the spirit of entrepreneurship with necessary skills and theoretical inputs aligning with the State Board of Technical Education and Training, (SBTET) AP, has been offering Diploma programmes to meet the above said National policy of 'Make in India'. The programme also provides for accomplishing higher education goals for those who wish to enrich their theoretical concepts further.

Aspirations of the stake holders: industries, students, academia, parents and the society at large. As such, it has been the practice of SBTET, A.P., to keep the curriculum abreast with the advances in technology through systematic and scientific analysis of current curriculum and bring out an updated revised version at regular intervals. Accordingly the SBTET, AP under the aegis of the Department of Technical Education, Andhra Pradesh in its 57th Board Meeting held on 05-02-2019 (vide item no: 18) resolved to update the Polytechnic Curriculum C-16 with the guidance of National Institute of Technical Teachers Training & Research (NITTTR), Extension Centre, Vijayawada (ECV), to be implemented with effect from the academic year '20-21.

Analysis of Curriculum C-16 (SWOT analysis) started in the month of June-2019. Feedback was collected from all stake holders: Students, Lecturers, Senior Lecturers, Head of Sections and Principals for all programmes for this purpose. A series of workshops with subject experts followed in the subsequent weeks and the draft curricula were prepared for every programme. Finally, an interactive session with representatives from industries, academia and subject experts was held on 04.01.2020 for thorough perusal and critique of draft curricula; and the suggestions received thus received from Industrialists and academia have been recorded , validated by another set of experienced subject teachers from the Department of Technical education for incorporation into the Curriculum C-20.

The design of new Curricula for the different diploma programmes has thus been finalised with the active participation of the members of the faculty teaching in the Polytechnics of Andhra Pradesh, and duly reviewed by Expert Committee constituted of academicians and representatives from industries. Thus, the primary objective of the curriculum change is to produce employable technicians in the country by correlating the growing needs of the industries with relevant academic input.

The outcome based approach as given by NBA guidelines has been followed throughout the design of this curriculum is designed to meet the requirements of NBA Accreditation, too.

The revised New Curriculum i.e., Curriculum–2020 (C-20) is approved by BoG of SBTET for its implementation with effect from 2020-21.

Highlights of Curriculum C-20:

1. Duration of course for regular Diploma and for sandwich Diploma is 3 years and 3½ years respectively.
2. The Curriculum is prepared in Semester Pattern. However, First Year is maintained as Year-wise pattern.
3. 6 Months Industrial training has been introduced for 3 years Diploma Courses and 1 year Industrial Training is introduced for 3 ½ years Sandwich Diploma courses.
4. Updated subjects relevant to the industry are introduced in all the Diploma courses.
5. CISCO course content has been incorporated into the ECE and CME programmes for certification from CISCO in lieu of industrial training when students are unable to get Industrial Training placement in any industry.
6. The policy decisions taken at the State and Central level with regard to environmental science are implemented by including relevant topics in Chemistry. This is also in accordance with the Supreme Court guidelines issued in Sri Mehta's case.
7. Keeping in view the increased need of communication skills which is playing a major role in the success of Diploma Level students in the Industries, emphasis is given for learning and acquiring listening, speaking, reading and writing skills in English. Further as emphasized in the meetings, Communication Skills lab and Life Skills lab are continuing for all the branches.
8. CAD specific to the branch has been given emphasis in the curriculum. Preparing drawings using CAD software has been given more importance.
9. Upon reviewing the existing C-16 curriculum, it is found that the theory content is found to have more weightage than the Practical content. In C-20 curriculum, more emphasis is given to the practical content in Laboratories and Workshops, thus strengthening the practical skills.
10. With increased emphasis for the student to acquire Practical skills, the course content in all the subjects is thoroughly reviewed and structured as outcome based than the conventional procedure based.
11. Curricula of Laboratory and Workshops have been thoroughly revised based on the suggestions received from the industry and faculty, for better utilization of the equipment available in the Polytechnics. The experiments /exercises that are chosen for the practical sessions are identified to confirm to the field requirements of industry.
12. An exclusive section for assessing Higher order Thinking skills (HOTS) has been introduced in summative evaluation.

Acknowledgements:

It is pertinent to acknowledge the support of the following in the making of Curriculum C-20.

A series of workshops in three phases were conducted by NITTTR, AP Extension Centre, Vijayawada involving faculty from Polytechnics, Premier Engineering Colleges & Industries to analyze the Previous C-16 Curriculum and to design C-20 Curriculum under the guidance of Dr C. R. Nagendra Rao, Professor & Head, NITTTR-ECV. The efforts & support extended by NITTTR to bring out final Curriculum C-20 by incorporating needs, aspiration & expectations of all stake holders is highly appreciated and gratefully acknowledged.

The Members of the working group are grateful to Sri M.M. Nayak, I.A.S., Special Commissioner of Technical Education & Chairman of SBTET, AP. and Sri. G. Anantha Ramu, I.A.S., Principal Secretary, Department of Skill Development and Training for their guidance and valuable inputs during process of revising, modifying and updating the Curriculum C-20.

The Members acknowledge with thanks the guidance & inspiration provided by Sri. V.S. Dutt, Secretary, SBTET, Andhra Pradesh and other officials of Directorate of Technical Education and the State Board of Technical Education, Andhra Pradesh, experts from industry, academia from the universities and higher learning institutions and all teaching fraternity from the Polytechnics who are directly or indirectly involved in preparation of the curricula.

RULES AND REGULATIONS OF C-20 CURRICULUM

1 DURATION AND PATTERN OF THE COURSES:

All the Diploma programs run at various institutions are of AICTE approved 3 years or 3½ years duration of academic instruction.

All the Diploma courses are run on year wise pattern in the first year, and the remaining two or two & half years are run in the semester pattern. In respect of few courses like Diploma in Bio-Medical course, the training will be in the seventh semester. Run-through system is adopted for all the Diploma Courses, subject to eligibility conditions.

2 PROCEDURE FOR ADMISSION INTO THE DIPLOMA COURSES:

Selection of candidates is governed by the Rules and Regulations laid down in this regard from time to time.

- a) Candidates who wish to seek admission in any of the Diploma courses will have to appear for the Common Entrance Test for admissions into Polytechnics (POLYCET) conducted by the State Board of Technical Education and Training, Andhra Pradesh, Vijayawada.
Only the candidates satisfying the following requirements will be eligible to appear for the Common Entrance Test for admissions into Polytechnics (POLYCET).
- b) The candidates seeking admission should have appeared for S.S.C examination, conducted by the Board of Secondary Education, Andhra Pradesh or equivalent examination thereto, at the time of applying for the Common Entrance Test for admissions into Polytechnics (POLYCET). In case of candidates whose results of their Qualifying Examinations is pending, their selection shall be subject to production of proof of their passing the qualifying examination in one attempt or compartmentally at the time of admission.
- c) Admissions are made based on the merit obtained in the Common Entrance Test (POLYCET) and the reservation rules stipulated by the Government of Andhra Pradesh from time to time.
- d) For admission into the following Diploma Courses for which entry qualification is 10+2, candidates need not appear for POLYCET. A separate notification will be issued for admission into these courses.
 - i). D.HMCT ii).D. Pharmacy

3 MEDIUM OF INSTRUCTION

The medium of instruction and examination shall be English.

4 PERMANENT IDENTIFICATION NUMBER (PIN)

A cumulative / academic record is to be maintained of the Marks secured in sessional work and end examination of each year for determining the eligibility for promotion etc., A Permanent Identification Number (PIN) will be allotted to each admitted candidate to maintain academic records.

5 NUMBER OF WORKING DAYS PER SEMESTER / YEAR:

- a) The Academic year for all the Courses shall be in accordance with the Academic Calendar.
- b) The Working days in a week shall be from Monday to Saturday
- c) There shall be 7 periods of 50 minutes duration each on all working days.
- d) The minimum number of working days for each semester / year shall be 90 / 180 days excluding examination days. If this prescribed minimum is not achieved due to any reason, special arrangements shall be made to conduct classes to complete the syllabus.

6 ELIGIBILITY (ATTENDANCE TO APPEAR FOR THE END EXAMINATION):

- a) A candidate shall be permitted to appear for the end examination in all subjects, if he or she has attended a minimum of 75% of working days during the year/Semester.
- b) Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester or 1st year may be granted on medical grounds.
- c) A stipulated fee shall be payable towards condonation for shortage of attendance.
- d) Candidates having less than 65% attendance shall be detained.
- e) Students whose shortage of attendance is not condoned in any semester / 1st year and not paid the condonation fee in time are not eligible to take their end examination of that class and their admissions shall stand cancelled. They may seek re-admission for that semester / 1st year when offered in the next subsequent academic semester/year.
- f) For INDUSTRIAL TRAINING:
 - i) During Industrial Training the candidate shall put in a minimum of 90% attendance.
 - ii) If the student fails to secure 90% attendance during industrial training, the student shall reappear for 6 months industrial training at his own expenses.

7 READMISSION

Readmission shall be granted to eligible candidates by the respective Principal/ Regional Joint Director.

- a) (i) Within 15 days after commencement of class work in any semester (Except Industrial Training).
(ii) For Industrial Training: before commencement of the Industrial training.
- b) Within 30 days after commencement of class work in any year (including D. Pharmacy course or first year course in Engineering and Non Engineering Diploma streams).
Otherwise such cases shall not be considered for readmission for that semester / year and are advised to seek readmission in the next subsequent eligible academic year.
The percentage of attendance of the readmitted candidates shall be calculated from the first day of beginning of the regular class work for that year / Semester, as officially announced by CTE/SBTET but not from the day on which he/she has actually reported to the class work.

8 SCHEME OF Evaluation

a) First Year

THEORY Courses: Each Course carries Maximum marks of 80 with examination of 3 hours duration, along with internal assessment for Maximum of 20 marks. (Sessional marks). However, there are no minimum marks prescribed for sessionals.

Laboratory Courses: There shall be 40 Marks for internal assessment i.e. sessional marks for each practical Course with an end examination of 3 hours duration carrying 60 marks. However, there are no minimum marks prescribed for sessionals.

b) III, IV, V, VI and VII Semesters:

THEORY Courses: End semester evaluation shall be of 3 hours duration and for a maximum of 80 marks.

Laboratory Courses: Each Course carry 60/30 marks of 3hours duration 40/20 sessional marks.

9 INTERNAL ASSESSMENT SCHEME

- a) **Theory Courses:** Internal assessment shall be conducted for awarding sessional marks on the dates specified. **Three unit tests shall be conducted for I year students and two Unit Tests for semesters.**

Internal Assessment shall be of 90 minutes duration and for a maximum of 40 marks. For each test

The average of marks of all the test, reduced to 20 shall be taken as final sessional in any case.

- b) **Practical Courses:**

(i) Drawing Courses:

The award of sessional marks for internal Assessment shall be as given in the following table

Distribution of Marks for the Internal Assessment Marks			
First Year (Total:40 Marks)		Semesters (Total:40 Marks)	
Max:20 Marks	Max:20 Marks	Max:20 Marks	Max:20 Marks
From the Average of THREE Unit Tests.	From the Average of Assessment of Regular Class work Exercises.	From the Average of TWO Unit Tests.	From the Average of Assessment of Regular Class work Exercises.

All Drawing exercises are to be filed in **serial order** and secured for further scrutiny by a competent authority

(ii) Laboratory Courses:

Student's performance in Laboratories / Workshop shall be assessed during the year/ semester of study for 40 marks in each practical Course.

Evaluation for Laboratory Courses, other than Drawing courses:

- i. Instruction (teaching) in laboratory courses (except for the course on Drawing) here after shall be task/competency based as delineated in the Laboratory sheets, prepared by SBTET, AP & NITTTR- ECV and posted in SBTET website.
 - ii. Internal assessment for Laboratory shall be done on the basis of task/s performed by the student as delineated in the laboratory sheets, prepared by SBTET, AP & NITTTR- ECV and posted in AP, SBTET website.
 - iii. Question paper for End semester Evaluation shall also be task/s based and shall be prepared and distributed by SBTET as done in case of theory courses be prepared as per SBTET rules in vogue.
- c) Internal assessment in Labs / workshops / Survey field work etc., during the course of study shall be done and sessional marks shall be awarded by the concerned Teacher.
- d) For practical examinations, except in drawing, there shall be two examiners. External examiner shall be appointed by the Principal in consultation with respective Head of Section preferably choosing a qualified person from in the order of preference.
- i) Nearby Industry
 - ii) Govt / Semi Govt organization like R & B, PWD, PR, Railways, BSNL, APSRTC, APSEB etc.,
 - iii) Govt / University Engg College.
 - iv) HoDs from Govt. Polytechnic
- Internal examiner shall be the person concerned with internal assessment as in (c) above. The end examination shall be held along with all theory papers in respect of drawing.
- e) Question Paper for Practicals: Question paper should cover (the experiments / exercise prescribed to test various) skills like handling, manipulating, testing, trouble shooting, repair, assembling and dismantling etc., from more than one experiment / exercise.
- f) Records pertaining to internal assessment marks of both theory and practical Courses are to be maintained for official inspection.
- g) **In case of Diploma programs *having* Industrial Training, Internal Assessment and Summative Evaluation**, shall be done as illustrated in the following table:

Assessment no	Upon completion of	By	Based on	Max Marks
1	12 weeks	1.The faculty concerned and	Learning outcomes as given in the scheme of assessment ,for Industrial Training	120
2	20-22 weeks	2. Training Mentor of the industry		120
3.Final summative Evaluation	23 week	1.The faculty member concerned,	1.Demonstration of any one of the skills listed in learning outcomes	30
		2.HoD concerned and	2.Training Report	20
		3.An external examiner	3.Viva Voce	10
TOTAL				300

10 MINIMUM PASS MARKS

THEORY EXAMINATION:

For passing a theory Course, a candidate has to secure a minimum of 35% in end examination and a combined minimum of 35% of both Sessional and end examination marks put together.

PRACTICAL EXAMINATION:

For passing a practical Course, a candidate has to secure a minimum of 50% in end examination and a combined minimum of 50% of both sessional and practical end examination marks put together. In case of D.C.C.P., the pass mark for typewriting and short hand is 45% in the end examination. There are no sessional marks for typewriting and Shorthand Courses of D.C.C.P course.

INDUSTRIAL ASSESSMENT:

Pass marks is 50% in assessment at Industry (I and II assessments put together) and also 50% in final summative assessment at institution level

11. PROVISION FOR IMPROVEMENT

Improvement is allowed only after he / she has completed all the Courses from First Year to Final semester of the Diploma.

- a) Improvement is allowed in any 4 (Four) Courses of the Diploma.
- b) The student can avail of this improvement chance **ONLY ONCE**, that too within the succeeding two examinations after the completion of Diploma. However, the duration including Improvement examination shall not exceed **FIVE** years from the year of first admission.
- c) No improvement is allowed in Practical / Lab Courses or Project work or Industrial Training assessment. However, improvement in drawing Course(s) is allowed.
- d) If improvement is not achieved, the marks obtained in previous Examinations hold good.
- e) Improvement is not allowed in respect of the candidates who are punished under Mal-practice in any Examination.
- f) Examination fee for improvement shall be paid as per the notification issued by State Board of Technical Education and Training from time to time.
- g) All the candidates who wish to appear for improvement of performance shall deposit the original Marks Memos of all the years / Semesters and also original Diploma Certificate to the Board. If there is improvement in performance of the current examination, the revised Memorandum of marks and Original Diploma Certificate will be issued, else the submitted originals will be returned.

12. RULES OF PROMOTION FROM 1ST YEAR TO 3rd, 4th, 5th, 6th and 7th SEMESTERS:

A) For Diploma Courses of 3 Years duration

- i. A candidate shall be permitted to appear for first year examination provided he / she puts in 75% attendance (which can be condoned on Medical grounds upto 10%) i.e. attendance after condonation on Medical grounds should not be less than 65% and pay the examination fee.
- ii. A candidate shall be promoted to 3rd semester if he/she puts the required percentage of attendance in the first year and pays the examination fee. A candidate who could not pay the first year examination fee has to pay the promotion fee as prescribed by State Board of Technical Education and Training, AP from time to time before commencement of 3rd semester.
- iii. A candidate shall be promoted to 4th semester provided he/she puts the required percentage of attendance in the 3rd semester and pay the examination fee. A candidate, who could not pay the 3rd semester exam fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training AP from time to time before commencement of 4th semester.

A candidate is eligible to appear for the 4th semester examination if he/she

- a) Puts the required percentage of attendance in the 4th semester
- b) Should not have failed in more than four Courses in 1st year

For IVC & ITI Lateral Entry Students:

- a) A candidate is eligible to appear for the 4th semester examination if he/she puts the required percentage of attendance in the 4th semester
- b) A candidate is eligible to appear for the 4th semester examination if he/she clears at least two Courses in third semester.
- iv) A candidate shall be promoted to 5th semester provided he / she puts the required percentage of attendance in the 4th semester and pays the examination fee. A candidate, who could not pay the 4th semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 5th semester.

A candidate is eligible to appear for the 5th semester examination if he/she

- a) Puts the required percentage of attendance in the 5th semester
- b) Should get eligibility to appear for 4th Semester examination.

The first backlog exam in 5th semester will be conducted only in instant/supplementary diploma examination.

For IVC& ITI Lateral Entry students:

- a) Puts the required percentage of attendance in the 5th semester
- v) A candidate shall be sent to Industrial training provided he/she puts in the required percentage of attendance in the 4th semester and pay the examination fee/ promotion fee as prescribed by SBTET.

A candidate is eligible to appear for Industrial Training assessment (Seminar/Viva-voce)

- a) Puts the required percentage of attendance, ie., 90% in 6th semester Industrial Training.

For IVC & ITI Lateral Entry students:

- a) Puts the required percentage of attendance, ie., 90% in 6th semester Industrial Training.
- b) should get eligibility to appear for 5th Semester Examination.

B) For Diploma Courses of 3 ½ Years duration (MET/ CH/ CHPP/ CHPC/ CHOT/ TT):

- i. A candidate shall be permitted to appear for 1st year examination provided he / she puts in 75% attendance (which can be condoned on Medical grounds upto 10%) i.e. attendance after condonation on Medical grounds should not be less than 65% and pay the examination fee.
- ii. A candidate shall be promoted to 3rd semester if he/she puts the required percentage of attendance in the 1st year and pays the examination fee. A candidate who could not pay the 1st year examination fee has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 3rd semester.

- iii. A candidate shall be promoted to 4th semester provided he/she puts the required percentage of attendance in the 3rd semester and pay the examination fee. A candidate, who could not pay the 3rd semester exam fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 4th semester.

A candidate is eligible to appear for the 4th semester exam if he/she

- a). Puts the required percentage of attendance in the 4th semester
- b). Should not have failed in more than Four backlog Courses of 1st year.

For IVC & ITI Lateral Entry students:

- a) Puts the required percentage of attendance in the 4th semester
- iv. A candidate shall be promoted to 5th semester industrial training provided he / she puts the required percentage of attendance in the 4th semester and pays the examination fee. A candidate, who could not pay the 4th semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 5th semester.
- v. Promotion from 5th to 6th semester is automatic (i.e., from 1st spell of Industrial Training to 2nd spell) provided he/she puts the required percentage of attendance, which in this case ie.,90 % of attendance and attends for the VIVA-VOCE examination at the end of training.
- vi. A candidate shall be promoted to 7th semester provided he / she puts the required percentage of attendance in the 6th semester and pays the examination fee. A candidate, who could not pay the 6th semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 7th semester.
- vii. A candidate shall be promoted to 7th semester of the course provided he/she has successfully completed both the spells of Industrial Training.

A candidate is eligible to appear for 7th semester examination if he/she

- a) Puts in the required percentage of attendance in the 7th semester
- b) Should get eligibility to appear for 4th semester Examination.

For IVC & ITI Lateral Entry students:

- a) Puts in the required percentage of attendance in the 7th semester
- b) Should not have failed more than four backlog Courses of 3rd Semester

C) For Diploma Courses of 3 ½ Years duration (BM):

The same rules which are applicable for conventional courses also apply for this course. The industrial training in respect of this course is restricted to one semester (6 months) after the 6th semester (3 years) of the course.

- i. A candidate shall be permitted to appear for first year examination provided he / she puts in 75% attendance (which can be condoned on Medical grounds upto 10%) i.e. attendance after condonation on Medical grounds should not be less than 65% and pay the examination fee.

- ii. A candidate shall be promoted to 3rd semester if he/she puts the required percentage of attendance in the first year and pays the examination fee. A candidate who could not pay the first year examination fee has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 3rd semester.
- iii. A candidate shall be promoted to 4th semester provided he/she puts the required percentage of attendance in the 3rd semester and pay the examination fee. A candidate who could not pay the 3rd semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 4th semester.

A candidate is eligible to appear for the 4th semester examination if he/she

- a) Puts in the required percentage of attendance in the 4th semester
- b) Should not have failed in more than Four backlog Courses of 1st year

For IVC & ITI Lateral Entry Students:

A candidate is eligible to appear for the 4th semester examination if he/she puts the required percentage of attendance in the 4th semester

- iv. A candidate shall be promoted to 5th semester provided he / she puts the required percentage of attendance in the 4th semester and pays the examination fee. A candidate, who could not pay the 4th semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 5th semester.

A candidate is eligible to appear for the 5th semester exam if he/she

- a) Puts in the required percentage of attendance in the 5th semester.
- b) Should get eligibility to appear for 4th Semester examination.

For IVC & ITI Lateral Entry students:

- a) Puts in the required percentage of attendance in the 5th semester.
- b) Should not have failed in more than Four backlog Courses of 3rd Semester.

- v. A candidate shall be promoted to 6th semester provided he/she puts in the required percentage of attendance in the 5th semester and pays the examination fee. A candidate who could not pay the 5th semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 6th semester.

A candidate is eligible to appear for 6th semester examination

- a) Puts in the required percentage of attendance in 6th semester and
- b) Should get eligibility to appear for 4th Semester Examination.

For IVC & ITI Lateral Entry students:

- a) Puts in the required percentage of attendance in 6th semester.
- b) Should get eligibility to appear for 5th Semester Examination.

- vi. A candidate shall be promoted to 7th semester provided he/she puts in the required percentage of attendance in 6th semester and pay the examination fee. A candidate, who could not pay the 6th semester examination fee, has to pay the promotion fee prescribed by SBTET from time to time before commencement of the 7th semester (Industrial Training). A candidate is eligible to appear for 7th semester Industrial Training assessment (Seminar/Viva-voce) if he/she
- a) Puts in the required percentage of attendance, ie., 90% in 7th semester Industrial Training
 - b) Should get eligibility to appear for 4th Semester Examination.

For IVC & ITI Lateral Entry students:

- a) Puts in the required percentage of attendance, ie., 90% in 7th semester Industrial Training.
- b) Should get eligibility to appear for 5th Semester Examination.

Important Note:

Seminar/Viva-voce should not be conducted for Not-Eligible Candidates, till the candidate gets eligibility. However, the record of internal Assessment for Industrial Training for 260 marks shall be maintained at Institution Level for all candidates and the data is to be uploaded only for eligible candidates. For not eligible candidates the data is to be uploaded as and when the candidate gets eligibility.

OTHER DETAILS

- a) In case a candidate does not successfully complete the Industrial training, he / she will have to repeat the training at his / her own cost.
- b) The First spell of Industrial training shall commence 10 days after the completion of the last theory examination of 4th Semester.
- c) The Second spell of Industrial training shall commence within 10 days after the completion of first spell of Industrial training.

13. STUDENTS PERFORMANCE EVALUATION

Successful candidates shall be awarded the Diploma under the following divisions of pass.

- a) First Class with Distinction shall be awarded to the candidates who secure an overall aggregate of 75% marks and above.
- b) First Class shall be awarded to candidates who secure overall aggregate of 60% marks and above and below 75% marks.
- c) Second Class shall be awarded to candidates who secure a pass with an overall aggregate of below 60%.

- i. The Weightage of marks for various year/Semesters which are taken for computing overall aggregate shall be 25% of I year marks + 100% of 3rd and subsequent Semesters.
 - ii. In respect IVC & ITI Lateral Entry candidates who are admitted directly into diploma course at the 3rd semester (i.e., second year) level the aggregate of (100%) marks secured at the 3rd and subsequent semesters of study shall be taken into consideration for determining the overall percentage of marks secured by the candidates for award of class/division.
- d) Second Class shall be awarded to all students, who fail to complete the Diploma in the regular 3 years/ 3 ½ years and four subsequent examinations, from the year of first admission.

14. EXAMINATION FEE SCHEDULE:

The examination fee should be as per the notification issued by State Board of Technical Education and Training, AP from time to time.

15. STRUCTURE OF EXAMINATION QUESTION PAPER:

I. Formative assessment (Internal examination)

a) For theory Courses:

Three unit tests for first year and two unit tests for semesters shall be conducted with a duration of 90 minutes for each test for maximum marks of 40. It consists of part A and Part B.

Part A contains five questions and carries 16 marks. Among these five questions first question consists of four objective items like one word or phrase answer/filling-in the blanks/true or false etc. with one mark for each question. The other four questions are short answer questions and carry three marks each.

Part B carries 24 marks and consists of three questions with internal choice i.e., Either/Or type, and each question carries 8 marks.

The sum of marks of 3 tests for I year and 2 tests for semesters shall be reduced to 20 marks in each Course for arriving at final sessional marks.

b) For drawing Courses:

For I year:

Three unit tests with duration of 90 minutes and for maximum marks of 40 marks shall be conducted for first year. It consists of part A and Part B.

Part A consists four questions for maximum marks of 16 and each question carries four marks (4×4 marks=16 marks).

Part B carries maximum marks of 24 and consists of five questions while the student shall answer any three questions out of these five questions. Each question in this part carries a maximum marks of 8, (3×8 marks=24 marks).

The sum of marks obtained in 3 unit test marks shall be reduced to 20 marks for arriving at final sessional marks. Remaining 20 marks are awarded by the Course teacher based on the student's performance during regular class exercise.

For semester: Two unit tests with duration of 90 minutes and for maximum marks of 40 marks shall be conducted. The sum of marks obtained in 2 unit test marks shall be reduced to 20 marks for arriving at final sessional marks. Remaining 20 marks are awarded by the Course teacher based on the student's performance during regular class exercise

c) For Laboratory /workshop: 50% of total marks for the Course shall be awarded based on continuous assessment of the student in laboratory/workshop classes and the remaining 50% shall be based on the sum of the marks obtained by the students in two tests.

II. Summative assessment (End examination)

The question paper for theory examination is patterned in such a manner that the Weightage of periods/marks allotted for each of the topics for a particular Course be considered. End Examination paper is of 3 hours duration.

a) Each theory paper consists of Section 'A', 'B' and 'C'.

Section 'A' with Max marks of 30, contains 10 short answer questions. All questions are to be answered and each carries 3 marks, i.e., $10 \times 3 = 30$.

Section 'B' with Max marks of 40 contains 5 essay type questions including Numerical questions (without any divisions in the question), with internal choice(Either/or type), each carrying 8 marks, i.e., Max. Marks: $5 \times 8 = 40$.

Section 'C' with Max marks of 10 contains single essay type, Higher order Thinking skills question (HoTs)including Numerical questions, without choice (without any divisions in the question),

Thus the total marks for theory examination shall be: 80.

b) For Engineering Drawing Course (107) consist of section 'A' and section 'B'.

Section 'A' with max marks of 20, contains four (4) questions. All questions in section 'A' are to be answered to the scale and each carries 5 marks, ie. $4 \times 5=20$.

Section 'B' with max marks of 40, contains six (6) questions. The student shall answer any four (4) questions out of the above six questions and each question carries 10 Marks, ie. $4 \times 10 = 40$.

c) Practical Examinations

For Workshop practice and Laboratory Examinations, Each student has to pick up a question paper distributed by Lottery System.

Max. Marks for an experiment / exercise : 50

Max. Marks for VIVA-VOCE : 10

Total Max. Marks : 60

In case of practical examinations with 50 marks, the marks shall be distributed as

Max. Marks for an experiment / exercise : 25

Max. Marks for VIVA-VOCE : 05

Total Max. Marks : 30

In case of any change in the pattern of question paper, the same shall be informed sufficiently in advance to the candidates.

d) Note: Evaluation for Laboratory Courses, other than Drawing courses:

- I. Instruction (teaching) in laboratory courses (except for the course on Drawing) hereafter shall be task/competency based as delineated in the Laboratory sheets, prepared by SBTET, AP and posted in its website.
- II. Internal assessment for Laboratory shall be done on basis of task/s performed by the student as delineated in the laboratory sheets, prepared by SBTET, AP and posted in its website.
- III. Question paper for End semester Evaluation shall be prepared as per SBTET rules in vogue.

16. ISSUE OF MEMORANDUM OF MARKS

All candidates who appear for the end examination will be issued memorandum of marks without any payment of fee. However candidates who lose the original memorandum of marks have to pay the prescribed fee to the Secretary, State Board of Technical Education and Training, A.P. for each duplicate memo from time to time.

17. MAXIMUM PERIOD FOR COMPLETION OF DIPLOMA Programmes:

Maximum period for completion of the diploma courses is twice the duration of the course from the date of First admission (includes the period of detention and discontinuation of studies by student etc.) failing which they will have to forfeit the claim for qualifying for the award of Diploma (They will not be permitted to appear for examinations after that date). This rule applies for all Diploma courses of 3 years and 3 ½ years of engineering and non-engineering courses.

18. ELIGIBILITY FOR AWARD OF DIPLOMA

A candidate is eligible for award of Diploma Certificate if he / she fulfil the following academic regulations.

- i. He / She pursued a course of study for not less than 3 / 3 ½ academic years & not more than 6 / 7 academic years.
- ii. He / she have completed all the Courses.
Students who fail to fulfil all the academic requirements for the award of the Diploma within 6 / 7 academic years from the year of admission shall forfeit their seat in the course & their seat shall stand cancelled.

For IVC & ITI Lateral Entry students:

- i. He / She pursued a course of study for not less than 2 / 2 ½ academic years & not more than 4 / 5 academic years.
- ii. He / she has completed all the Courses.
Students who fail to fulfil all the academic requirements for the award of the Diploma within 4 / 5 academic years from the year of admission shall forfeit their seat in the course & their seat shall stand cancelled.

19. ISSUE OF PHOTO COPY OF VALUED ANSWER SCRIPT, RECOUNTING& REVERIFICATION:

A) FOR ISSUE OF PHOTO COPIES OF VALUED ANSWER SCRIPTS

- I. A candidate desirous of applying for Photo copy of valued answer script/s should apply within prescribed date from the date of the declaration of the result.
- II. Photo copies of valued answer scripts will be issued to all theory Courses and Drawing Course(s).
- III. The Photo copy of valued answer script will be dispatched to the concerned candidate's address as mentioned in the application form by post.
- IV. No application can be entertained from third parties.

B) FOR RE-COUNTING(RC) and RE-VERIFICATION(RV) OF THE VALUED ANSWER SCRIPT

- i. A candidate desirous of applying for Re-verification of valued answer script should apply within prescribed date from the date of the declaration of the result.
- ii. Re-verification of valued answer script shall be done for all theory Courses' and Drawing Course(s).
- iii. The Re-verification committee constituted by the Secretary, SBTETAP with Course experts shall re-verify the answer scripts.

I. RE-COUNTING

The Officer of SBTET will verify the marks posted and recount them in the already valued answer script. The variations if any will be recorded separately, without making any changes on the already valued answer script. The marks awarded in the original answer script are maintained (hidden).

II. RE-VERIFICATION

- (i) The Committee has to verify the intactness and genuineness of the answer script(s) placed for Re-verification.
- (ii) Initially single member shall carry out the re-verification.
- (iii) On re-verification by single member, if the variation is less than 12% of maximum marks, and if there is no change in the STATUS in the result of the candidate, such cases will not be referred to the next level ie., for 2-Tier evaluation.
- (iv) On re-verification by a single member, if the variation is more than 12% of maximum marks, it will be referred to 2-Tier evaluation.
- (v) If the 2-Tier evaluation confirms variation in marks as more than 12% of maximum marks, the variation is considered as follows:
 - a) If the candidate has already passed and obtains more than 12% of the maximum marks on Re-verification, then the variation is considered.
 - b) If the candidate is failed and obtains more than 12% of the maximum marks on Re-verification and secured pass marks on re-verification, then the status of the candidate changes to PASS.
 - c) If a candidate is failed and obtains more than 12% of the maximum marks on Re-verification and if the marks secured on re-verification are still less than the minimum pass marks, the status of the candidate remain FAIL only.

- (vii) After Re-verification of valued answer script the same or change if any therein on Re-verification, will be communicated to the candidate.
- (viii) On Re-verification of Valued Answer Script if the candidate's marks are revised, the fee paid by the candidate will be refunded or else the candidate has to forfeit the fee amount.

Note: No request for Photo copies/ Recounting /Re-verification of valued answer script would be entertained from a candidate who is reported to have resorted to Malpractice in that examination.

20. MAL PRACTICE CASES:

If any candidate resorts to Mal Practice during examinations, he / she shall be booked and the Punishment shall be awarded as per SBTETAP rules and regulations in vogue.

21. DISCREPANCIES/ PLEAS:

Any Discrepancy /Pleas regarding results etc., shall be represented to the SBTETAP within one month from the date of issue of results. Thereafter, no such cases shall be entertained in any manner.

22. ISSUE OF DUPLICATE DIPLOMA

If a candidate loses his/her original Diploma Certificate and desires a duplicate to be issued he/she should produce written evidence to this effect. He / she may obtain a duplicate from the Secretary, State Board of Technical Education and Training, A.P., on payment of prescribed fee and on production of an affidavit signed before a First Class Magistrate (Judicial) and non-traceable certificate from the Department of Police. In case of damage of original Diploma Certificate, he / she may obtain a duplicate certificate by surrendering the original damaged certificate on payment of prescribed fee to the State Board of Technical Education and Training, A.P.

In case the candidate cannot collect the original Diploma within 1 year from the date of issue of the certificate, the candidate has to pay the penalty prescribed by the SBTET AP from time to time.

23. ISSUE OF MIGRATION CERTIFICATE AND TRANSCRIPTS:

The Board on payment of prescribed fee will issue these certificates for the candidates who intend to prosecute Higher Studies in India or Abroad.

24. The following specific changes are discussed and incorporated:

25. GENERAL

- i. The Board may change or amend the academic rules and regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students, for whom it is intended, with effect from the dates notified by the competent authority.
- ii. All legal matters pertaining to the State Board of Technical Education and Training, AP are within the jurisdiction of Vijayawada.
- iii. In case of any ambiguity in the interpretation of the above rules, the decision of the Secretary, SBTET, A.P is final.

C-20 Curriculum for DMNGE
With Industrial training in Semester VI

VISION

Develop Mining Engineering professionals competent to face the global challenges in a progressive environment conducive to learn technical knowledge, skills blended with ethics and values, to serve the society and to better it for a happy and comfortable living.

MISSION

M1	To provide a competitive learning environment, through a need based curriculum designed in collaboration with industry, conducive for high quality education emphasising on transfer of knowledge and skill development essential for the profession and the society as well.
M2	To nurture higher order leadership qualities and ethics and values in students to enable them to be leaders in their chosen professions while maintaining the highest level of ethics.
M3	Conduct of laboratories, guest lectures, industrial visits and industrial training for better understanding of critical concepts of Mining Engineering
M4	To foster effective interactions and networking with all the stake holders so as to work towards the growth and sustainability of the society and environment.

PROGRAMME OUTCOMES (POs)

1. **Basic and discipline specific knowledge:** Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the engineering problems.
2. **Problem analysis:** Identify and analyse well-defined engineering problems using codified standard methods.
3. **Design/Development of solutions:** Design solutions for well-defined technical problems and assist with the design of systems components or processes to meet specified needs .
4. **Engineering tools, Experimentation and Testing:** Apply modern engineering tools and appropriate technique to conduct standard tests and measurements.
5. **Engineering practices for society, sustainability and environment:** Apply appropriate technology in context of society, sustainability, environment and ethical practices.
6. **Project Management:** Use engineering management principles individually, as a team member or a leader to manage projects and effectively communicate about well defined engineering activities.
7. **Life-long learning:** Ability to analyse individual needs and engaging updating in the context of technological changes.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

1. An ability to apply disciplines - specific knowledge to solve core and/or applied Mining Engineering problems.
2. An ability to plan and perform experiments and practices and to use the results to solve Mining Engineering problems.

Apply appropriate technologies and tools with an understanding of the limitations

DIPLOMA IN MINING ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATIONS
I YEAR

Subject Code	Name of the Subject	Instruction period / week		Total Period / Sem	Scheme of Examination			
		Theory	Practical/Tutorial		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
THEORY								
MNG-101	English	3	-	90	3	20	80	100
MNG-102	Engineering Mathematics – I	5	-	150	3	20	80	100
MNG-103	Engineering Physics	4	-	120	3	20	80	100
MNG-104	Engineering Chemistry & Environmental Studies	4	-	120	3	20	80	100
MNG-105	Elements of Mining	6	-	180	3	20	80	100
MNG-106	Fundamentals of Geology	5	-	150	3	20	80	100
PRACTICAL								
MNG-107	Engineering Drawing	-	6	180	3	40	60	100
MNG-108	Workshop Practice	-	3	90	3	40	60	100
MNG-109	109-A Physics Lab	-	3	45	3	20	30	50
	109-B Chemistry Lab			45		20	30	50
MNG-110	Computer Fundamentals Practice	-	3	90	3	40	60	100
	TOTAL	27	15	1260		280	720	1000

**DIPLOMA IN MINING ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATIONS
III SEMESTER (SECOND YEAR)**

Subject Code	Name of the Subject	Instruction period / week		Total Period / Sem	Scheme of Examination			
		Theory	Practical/Tutorial		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
THEORY								
MNG-301	Engineering Mathematics – II	4	-	60	3	20	80	100
MNG-302	Basic Electrical Engineering	5	-	75	3	20	80	100
MNG-303	Basic Mechanical Engineering	5	-	75	3	20	80	100
MNG-304	Underground Coal Mining Methods	5	-	75	3	20	80	100
MNG-305	Mine Surveying-I	5	-	75	3	20	80	100
MNG-306	Mining Geology	5	-	75	3	20	80	100
PRACTICAL								
MNG-307	Basic Electrical Engineering Laboratory Practice	-	3	45	3	40	60	100
MNG-308	Basic Mechanical Engineering Laboratory Practice	-	3	45	3	40	60	100
MNG-309	Mine Surveying Practice –I	-	4	60	3	40	60	100
MNG-310	Mining Geology Laboratory Practice	-	3	45	3	40	60	100
	TOTAL	29	13	630		280	720	1000

**DIPLOMA IN MINING ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATIONS
IV SEMESTER (SECOND YEAR)**

Subject Code	Name of the Subject	Instruction period / week		Total Period / Sem	Scheme of Examination			
		Theory	Practical/Tutorial		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
THEORY								
MNG-401	Engineering Mathematics – III	3	-	45	3	20	80	100
MNG-402	Underground Metal Mining Methods	5	-	75	3	20	80	100
MNG-403	Mine Environmental Engineering	4	-	60	3	20	80	100
MNG-404	Mining Machinery-I	4	-	60	3	20	80	100
MNG-405	Mine Surveying – II	5	-	75	3	20	80	100
MNG-406	Surface Mining	5		75	3	20	80	100
PRACTICAL								
MNG-407	Mine Environmental Engineering Laboratory Practice	-	3	45	3	40	60	100
MNG-408	Communication Skills	-	3	45	3	40	60	100
MNG-409	Mine Surveying Practice - II	-	4	60	3	40	60	100
MNG-410	Mine Planning and Design Laboratory Practice	-	3	45	3	40	60	100
MNG-411	Mining Machinery Laboratory Practice		3	45	3	40	60	100
	TOTAL	26	16	630		320	780	1100

DIPLOMA IN MINING ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATIONS
V SEMESTER (THIRD YEAR)

Subject Code	Name of the Subject	Instruction period / week		Total Period / Sem	Scheme of Examination			
		Theory	Practical/Tutorial		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
THEORY								
MNG-501	Mine Management and Entrepreneurship	5	-	75	3	20	80	100
MNG-502	Mine Legislation and Safety	6	-	90	3	20	80	100
MNG-503	Mine Hazards and Rescue	5	-	75	3	20	80	100
MNG-504	Mining Machinery-II	6	-	90	3	20	80	100
MNG-505	Rock Mechanics and Strata Control	5	-	75	3	20	80	100
PRACTICAL								
MNG-506	Practical Training and Assessment*	-	1	07	1	20	30	50
MNG-507	Rock Mechanics Laboratory Practice	-	3	45	3	40	60	100
MNG-508	Life Skills	-	3	45	3	40	60	100
MNG-509	CAD Practice	-	3	45	3	40	60	100
MNG-510	Total Station Survey Practice	-	3	45	3	40	60	100
MNG-511	Project Work	-	2	38	2	20	30	50
	TOTAL	27	15	630		300	700	1000

*MNG 506 shall be scheduled for one single day for entire semester while framing the time table for class work.

MNG-601 INDUSTRIAL TRAINING

Assessment no	Upon completion of	By	Based on	Max Marks
1	12 weeks	1.The faculty concerned and 2. Training Mentor of the industry	Learning outcomes as given in the following scheme of assessment	120
2	20-22 weeks			120
3.Final summative Evaluation	23 week	1.The faculty member concerned, 2.HoD concerned and 3.An external examiner	1. Demonstration of any one of the skills listed in learning outcomes,other than S.No. 2	30
			2.Training Report	20
			3.Viva Voce	10
TOTAL				300

FIRST YEAR

DIPLOMA IN MINING ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATIONS
I YEAR

Subject Code	Name of the Subject	Instruction period / week		Total Period / Sem	Scheme of Examination			
		Theory	Practical/ Tutorial		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
THEORY								
MNG- 101	English	3	-	90	3	20	80	100
MNG-102	Engineering Mathematics – I	5	-	150	3	20	80	100
MNG-103	Engineering Physics	4	-	120	3	20	80	100
MNG-104	Engineering Chemistry & Environmental Studies	4	-	120	3	20	80	100
MNG-105	Elements of Mining	6	-	180	3	20	80	100
MNG-106	Fundamentals of Geology	5	-	150	3	20	80	100
PRACTICAL								
MNG-107	Engineering Drawing	-	6	180	3	40	60	100
MNG-108	Workshop Practice	-	3	90	3	40	60	100
MNG-109	109-A Physics Lab 109-B Chemistry Lab	-	3	45 45	3	20 20	30 30	50 50
MNG-110	Computer Fundamentals Practice	-	3	90	3	40	60	100
	TOTAL	27	15	1260		280	720	1000

English

Course Code	Course Title	No. of Periods/Week	Total No. of Periods	Marks for FA	Marks for SA
MNG-101	English	3	90	20	80

S. No.	Unit Title	No of Periods	COs Mapped
1	English for Employability	8	CO1, CO2, CO3, CO4
2	Living in Harmony	8	CO1, CO2, CO3, CO4
3	Connect with Care	8	CO1, CO2, CO3, CO4
4	Humour for Happiness	8	CO1, CO2, CO3, CO4
5	Never Ever Give Up!	8	CO1, CO2, CO3, CO4
6	Preserve or Perish	9	CO1, CO2, CO3, CO4
7	The Rainbow of Diversity	8	CO1, CO2, CO3, CO4
8	New Challenges- Newer Ideas	8	CO1, CO2, CO3, CO4
9	The End Point First!	8	CO1, CO2, CO3, CO4
10	The Equal Halves	8	CO1, CO2, CO3, CO4
11	Dealing with Disaster	9	CO1, CO2, CO3, CO4
Total Periods		90	

Course Objectives	To improve the skills of English Language use by enriching vocabulary and learning accurate structures for effective communication.
	To comprehend themes for value based living in professional and personal settings.

CO No.	Course Outcomes
CO1	Applies perceptions of themes related to societal responsibility of adolescents towards their surroundings.
CO2	Demonstrates knowledge of form and function of 'grammar items' and use them in both academic and everyday situations.
CO3	Demonstrates effective English communication skills with competence in listening, speaking, reading and writing in academic, professional and everyday contexts.
CO4	Displays positivity and values of harmonious living in personal and professional spheres as reflected through communication.

CO-PO Matrix

Course Code MNG-101	Course Title: English Number of Course Outcomes: 4				No. of Periods: 90
POs	Mapped with CO No.	CO Periods Addressing PO in Column 1		Level of Mapping (1,2,3)	Remarks
		Number	Percentage		
PO1		Not directly Applicable for English course, however activities that use content from science and technology relevant to the Programme taken up by the student shall be exploited for communication in the Course.			
PO2					
PO3					
PO4					
PO5	CO1, CO2, CO3, CO4	20	22		>50%: Level 3
PO6	CO1, CO2, CO3, CO4	52	58		21-50%: Level 2
PO7	CO1, CO2, CO3, CO4	18	20		Up to 20%: Level 1

Level 3 – Strongly Mapped

Level 2- Moderately Mapped

Level 1- Slightly Mapped

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1					✓	✓	✓
CO 2					✓	✓	✓
CO3					✓	✓	✓
CO 4					✓	✓	✓

NOTE: CO-PO groups shall be fulfilled through activities that use content from science and technology relevant to the Programme taken up by the student shall be exploited for communication in the Course.

PO5: Appropriate quiz programme may be conducted at intervals and duration as decided by concerned teacher.

PO6: Seminars on applications of mathematics in various engineering disciplines are to be planned and conducted.

PO7: Such activities are to be planned that students visit library to refer standard books on Mathematics and latest updates in reputed national and international journals, attending seminars, learning mathematical software tools.

Blue Print of Question Paper

S. No.	Name of the Unit	Periods Allocated	Weightage Allocated	Marks Wise Distribution of Weightage				Question Wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	English for Employability	8	17	3	8*			1	1*	1*		CO1, CO2, CO3, CO4
2	Living in Harmony	8		3				1				CO1, CO2, CO3, CO4
3	Connect with Care	8				3						CO1, CO2, CO3, CO4
4	Humour for Happiness	8	14		3	8*			1	1*		CO1, CO2, CO3, CO4
5	Never Ever Give Up!	8			3				1			CO1, CO2, CO3, CO4
6	Preserve or Perish	9	14		8*	3			1*	1		CO1, CO2, CO3, CO4
7	The Rainbow of Diversity	8				3					1	CO1, CO2, CO3, CO4
8	New Challenges - Newer Ideas	8	35		8*	8*+ 3+3+ 3	10*		1*	4	1*	CO1, CO2, CO3, CO4
9	The End Point First!	8										CO1, CO2, CO3, CO4
10	The Equal Halves	8										CO1, CO2, CO3, CO4
11	Dealing with Disasters	9										CO1, CO2, CO3, CO4
TOTAL		90	80	6	30	34	10	2	5	8	1	

PART-A: 10 Questions 3 marks each =30 Marks

All Questions are compulsory

: 60 minutes

PART-B: 5 Questions 8 marks each =40 Marks

Internal choice

: 90 minutes

Part-C: 1 Question 10 marks =10 Marks

(Higher Order Question)

No choice, one compulsory question : 30 minutes

NOTE: * indicates questions can be given from any of the corresponding lessons in the blue print.

Question Paper Pattern for Unit Tests

Part A: 16 marks: 4 questions with 1 mark each (FIB, True/false, one word/phrase, etc.)

4 questions with 3 marks each (short answer/ descriptive/ applicative questions)

Part B: 24 marks: 3 questions 8 marks each with internal choice

LEARNING OUTCOMES

1. English for Employability

- 1.1. Explain the need for improving communication in English for employability
- 1.2. Use adjectives and articles effectively while speaking and in writing
- 1.3. Write simple sentences

2. Living in Harmony

- 2.1. Develop positive self-esteem for harmonious relationships
- 2.2. Use affixation to form new words
- 2.3. Use prepositions and use a few phrasal verbs contextually

3. Connect with Care

- 3.1. Use social media with discretion
- 3.2. Speak about abilities and possibilities
- 3.3. Make requests and express obligations
- 3.4. Use modal verbs and main verbs in appropriate form
- 3.5. Write short dialogues for everyday situations

4. Humour for Happiness

- 4.1. Explain the importance of humour for a healthy living
- 4.2. Improve vocabulary related to the theme
- 4.3. Display reading and speaking skills
- 4.4. Frame sentences with proper Subject – Verb agreement
- 4.5. Explain the features of a good paragraph and learn how to gather ideas as a preliminary step for writing a good paragraph.

5. Never Ever Give Up!

- 5.1. Practice to deal with failures in life.
- 5.2. Use the present tense form for various every day communicative functions such as speaking and writing about routines, professions, scientific descriptions and sports commentary.
- 5.3. Write paragraphs with coherence and other necessary skills.

6. Preserve or Perish

- 6.1. Describe the ecological challenges that we face today and act to save the environment.
- 6.2. Narrate / Report past events.
- 6.3. Develop vocabulary related to environment.
- 6.4. Write e-mails.

7. The Rainbow of Diversity

- 7.1. Illustrate and value other cultures for a happy living in multi-cultural workspace
- 7.2. use different types of sentences
- 7.3. Ask for or give directions, information, instructions
- 7.4. Use language to express emotions in various situations
- 7.5. Write letters in various real life situations

8. New Challenges – Newer Ideas

- 8.1. Explain the functional difference between Active Voice and Passive Voice
- 8.2. Use Passive Voice to speak and write in various contexts
- 8.3. List the major parts and salient features of an essay
- 8.4. Explain latest innovations and get motivated

9. The End Point First!

- 9.1. Illustrate the importance of setting a goal in life
- 9.2. Report about what others have said both in speaking and writing
- 9.3. Write an essay following the structure in a cohesive and comprehensive manner
- 9.4. Apply the words related to Goal Setting in conversations and in life

10. The Equal Halves

- 10.1. Value the other genders and develop a gender-balanced view towards life
- 10.2. Identify the use of different conjunctions in synthesising sentences
- 10.3. Write various types of sentences to compare and contrast the ideas
- 10.4. Apply the knowledge of sentence synthesis in revising and rewriting short essays
- 10.5. Develop discourses in speech and writing

11. Dealing with Disasters

- 11.1. Speak and write about different kinds of disasters and the concept of disaster management
- 11.2. Generate vocabulary relevant to disaster management and use it in sentences
- 11.3. Analyze an error in a sentence and correct it
- 11.4. write different kinds of reports

Textbook: INTERACT (A Textbook for I Year English) - Published by SBTET, AP

Reference Books:

Martin Hewings	: Advanced Grammar in Use, Cambridge University Press
Murphy, Raymond	: English Grammar in Use, Cambridge University Press
Sidney Greenbaum	: Oxford English Grammar, Oxford University Press
Wren and Martin (Revised	
By N.D.V. Prasad Rao)	: English Grammar and Composition, Blackie ELT Books, S. Chand and Co.
Sarah Freeman	: Strengthen Your Writing, Macmillan

STATE BOARD OF TECHNICAL EDUCATION –A.P

C20- MNG-101-ENGLISH

UNIT TEST-1

Time: 90 minutes

Max. Marks: 40

PART-A

4X4= 16 marks

Instructions: Answer all the questions. Each question carries FOUR Marks.

1. Rewrite / Fill in the blank as directed. Each question carries ½ Mark. (CO2)
 - a) Write the antonym of 'cruel'
 - b) Write the synonym of 'love'
 - c) Give prefix to 'adventure'.
 - d) Give suffix to 'liberate'
 - e) It is _____ universal truth. (Fill in with suitable article)
 - f) The boy is fond _____ ice-cream. (Fill in the blank with proper preposition)
 - g) He _____ not like sweets. (Fill in the blank with correct primary auxiliary verb.)
 - h) We _____ respect our national flag. (Fill in with a proper modal verb)
2. Rewrite the sentences as directed. Each question carries One mark. 4X1=4 Marks (CO2)
 - a) No other metal is so useful as iron. (Change into superlative degree)
 - b) Very few students are so clever as Ramesh. (Change into comparative degree)
 - c) Guess the contextual meaning of the italicized word in the following sentence.
"The CBI officer has *interrogated* the bank employees in connection with the scam."
 - d) only sings plays Prasanth not also well but cricket. (Rearrange the jumbled words)
3. Fill in the blanks with proper form of the verb given in brackets. 4X1 = 4 marks (CO2)

The IPSGM _____(hold) in our college last month. Nearly all the colleges in our zone _____(participate) in the event. The prizes _____ (distribute) by the district collector. Next year, Government Polytechnic, Vijayawada _____ (conduct) the games meet.
4. Rewrite the following sentences after making necessary corrections: 4X 1= 4 Marks (CO3)
 - a) The police has arrested the culprit.
 - b) Three hundred miles are a long distance.
 - c) The Principal along with the Heads of Sections have visited the laboratories.
 - d) Either he or I is to blame.

PART-B

3X8=24 Marks

Instructions: Answer all the questions and each question carries EIGHT marks.

5. Write a dialogue of at least five turns between a shopkeeper and customer about buying a mobilephone. (CO3)
6. Make an analysis and write a paragraph in around 100 words about your strengths and weaknesses in learning and using English and also the measures to improve it. (CO3)
7. Write a paragraph in about 100 words on how to overcome low esteem and negativity. (CO3, CO4)

STATE BOARD OF TECHNICAL EDUCATION –A.P
C20-MNG-101-ENGLISH
UNIT TEST-II

Time: 90 minutes

Max. Marks: 40

PART-A

4X4= 16 Marks

Instructions: Answer all the questions. Each question carries FOUR marks.

1. Match the words in column A with their corresponding meanings in column B **(CO2)**

Column A

Column B

- | | |
|---------------|---------------|
| a) Deserve | i) continuous |
| b) hidden | ii) protect |
| c) Preserve | iii) worthy |
| d) Incessant | iv) praise |
| v) unseen | |
| vi) affection | |

2. Rewrite as directed: **(CO3)**

- a) You ask your Mom to give you another chocolate. (Change into a request)
- b) The baby fell down and got injured. (Change into an exclamatory sentence)
- c) The match was very interesting. (Frame a question using 'how')
- d) Hemanth submitted his project report last week. (Frame Yes-No question)

3. Fill in the blanks with appropriate forms of verbs given in brackets: **(CO2)**

- a) The Sun _____ (set) in the west.
- b) Balu _____ (sing) for over fifty years in the films.
- c) We _____ (see) a camel on the road yesterday.
- d) They _____ (enter) the stadium before the gates were closed.

4. Change the voice of the following: **(CO2)**

- a) Marconi invented the radio.
- b) Sravanthi has been offered a job.
- c) Pragathi can type the letter.
- d) The Chief Guest will be received by the Final year students.

PART-B**3X8=24 Marks****Answer all the questions. Each question carries EIGHT marks.**

5. Write a letter to your younger brother motivating him to deal with failures and hurdles in life. **(CO3)**
6. Write an essay in around 120 words on the role of robots in the modern world. **(CO3)**
7. Read the following passage and answer the questions that follow: **(CO3)**

The greatest enemy of mankind, as people have discovered, is not science, but war. Science merely reflects the social forces by which it is surrounded. It was found that when there is peace, science is constructive when there is war, science is perverted to destructive end. The weapons which science gives us do not necessarily create war. These make war increasingly more terrible. Until now, it has brought us on the doorstep of doom. Our main problem, therefore, is not to curb science, but to substitute law for force, and international government for anarchy in the relations of one nation with another. That is a job in which everybody must participate, including the scientists. Now we are face to face with these urgent questions: Can education and tolerance, understanding and creative intelligence run fast enough to keep us side by side without our mounting capacity to destroy? That is the question which we shall have to answer, one way or the other, in this generation. Science must help us in the answer, but the main decision lies within ourselves. The hour is late and our work has scarcely begun.

- a. What is the chief enemy of man?
- b. What does science reflect?
- c. When is science perverted?
- d. What makes war more terrible?
- e. Why do we need international government?
- f. What are the four aspects that may stop destruction?
- g. Have we really started our work to fight the problem discussed?
- h. Pick the word from the passage that would mean: 'replace with other one'

STATE BOARD OF TECHNICAL EDUCATION –A.P
C20-MNG-101-ENGLISH
UNIT TEST-III

Time: 90 minutes

Max. Marks: 40

PART-A

4X4 = 16 Marks

Instructions: Answer all the questions. Each question carries Four marks.

1. Give the meaning of the word in italics: **(CO3)**
 - a) When the girls laughed in the class, the teacher was *furious*.
 - b) He was *rusticated* from the school for his misbehavior.
 - c) Vikramaditya was a *benevolent* Indian King.
 - d) We should not show any *discrimination* between boys and girls.
2. Change the speech of the following: **(CO2)**
 - a) He said, "I am sorry."
 - b) The teacher said to the boys, "Why are you late?"
 - c) Sushma said that she had submitted her report recently.
 - d) Pratap requested Priya to give him her pen.
3. Rewrite as directed: **(CO2)**
 - a) Though he was weak, he took the test. (change into a simple sentence)
 - b) You must work hard to achieve success. (change into a complex sentence)
 - c) If you run fast, you will catch the bus. (change into a compound sentence)
 - d) The fog disappeared when the Sun rose. (Split into two simple sentences)
4. Locate eight errors from the following passage and correct them. **(CO2)**

Once upon a time there live a king who was very kind to his people. In his council of ministers, there is a wise man. He had a son called Sumanth who was a educated and highly learned. Once the wise minister fall sick. All the physicists in the country could not heal him. Then Sumanth will go in search of medicine in Himalayas. He bring the special medicinal roots to cure his father's sickness. Sumanth looked before his father carefully and healed him. The king rewarded Sumanth with rich gifts.

PART- B 3X8 = 24 Marks

Instructions: Answer all the questions and each one carries eight marks.

5. Read the following paragraph and make notes first and then its summary. **(CO3)**
- Astronauts are people who travel on space ships. They need to have a very clean home. They travel far from Earth. We need clean kitchens everywhere on earth and in space. Astronauts have to solve two problems: how to get food and how to keep their spaceship clean. Here is how they solved the food problem. At first, the astronauts took tubes of food with them into space. They would squeeze a tube and eat semi-liquid food. It did not taste great, but since they did not need to take dishes or silverware with them, they had no dishes to wash. Today's spaceships have a bigger menu. Astronauts can eat from bowls. In fact, they take cereal and other standard foods with them. The foods are packaged in special containers to keep them fresh. They use knives, forks, and spoons. One unusual item on their table is a pair of scissors. They use the scissors to open the food packages. They can eat right from the package. They have a kitchen on the spaceship. Its oven can heat food to 170 degrees. The kitchen has water and sets of meals that come on trays. The astronauts choose their menu before they go into space. They take a lot of food with them. The astronauts keep bread and fresh fruits and vegetables in a special food locker. How do they keep the kitchen clean? They do not have to worry about mice or other rodents. They make sure that there are no rodents before the ship leaves. But sometimes mice travel on the ship. Those mice are part of experiments. They live in cages. How do astronauts keep their trays clean? That is another health problem the astronauts solve. They need to stay healthy in space. To carry a lot of water to wash trays would be a lot of extra weight. They pack wet wipes in plastic bags. They use them to clean trays. So, their kitchen is clean and they stay healthy.
6. Write an essay in about 120 words on the importance of goal setting and your short and long term goals. **(CO3,CO4)**
7. Write a report about the bush fire that raged in Australia recently by using the following clues: forest, natural disaster, wild fire, dried leaves, no rain fall, wild animals, burnt alive, loss of flora and fauna, fire fighters, uncontrollable, moderate rains, environmental pollution, measures to protect...etc. **(CO3)**

STATE BOARD OF TECHNICAL EDUCATION- A.P
MODEL QUESTION PAPER
C20-MNG-101- ENGLISH

Time: 3hrs

Max.Marks:80

PART-A

10X3=30 Marks

Instructions: Answer all the questions. Each question carries Three marks.

1. a) Fill in the blanks with suitable articles: (CO2)
I have seen _____ European at _____ local market.
b) Fill in with proper form of adjective given in the bracket: (CO2)
China is the _____ country in the world. (populous, more populous, most populous)
c) i) Choose the synonym from the following for the word : 'filthy' (CO3)
dirty / clean / hygienic / tidy
ii) Choose the antonym from the following for the word: 'exterior' (CO3)
external / internal / open / interior
2. a) i) Give prefix for the word: 'popular' (CO2)
ii) Write suffix for the word : 'king' (CO2)
b) He was married _____ her _____ January 2015. (Fill in with appropriate preposition) (CO3)
c) Match the words in column A with their corresponding meanings in column B: (CO2)

Column-A	Column-B
i) Dynamic	a) tasty
ii) Gloomy	b) active
	c) sad
	d) proud
3. a) The old man *hunted* for his spectacles. (Give the contextual meaning of the word in italics) (CO3)
b) The committee / have submitted / its report / to the President. (identify the part which contains an error) (CO3)
c) Recently has a scooter purchased Shanthi. (Rearrange the jumbled words to make a meaningful sentence.) (CO3)
4. a) Use the following primary auxiliary verb in sentence of your own: **(CO2)**
' does'
b) Fill in the blank with proper modal auxiliary verb based on the clue in the bracket: (CO2)
Harish _____ speak four languages. (ability)
c) Rakesh wants two hundred rupees from his father. (Write the sentence how he requests his Father) (CO2)
5. Fill in the blanks with suitable form of the verb given in brackets: (CO2)
a) He _____ (go) for a walk daily.
b) The bus _____ (arrive) just now.
c) We _____ (live) in Chennai since 2005.

6. Change the voice of the following sentences: (CO2)
- English is spoken all over the world.
 - They watched a movie yesterday.
 - The Chief Minister will inaugurate the exhibition.
7. a) It is a beautiful rainbow. (Change into an exclamatory sentence) (CO3)
- b) C.V. Raman won the Nobel Prize in 1930. (Frame a question using 'When') (CO3)
- c) He can swim across the river. (change into 'Yes / No' question) (CO3)
8. Change the speech of the following: (CO2)
- He said, "I will go to Delhi tomorrow."
 - Ravi said to Ashok, " Where are you going?"
 - She told him to mind his own business.
9. Rewrite as directed: (CO2)
- In spite of being busy he attended the meeting. (Rewrite the sentence using 'though')
 - She is poor. She is honest. (combine the two sentences using 'but')
 - On seeing the tiger, he climbed a tree. (split into two simple sentences)
10. Rewrite the following sentences after making necessary corrections: (CO2)
- We have gone to picnic yesterday.
 - Suresh watched T.V when I went to his house.
 - They left Gujarat before the earthquake occurred.

PART-B

5X8=40

Instructions: Answer the following questions. Each question carries EIGHT marks.

11. Write a paragraph in about 100 words on what you do daily. (CO3,CO4)

OR

Write a paragraph in about 100 words on the uses and misuses of social media.

12. Construct a dialogue of at least five turns between an American and you about places worth visiting in your city. (CO3,CO4)

OR

Compose a dialogue of at least five turns between two friends, one favouring homemade food and the other, fast foods.

13. Write a letter to your parents about your preparation for year-end examinations. (CO3,CO4)

OR

Write a letter to the editor of a newspaper about the inconvenience caused due to loud speakers in your area.

14. Write an essay in about 120 words on measures to prevent water pollution.

OR

Write an essay in about 120 words on importance of gender equality.

15. Read the following passage and answer the questions that follow:

(CO3)

A farmer in ancient China had a neighbour who was a hunter, and who owned ferocious and poorly trained hunting dogs. They jumped over the fence frequently and chased the farmer's lambs. The farmer asked his neighbour to keep his dogs in check, but this fell on deaf ears. One day the dogs again jumped the fence, attacked and severely injured several of the lambs.

The farmer had had enough, and went to town to consult a judge who listened carefully to the story and said: "I could punish the hunter and instruct him to keep his dogs chained or lock them up. But you would lose a friend and gain an enemy. Which would you rather have, friend or foe for a neighbour?" The farmer replied that he preferred a friend. "Alright, I will offer you a solution that keeps your lambs safe, and which will keep your a neighbour a friend." Having heard the judge's solution, the farmer agreed.

Once at home, the farmer immediately put the judge's suggestions to the test. He took three of his best lambs and presented them to his neighbour's three small sons, who were beside themselves with joy and began to play with them. To protect his son's newly acquired playthings, the hunter built a strong kennel for his dogs. Since then, the dogs never again bothered the farmer's lambs. Out of gratitude for the farmer's generosity toward his sons, the hunter often shared the game he had hunted with the farmer. The farmer reciprocated by sending the hunter the cheese he had made. Within a short time the neighbours became good friends.

- a) What kind of dogs does the neighbour have?
- b) When did the farmer consult the judge?
- c) What would be the consequence if the judge punished the neighbour?
- d) What was the solution suggested by the judge?
- e) What did the neighbour's sons do with the gifts they received?
- f) How did the dogs stop bothering the farmer's lambs?
- g) What items are exchanged happily between the two neighbours?
- h) Pick the word from the passage that would mean: 'a closed shelter for dogs'.

OR

Read the following short poem and answer the questions that follow:

Crisp in the winter's morning,
Softly all through the night,
What is this without warning,
Falling and white?

I have never seen snow,
But I can imagine it quite –
Not how it tastes, but I know,
It falls and is white.

One morning I'll open the door,
To bring in the morning's milk,
And all around there'll be snow –
Fallen and still.

How I'll roll in the stuff!
How I'll tumble and spin!
Until the neighbours cry,
Enough! And send me back in.

- Q.1. What is the poem about?
2. How does snow fall?
3. Did you ever touch snow? How did you feel?
4. a) Pick the word from the poem that means 'slip and fall'
b) Write the antonym for the word 'soft'

SECTION – C

1X10=10 Marks

16. Write a report on the blood donation camp organized by International Red Cross Society in your college. Use the following clues: date, time, place, arrangements, donors, equipment, doctors, response, sponsors, snacks, volunteers, help others, save lives...etc.

Course Code	Course Title	No. of Periods/week	Total No. of periods	Marks for FA	Marks for SA
MNG-102	Engineering Mathematics-I	5	150	20	80

S.No.	Unit Title	No. of periods	COs mapped
1	Algebra	31	CO1
2	Trigonometry	44	CO2
3	Co-ordinate Geometry	23	CO3
4	Differential Calculus	33	CO4
5	Applications of Differentiation	19	CO4, CO5
Total Periods		150	

Course Objectives	(i) To apply the principles of Algebra, Trigonometry and Co-Ordinate Geometry to real-time problems in engineering. (ii) To comprehend and apply the concept of Differential Calculus in engineering applications.
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Course Outcomes	CO1	Identify various functions, resolve partial fractions and solve problems on matrices.
	CO2	Solve problems using the concept of trigonometric functions, their inverses and complex numbers.
	CO3	Find the equations and properties of straight lines, circles and conic sections in coordinate system.
	CO4	Evaluate the limits and derivatives of various functions.
	CO5	Evaluate solutions for engineering problems using differentiation.

ENGINEERING MATHEMATICS – I
COMMON TO ALL BRANCHES

Learning Outcomes

UNIT - I

C.O. 1 Identify various functions, resolve partial fractions and solve problems on matrices.

L.O. 1.1 Define Set, ordered pairs and Cartesian product - examples.

- 1.2 Explain Relations and functions – examples
- 1.3 Find Domain & Range of functions – simple examples.
- 1.4 Classify types of functions (into, many-to-one, one-one, onto and bijective).
- 1.5 Define inverse functions - examples.
- 1.6 Define rational, proper and improper fractions of polynomials.
- 1.7 Explain the procedure of resolving rational fractions of the type mentioned below into partial fractions

$$\begin{array}{ll} i) \quad \frac{f(x)}{(ax+b)(cx+d)} & ii) \quad \frac{f(x)}{(ax+b)^2(cx+d)} \\ iii) \quad \frac{f(x)}{(x^2+a^2)(bx+c)} & iv) \quad \frac{f(x)}{(x^2+a^2)(x^2+b^2)} \end{array}$$

- 1.8 Define a matrix and order of a matrix.
- 1.9 State various types of matrices with examples (emphasis on 3rd order square matrices).
- 1.10 Compute sum, scalar multiplication and product of matrices. Illustrate the properties of these operations such as associative, distributive, commutative properties with examples and counter examples.
- 1.11 Define the transpose of a matrix and write its properties;
- 1.12 Define symmetric and skew-symmetric matrices with examples. Resolve a square matrix into a sum of a symmetric and skew-symmetric matrices and provide examples.
- 1.13 Define determinant of a square matrix, minor, co-factor of an element of a 3x3 square matrix with examples. Expand the determinant of a 3 x 3 matrix using Laplace expansion formula. State and apply the properties of determinants to solve problems.
- 1.14 Distinguish singular and non-singular matrices. Define multiplicative inverse of a matrix and list properties of adjoint and inverse. Compute adjoint and multiplicative inverse of a square matrix.
- 1.15 Solve system of 3 linear equations in 3 unknowns using Cramer's rule and matrix inversion method.

UNIT - II

C.O.2 Solve problems using the concept of trigonometric functions, their inverses and complex numbers.

L.O. 2.1 Define trigonometric ratios of any angle.

- 2.2 List the values of trigonometric ratios at specified values.
- 2.3 Draw graphs of trigonometric functions.
- 2.4 Explain periodicity of trigonometric functions.
- 2.5 Define compound angles and state the formulae of $\sin(A \pm B)$, $\cos(A \pm B)$, $\tan(A \pm B)$ and $\cot(A \pm B)$.
- 2.6 Give simple examples on compound angles to derive the values of $\sin 15^\circ$, $\cos 15^\circ$, $\sin 75^\circ$, $\cos 75^\circ$, $\tan 15^\circ$, $\tan 75^\circ$ etc.
- 2.7 Derive identities like $\sin(A+B) \sin(A-B) = \sin^2 A - \sin^2 B$ etc.
- 2.8 Solve simple problems on compound angles.
- 2.9 Derive the formulae of multiple angles $2A$, $3A$ etc. and sub multiple angles $A/2$ in terms of angle A of trigonometric functions.

2.10 Derive useful allied formulas like $\sin^2 A = (1 - \cos 2A)/2$ etc.

2.11 Solve simple problems using the above formulae

Syllabus for Unit test-I completed

2.12 Derive the formulae on transforming sum or difference of two trigonometric ratios into a product and vice versa, examples on these formulae.

2.13 Solve problems by applying these formulae to sum or difference or product of three or more terms.

2.14 Explain the concept of the inverse of a trigonometric function by selecting an appropriate domain and range.

2.15 Define inverses of six trigonometric functions along with their domains and ranges.

2.16 Derive relations between inverse trigonometric functions so that given $A = \sin^{-1} x$, express angle A in terms of other inverse trigonometric functions with examples.

2.17 State various properties of inverse trigonometric functions and identities like

$$\sin^{-1} x + \cos^{-1} x = \frac{\pi}{2} \text{ etc.}$$

2.18 Apply formulae like $\tan^{-1} x + \tan^{-1} y = \tan^{-1} \left(\frac{x+y}{1-xy} \right)$, where $x \geq 0, y \geq 0, xy < 1$ etc.,

to solve Simple problems.

2.19 Explain what is meant by solutions of trigonometric equations and find the general solutions of $\sin x = k$, $\cos x = k$ and $\tan x = k$ with appropriate examples.

2.20 Solve models of the type $a \sin^2 x + b \sin x + c = 0$, $a \cos x + b \sin x = c$ etc., and problems using simple transformations.

2.21 State sine rule, cosine rule, tangent rule and projection rule.

2.22 Explain the formulae for $\sin A/2$, $\cos A/2$, $\tan A/2$ and $\cot A/2$ in terms of semi-perimeter s and sides a, b, c and solve problems.

2.23 List various formulae for the area of a triangle.

2.24 Solve problems using the above formulae.

2.25 Define Sinh x , cosh x and tanh x and list the hyperbolic identities.

2.26 Represent inverse hyperbolic functions in terms of logarithms.

2.27 Define complex number, its modulus, conjugate and list their properties.

2.28 Define the operations on complex numbers with examples.

2.29 Define amplitude of a complex number.

2.30 Represent the complex number in various forms like modulus-amplitude (polar) form, Exponential (Euler) form with examples.

2.31 Write DeMoivre's theorem (without proof) and illustrate with simple examples.

UNIT - III

Coordinate Geometry

C.O. 3 Find the equations and properties of straight lines, circles and conic sections in coordinate system.

L.O. 3.1 Write the different forms of a straight line – general form, point-slope form, slope-intercept form, two-point form, intercept form and normal form or perpendicular form.

3.2 Solve simple problems on the above forms.

3.3 Find distance of a point from a line, acute angle between two lines, intersection of two non-parallel lines and distance between two parallel lines.

3.4 Define locus of a point and define a circle.

3.5 Write the general equation of a circle and find the centre and radius.

- 3.6 Find the equation of a circle given (i) centre and radius, (ii) two ends of a diameter
(iii) Centre and a point on the circumference (iv) three non collinear points.
- 3.7 Define a conic section.
- 3.8 Explain the terms focus, directrix, eccentricity, axes and latus rectum of a conic with illustrations.
- 3.9 Find the equation of a conic when focus, directrix and eccentricity are given.
- 3.10 Describe the properties of Parabola, Ellipse and Hyperbola in standard forms whose axes are along co-ordinate axes and solve simple examples on above.

Syllabus for Unit test-II completed

C.O.4 Evaluate the limits and derivatives of various functions.

- L.O. 4.1 Explain the concept of limit and meaning of $\lim_{x \rightarrow a} f(x) = l$ and state the properties of limits.

- 4.2 Evaluate the limits of the type $\lim_{x \rightarrow l} \frac{f(x)}{g(x)}$ and $\lim_{x \rightarrow \infty} \frac{f(x)}{g(x)}$

- 4.3 Mention the Standard limits $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a}$, $\lim_{x \rightarrow 0} \frac{\sin x}{x}$, $\lim_{x \rightarrow 0} \frac{\tan x}{x}$, $\lim_{x \rightarrow 0} \frac{a^x - 1}{x}$,

$$\lim_{x \rightarrow 0} \frac{e^x - 1}{x}, \lim_{x \rightarrow 0} (1 + x)^{\frac{1}{x}}, \lim_{x \rightarrow \infty} \left(1 + \frac{1}{x}\right)^x \text{ (without proof) and solve the problems}$$

using these standard limits.

- 4.4 Explain the concept of continuity of a function at a point and on an interval with some examples whether a given function is continuous or not.
- 4.5 State the concept of derivative of a function $y = f(x)$ – definition, first principle as $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ and also provide standard notations to denote the derivative of a function.
- 4.6 State the significance of derivative in scientific and engineering applications.
- 4.7 Find the derivatives of elementary functions like x^n , a^x , e^x , $\log x$, $\sin x$, $\cos x$, $\tan x$, $\sec x$, $\csc x$ and $\cot x$ using the first principles.
- 4.8 Find the derivatives of simple functions from the first principle .
- 4.9 State the rules of differentiation of sum, difference, scalar multiplication, product and quotient of functions with illustrative and simple examples.
- 4.10 Explain the method of differentiation of a function of a function (Chain rule) with illustrative examples.
- 4.11 Find the derivatives of Inverse Trigonometric functions and examples using the Trigonometric transformations.
- 4.12 Explain the method of differentiation of a function with respect to another function and also differentiation of parametric functions with examples.
- 4.13 Find the derivatives of hyperbolic functions.
- 4.14 Explain the procedures for finding the derivatives of implicit function with examples.
- 4.15 Explain the need of taking logarithms for differentiating some functions with examples like $[f(x)]^{g(x)}$.
- 4.16 Explain the concept of finding the higher order derivatives of second and third order with examples.
- 4.17 Explain the concept of functions of several variables, partial derivatives and difference between the ordinary and partial derivatives with simple examples.
- 4.18 Explain the definition of Homogenous function of degree n .
- 4.19 Explain Euler's theorem for homogeneous functions with applications to simple problems.

C.O. 5 Evaluate solutions for engineering problems using differentiation.

L.O.5.1 State the geometrical meaning of the derivative as the slope of the tangent to the curve $y=f(x)$ at any point on the curve.

5.2 Explain the concept of derivative to find the slope of tangent and to find the equation of tangent and normal to the curve $y=f(x)$ at any point on it.

5.3 Find the lengths of tangent, normal, sub-tangent and sub normal at any point on the curve $y=f(x)$.

5.4 Explain the derivative as a rate of change in distance-time relations to find the velocity and acceleration of a moving particle with examples.

5.5 Explain the derivative as a rate measurer in the problems where the quantities like volumes, areas vary with respect to time- illustrative examples.

5.6 Define the concept of increasing and decreasing functions.

5.7 Explain the conditions to find points where the given function is increasing or decreasing with illustrative examples.

5.8 Explain the procedure to find the extreme values (maxima or minima) of a function of single variable- simple problems yielding maxima and minima.

5.9 Solve problems on maxima and minima in applications like finding areas, volumes etc.

5.10 Apply the concept of derivatives to find the errors and approximations in simple problems.

Syllabus for Unit test-III completed

CO/PO – Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	1	2				3	2	3
CO2	3	3	3	2				3	3	1
CO3	3	2	2	1				3	2	2
CO4	3	3	2	2				3	2	1
CO5	3	3	3	3				3	3	3
Avg	3	2.6	2.5	2				3	2.4	2

3 = Strongly mapped (High), **2** =moderately mapped (Medium), **1** =slightly mapped (Low)

Note:

- PO5:** Appropriate quiz programme may be conducted at intervals and duration as decided by concerned teacher.
- PO6:** Seminars on applications of mathematics in various engineering disciplines are to be planned and conducted.
- PO7:** Such activities are to be planned that students visit library to refer standard books on Mathematics and latest updates in reputed national and international journals, attending seminars, learning mathematical software tools.
- PSO1:** An ability to understand the concepts of basic mathematical concepts and to apply them in various areas like computer programming, civil constructions, fluid dynamics, electrical and electronic systems and all concerned engineering disciplines.
- PSO2:** An ability to solve the Engineering problems using latest software tool, along with analytical skills to arrive at faster and appropriate solutions.
- PSO3:** Wisdom of social and environmental awareness along with ethical responsibility to have a successful career as an engineer and to sustain passion and zeal for real world technological applications.

PO- CO – Mapping strength

PO no	Mapped with CO no	CO periods addressing PO in column I		Level (1,2 or 3)	Remarks
		No	%		
1	CO1, CO2, CO3, CO4, CO5	150	100%	3	>40% Level 3 Highly addressed
2	CO1, CO2, CO3, CO4, CO5	138	92%	3	
3	CO1, CO2, CO3, CO4, CO5	133	88.6%	3	
4	CO1, CO2, CO3, CO4, CO5	120	80%	3	
PSO 1	CO1, CO2, CO3, CO4, CO5	150	100%	3	25% to 40% Level 2 Moderately addressed
PSO 2	CO1, CO2, CO3, CO4, CO5	135	90%	3	5% to 25% Level 1 Low addressed <5% Not addressed
PSO 3	CO1, CO2, CO3, CO4, CO5	125	83.3%	3	

COMMON TO ALL BRANCHES
COURSE CONTENT

Unit-I

Algebra

1. Relations and Functions:

Define Set, Ordered pairs, Cartesian product, Relations, functions, domain & range of functions. Describe types of functions (in-to, many-to-one, one-one, onto and bijective) and inverse functions – examples.

2. Partial Fractions:

Define rational, proper and improper fractions of polynomials. Resolve rational fractions in to their partial fractions covering the types mentioned below.

$$\begin{array}{ll} i) \quad \frac{f(x)}{(ax+b)(cx+d)} & ii) \quad \frac{f(x)}{(ax+b)^2(cx+d)} \\ iii) \quad \frac{f(x)}{(x^2+a^2)(bx+c)} & iv) \quad \frac{f(x)}{(x^2+a^2)(x^2+b^2)} \end{array}$$

3. Matrices:

Definition of a matrix, types of matrices-examples, algebra of matrices-equality of two matrices, sum, scalar multiplication and product of matrices. Transpose of a matrix-Symmetric, skew symmetric matrices-Minor, cofactor of an element-Determinant of a square matrix-Laplace's expansion, properties of determinants. Singular and non-singular matrices-Adjoint and multiplicative inverse of a square matrix-examples-System of linear equations in 3 variables-Solutions by Cramers's rule and Matrix inversion method-examples.

Unit-II

Trigonometry

4. Trigonometric ratios:

Definition of trigonometric ratios of any angle, values of trigonometric ratios at specified values, draw graphs of trigonometric functions, periodicity of trigonometric functions.

5. Compound angles:

Formulas of $\sin(A \pm B)$, $\cos(A \pm B)$, $\tan(A \pm B)$, $\cot(A \pm B)$, and related identities with problems.

6. Multiple and sub multiple angles:

Formulae for trigonometric ratios of multiple angles $2A$, $3A$ and sub multiple angles $A/2$ with problems.

7. Transformations of products into sums or differences and vice versa simple problems

8. Inverse trigonometric functions:

Definition, domains and ranges-basic properties- problems.

9. Trigonometric equations:

Concept of a solution, principal value and general solution of trigonometric equations: $\sin x = k$, $\cos x = k$, $\tan x = k$, where k is a constant. Solutions of simple quadratic equations, equations involving usage of transformations- problems.

10. Properties of triangles:

Relation between sides and angles of a triangle- sine rule, cosine rule, tangent rule and projection rule- area of a triangle- problems.

11. Hyperbolic functions:

Definitions of hyperbolic functions, identities of hyperbolic functions, inverse hyperbolic functions and expression of inverse hyperbolic functions in terms of logarithms.

12. Complex Numbers:

Definition of a complex number, Modulus and conjugate of a complex number, Arithmetic operations on complex numbers, Modulus- Amplitude (polar) form , Exponential form (Euler form) of a complex number- Problems. DeMoivre's theorem.

UNIT-III

Coordinate geometry

- 13 **Straight lines:** various forms of straight lines, angle between lines, perpendicular distance from a point, distance between parallel lines-examples.
- 14. **Circle:** locus of a point, Circle, definition-Circle equation given (i) centre and radius, (ii) two ends of a diameter (iii) centre and a point on the circumference (iv) three non collinear points - general equation of a circle – finding centre, radius.
- 15. Definition of a conic section, equation of a conic when focus directrix and eccentricity are given. properties of parabola, ellipse and hyperbola in standard forms.

UNIT-IV

Differential Calculus:

- 16. **Concept of Limit-** Definition- Properties of Limits and Standard Limits -Simple Problems- Continuity of a function at a point- Simple Examples only.
- 17. **Concept of derivative-** Definition (first principle)- different notations-derivatives of elementary functions- problems. Derivatives of sum, product, quotient, scalar multiplication of functions - problems. Chain rule, derivatives of inverse trigonometric functions, derivative of a function with respect to another function, derivative of parametric functions, derivative of hyperbolic, implicit functions, logarithmic differentiation – problems in each case. Higher order derivatives - examples – functions of several variables - partial differentiation, Euler's theorem-simple problems.

UNIT-V

Applications of Derivatives:

- 18. Geometrical meaning of the derivative, equations of Tangent and normal to a curve at any point. Lengths of tangent, normal, sub tangent and subnormal to the curve at any point - problems.
- 19. Physical applications of the derivative – velocity, acceleration, derivative as a rate measure – Problems.
- 20. Applications of the derivative to find the extreme values – Increasing and decreasing functions, finding the maxima and minima of simple functions - problems leading to applications of maxima and minima.
- 21. Using the concept of derivative of a function of single variable, find the absolute error, relative and percentage errors and approximate values due to errors in measuring.

Textbook:

Engineering Mathematics-I, a textbook for first year diploma courses, prepared & prescribed by SBTET, AP.

Reference Books:

- 1. Shanti Narayan, A Textbook of matrices, S.Chand &Co.
- 2. Robert E. Moyer & Frank Ayers Jr., Schaum's Outline of Trigonometry, 4th Edition, Schaum's Series
- 3. M.Vygodsky, Mathematical Handbook, Mir Publishers, Moscow.
- 4. Frank Ayers & Elliott Mendelson, Schaum's Outline of Calculus, Schaum's Series.

Engineering Mathematics – I
Blue print

S. No	Chapter/ Unit title	No of Periods		Weightage Allotted	Marks wise distribution of weight age				Question wise distribution of weight age				COs mapped
		Theory	Practice		R	U	Ap	An	R	U	Ap	An	
	Unit - I : Algebra												
1	Relations and Functions	4	2	3	0	3	0	0	0	1	0	0	CO 1
2	Partial Fractions	3	2	3	0	3	0	0	0	1	0	0	CO 1
3	Matrices and Determinants	10	10	11	3	0	8	0	1	0	1	0	CO 1
	Unit - II : Trigonometry												
4	Trigonometric Ratios	1	1	0	0	0	0	0	0	0	0	0	CO2
5	Compound Angles	3	2	3	3	0	0	0	1	0	0	0	CO2
6	Multiple and Submultiple angles	4	4	3	0	3	0	0	0	1	0	0	CO2
7	Transformations	3	3	8	0	8	0	0	0	1	0	0	CO2
8	Inverse Trigonometric Functions	3	2										
9	Trigonometric Equations	3	2	8	0	0	8	0	0	0	1	0	CO2
10	Properties of triangles	3	2										
11	Hyperbolic Functions	1	1	0	0	0	0	0	0	0	0	0	CO2
12	Complex Numbers	4	2	3	3	0	0	0	1	0	0	0	CO2

	Unit III : Co-ordinate Geometry												
13	Straight Lines	4	2	3	3	0	0	0	1	0	0	0	CO3
14	Circle	3	2	8	0	8	0	0	0	1	0	0	CO3
15	Conic Sections	8	4										
	Unit – IV : Differential Calculus												
16	Limits and Continuity	4	2	3	0	3	0	0	0	1	0	0	CO4
17	Differentiation	17	10	14	3	11	0	0	1	2	0	0	CO4
	Unit - V : Applications of Differentiation												
18	Geometrical Applications	3	2	10	0	0	0	10	0	0	0	1	CO5
19	Physical Applications	2	2										
20	Maxima and Minima	3	4										
21	Errors and Approximations	2	1										
Total		89	61	80	15	39	16	10	5	8	2	1	

R: Remembering Type : 15 Marks
U: understanding Type : 39 Marks
Ap: Application Type : 16 Marks
An: Analysing Type : 10 Marks

Engineering Mathematics – I
Unit Test Syllabus

Unit Test	Syllabus
Unit Test-I	From L.O. 1.1 to L.O. 2.11
Unit Test-II	From L.O. 2.12 to L.O. 3.10
Unit Test-III	From L.O.4.1 to L.O. 5.10

Unit Test I **C –20, MNG-102**
State Board of Technical Education and Training, A. P
First Year
Subject Name: Engineering Mathematics-I
Sub Code: MNG-102

Time : 90 minutes

Max.marks:40

Part-A

16Marks

Instructions: (1) Answer all questions.

(2) First question carries four marks and the remaining questions carry three marks each.

1. Answer the following.

a. If $f(x) = x^2$ and domain = $\{-1, 0, 1\}$, then find range. (CO1)

b. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, then find $3A$. (CO1)

c. Write the value of $\sin 120^\circ$ (CO2)

d. Write the formula for $\tan 2A$ in terms of $\tan A$ (CO2)

2. If $f : R \rightarrow R$ is defined by $f(x) = 3x - 5$, then prove that $f(x)$ is onto. (CO1)

3. If $A = \begin{bmatrix} 1 & 3 \\ 4 & -9 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 4 \\ -3 & 1 \end{bmatrix}$ then find $2A + 3B$ (CO1)

4. Prove that $\sin^2 45^\circ - \sin^2 15^\circ = \frac{\sqrt{3}}{4}$ (CO2)

5. Prove that $\frac{\sin 2A}{1 - \cos 2A} = \cot A$ (CO2)

Part-B

3×8=24

Instructions: (1) Answer all questions.

(2) Each question carries eight marks

(3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. A) Resolve $\frac{2x}{(x-1)(x-3)}$ into partial fractions. (CO1)
or

- B) Resolve $\frac{x+4}{x^2-3x+2}$ into partial fractions. (CO1)
7. A) Using Cramer's rule to solve
 $x - y + z = 2, 2x + 3y - 4z = -4, 3x + y + z = 8$ (CO1)
or
- B) Prove that $\begin{vmatrix} bc & b+c & 1 \\ ca & c+a & 1 \\ ab & a+b & 1 \end{vmatrix} = (a-b)(b-c)(c-a)$ (CO1)
8. A) Find the adjoint of Matrix $\begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 5 \\ 2 & 7 & -4 \end{bmatrix}$ (CO1)
or
- B) If $A = \begin{bmatrix} 2 & 3 & 4 \\ 5 & 7 & 9 \\ -2 & 1 & 3 \end{bmatrix}$; $B = \begin{bmatrix} 3 & 1 & -5 \\ 2 & 1 & 4 \\ 0 & 3 & 1 \end{bmatrix}$, find AB and BA and verify if $AB = BA$. (CO1)

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Unit Test II
State Board of Technical Education and Training, A. P
First Year
Subject Name: Engineering Mathematics-I
Sub Code: MNG- 102

C –20, MNG -102

Time : 90 minutes

Max.Marks:40

Part-A

16Marks

Instructions: **(1) Answer all questions.**
 (2) First question carries four marks and the remaining questions carry three marks each

1. Answer the following.

a. $\sin C + \sin D = 2 \cos \left(\frac{C+D}{2} \right) \sin \left(\frac{C-D}{2} \right)$: State TRUE/FALSE (CO2)

b. If $z = 2 + 3i$, then find $|z|$ (CO2)

c. $\sinh x = \frac{e^x - e^{-x}}{2}$: State TRUE/FALSE (CO2)

d. Write the eccentricity of rectangular hyperbola. (CO3)

2. Express $(3 - 4i)(7 + 2i)$ in terms of $a + ib$ (CO2)

3. Find the perpendicular distance from (1,1) to the line $2x + 3y - 1 = 0$ (CO3)

4. Find the angle between lines $2x - y + 3 = 0$ and $x + y - 2 = 0$ (CO3)

5. Find the centre and radius of the circle $x^2 + y^2 - 2x + 4y - 4 = 0$ (CO3)

Part-B**3×8=24**

Instructions: (1) Answer all questions.
(2) Each question carries eight marks
(3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. A) Prove that $\frac{\sin 2\theta + \sin 4\theta + \sin 6\theta}{\cos 2\theta + \cos 4\theta + \cos 6\theta} = \tan 4\theta$. (CO2)
or
B) Prove that $\tan^{-1} \frac{1}{2} + \tan^{-1} \frac{1}{5} + \tan^{-1} \frac{1}{8} = \frac{\pi}{4}$ (CO2)
7. A) Solve $2\sin^2 \theta - \sin \theta - 1 = 0$ (CO2)
or
B) In any $\triangle ABC$, If $\angle B = 60^\circ$ then $\frac{c}{a+b} + \frac{a}{b+c} = 1$ (CO2)
8. A) Find the equation of circle with (2, 3) and (6, 9) as the end points of diameter and also find centre and radius of circle. (CO3)
or
B) Find the equation of ellipse whose focus is (1, -1), directrix is $x - y + 3 = 0$ and eccentricity is $1/2$. (CO3)

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Unit Test III
State Board of Technical Education and Training, A. P
First Year
Subject Name: Engineering Mathematics-I
Sub Code: MNG-102

C –20, MNG -102

Time : 90 minutes

Max.Marks:40

Part-A

16Marks

Instructions: (1) Answer all questions.

(2) First question carries four marks and the remaining questions carry three marks each

1. Answer the following.

a. Find $\lim_{x \rightarrow 1} \frac{x^2 + 1}{x + 5}$ (CO4)

b. $\lim_{\theta \rightarrow 0} \frac{\sin 2\theta}{\theta} = 2$: State TRUE/FALSE (CO4)

c. $\frac{d}{dx} (3 \tan^{-1} x) = ?$ (CO4)

d. Formula for percentage error in x is _____ (CO5)

2. Evaluate $\lim_{x \rightarrow 2} \frac{x^5 - 32}{x^2 - 4}$ (CO4)

3. Find the derivative of $3 \tan x - 4 \log x + 7^x$ w.r.t. x (CO4)

4. Differentiate $x^2 \sin x$ w.r.t. x (CO4)

5. Find the derivative of $\frac{2x + 3}{3x + 4}$ (CO4)

Part-B**3×8=24**

- Instructions:** (1) Answer all questions.
(2) Each question carries eight marks
(3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. A) Find the derivative of $\sin^{-1}\left(\frac{2x}{1+x^2}\right)$ w.r.t. $\tan^{-1}\left(\frac{2x}{1-x^2}\right)$. (CO4)

OR

B) Find $\frac{dy}{dx}$ if $y = x^{\cos x}$ (CO4)

7. A) Verify Euler's theorem when $u(x, y) = \frac{x^4 + y^4}{x - y}$ (CO4)

OR

B) Find the equation of tangent and normal to the curve $3y = x^2 - 6x + 17$ at $(4, 3)$ (CO5)

8. A) Circular patch of oil spreads on water and the area is growing at the rate of 8 sq cm/min . How fast is the radius increasing when radius is 5 cm . (CO5)

OR

B) Find the maxima and minima values of $f(x) = x^3 - 6x^2 + 9x + 15$. (CO5)

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END-EXAM MODEL PAPERS
STATE BOARD OF TECHNICAL EDUCATION, A.P
ENGINEERING MATHEMATICS MNG- 102

TIME : 3 HOURS

MODEL PAPER- I

MAX.MARKS : 80M

PART-A

Answer All questions. Each question carries THREE marks.

10x3=30M

1. If $A = \left\{0, \frac{\pi}{6}, \frac{\pi}{4}, \frac{\pi}{3}, \frac{\pi}{2}\right\}$ and $f : A \rightarrow B$ is a function such that $f(x) = \cos x$, then find the range of f . **CO 1**
2. Resolve the function $\frac{x}{(x-1)(x-2)}$ into partial fractions. **CO1**
3. If $A = \begin{bmatrix} 3 & 9 & 0 \\ 1 & 8 & -2 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & 0 & 2 \\ 7 & 1 & 4 \end{bmatrix}$, find $A+B$ and $A-B$. **CO1**
4. Show that $\frac{\cos 16^\circ + \sin 16^\circ}{\cos 16^\circ - \sin 16^\circ} = \tan 61^\circ$. **CO2**
5. Prove that $\frac{\sin 2\theta}{1 - \cos 2\theta} = \cot \theta$. **CO2**
6. Find the modulus of the complex number $\left(\frac{1-i}{2+i}\right)$. **CO2**
7. Find the distance between parallel lines $x+2y+3=0$ and $x+2y+8=0$. **CO3**
8. Find $\lim_{x \rightarrow 0} \frac{\sin 77x}{\sin 11x}$. **CO4**
9. Differentiate $3 \tan x - 4 \log x - 7x^2$ w.r.t. x . **CO4**
10. If $x = at^2$, $y = 2at$, then find $\frac{dy}{dx}$. **CO4**

PART-B

Answer All questions. Each question carries EIGHT marks.

5x8=40M

- 11 A) Find the inverse of the matrix $\begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$. **CO1**

Or

- B) Solve the system of equations $x + y + z = 6$, $x - y + z = 2$ and $2x - y + 3z = 9$ by Cramer's rule. **CO1**

- 12 A) If $\cos x + \cos y = \frac{3}{5}$ and $\cos x - \cos y = \frac{2}{7}$, then show that **CO2**

$$21 \tan\left(\frac{x-y}{2}\right) + 10 \cot\left(\frac{x+y}{2}\right) = 0.$$

Or

- B) If $\tan^{-1} x + \tan^{-1} y + \tan^{-1} z = \pi$ then show that $x + y + z = xyz$. **CO2**

- 13 A) Solve $\sqrt{3} \cos \theta - \sin \theta = 1$. **CO2**

Or

- B) In any ΔABC , Show that $\cot \frac{A}{2} + \cot \frac{B}{2} + \cot \frac{C}{2} = \frac{s^2}{\Delta}$. **CO2**

- 14 A) Find the equation of the circle with $(4, 2)$ and $(1, 5)$ as the two ends of its diameter and also find its centre and radius. **CO3**

Or

- B) Find the centre, vertices, equation of axes, lengths of axes, eccentricity, foci, equations of directrices and length of latus rectum of the ellipse $4x^2 + 16y^2 = 1$. **CO3**

- 15 A) Find the derivative of $\sin^{-1}\left(\frac{2x}{1+x^2}\right)$ w.r.t. $\tan^{-1}\left(\frac{2x}{1-x^2}\right)$ **CO4**

Or

- B) If $u = \tan^{-1}\left(\frac{x^3 - y^3}{x + y}\right)$, then prove that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \sin 2u$. **CO4**

PART-C

Answer the following question. Question carries TEN marks.

1x10=10M

16. The sum of two numbers is 24. Find them so that the sum of their squares is minimum. **CO5**

STATE BOARD OF TECHNICAL EDUCATION, A.P
ENGINEERING MATHEMATICS MNG- 102

TIME : 3 HOURS

MODEL PAPER- II

MAX.MARKS : 80M

PART-A

Answer All questions. Each question carries THREE marks.

10x3=30M

1. If $\lim_{x \rightarrow 0} \frac{\tan x}{x}$, is a bijective function such that $\lim_{x \rightarrow 0} \frac{a^x - 1}{x}$, then find $\lim_{x \rightarrow 0} \frac{e^x - 1}{x}$, **CO1**
2. Resolve the function $\lim_{x \rightarrow 0} (1+x)^{\frac{1}{x}}$, into partial fractions. **CO1**
3. If $\lim_{x \rightarrow \infty} \left(1 + \frac{1}{x}\right)^x$ is a skew-symmetric matrix, find the value of $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ **CO1**
4. Find the value of i) $\frac{f(x)}{(ax+b)(cx+d)}$ **CO2**
5. Prove that ii) $\frac{f(x)}{(ax+b)^2(cx+d)}$ **CO2**
6. Find the conjugate of the complex number $(3-2i).(4+7i)$ **CO2**
7. Find the equation of the line passing through the points iv) $\frac{f(x)}{(x^2+a^2)(x^2+b^2)}$ and $(3,-4)$. **CO3**
8. Find $= \{-1, 0, 1\}$, **CO4**
9. Differentiate w.r.t. X . **CO4**
10. If $\tan 2A$ then find $\tan A$ and $f: R \rightarrow R$ **CO4**

PART-B

Answer All questions. Each question carries EIGHT marks.

5x8=40M

- 11 A) Show that $f(x) = 3x - 5$ **CO1**

Or

- B) Solve the system of equations $f(x)$ and $A = \begin{bmatrix} 1 & 3 \\ 4 & -9 \end{bmatrix}$ using matrix inversion method. **CO1**

- 12 A) Prove that $B = \begin{bmatrix} 2 & 4 \\ -3 & 1 \end{bmatrix}$ **CO2**

Or

B) Prove that $2A + 3B$

CO2

13 A) Solve $\sin^2 45^\circ - \sin^2 15^\circ = \frac{\sqrt{3}}{4}$

CO2

Or

B) In any $\triangle ABC$, Show that $\frac{2x}{(x-1)(x-3)}$

CO2

14 A) Find the equation of the circle passing through the points $\frac{x+4}{x^2-3x+2}$ and

$$x - y + z = 2, 2x + 3y - 4z = -4, 3x + y + z = 8$$

CO3

Or

B) Find the equation of the rectangular hyperbola whose focus is $\begin{vmatrix} bc & b+c & 1 \\ ca & c+a & 1 \\ ab & a+b & 1 \end{vmatrix} = (a-b)(b-c)(c-a)$

and directrix is $\begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 5 \\ 2 & 7 & -4 \end{bmatrix}$

CO3

15 A) If $A = \begin{bmatrix} 2 & 3 & 4 \\ 5 & 7 & 9 \\ -2 & 1 & 3 \end{bmatrix}$ then prove that $B = \begin{bmatrix} 3 & 1 & -5 \\ 2 & 1 & 4 \\ 0 & 3 & 1 \end{bmatrix}$

CO4

Or

B) If $AB = BA$ then prove that $\sin C + \sin D = 2 \cos\left(\frac{C+D}{2}\right) \sin\left(\frac{C-D}{2}\right)$

CO4

PART-C

Answer the following question. Question carries TEN marks.

1x10=10M

16 Show that the semi-vertical angle of the cone of maximum volume and of given slant height is $z = 2 + 3i$

CO4

Course code	Course Title	No. of Periods per week	Total No. of Periods	Marks for FA	Marks for SA
MNG-103	Engineering Physics	4	120	20	80

S. No	Unit Title/Chapter	No of Periods	COs Mapped
1	Units and Dimensions	08	CO1
2	Elements of Vectors	12	CO1
3	Dynamics	12	CO2
4	Friction	10	CO2
5	Work, Power and Energy	12	CO3
6	Simple harmonic motion	12	CO3
7	Heat and Thermodynamics	12	CO4
8	Sound	10	CO4
9	Properties of matter	10	CO5
10	Electricity and Magnetism	12	CO5
11	Modern physics	10	CO5
Total		120	

Course Title: Engineering Physics	
Course Objectives	<ol style="list-style-type: none"> 1. To familiarize with the concepts of Physics involved in the process of various Engineering, Industrial and Daily life Applications. 2. To understand and apply the basic principles of physics in the field of engineering and technology to familiarize certain natural phenomenon occurring in the day to day life 3. To reinforce theoretical concepts by conducting relevant experiments/exercises

Course Outcomes	CO1	Explain S.I units and dimensions of different physical quantities, basic operations among vector quantities.
	CO2	Explain the motion of objects moving in one dimension and two dimensions, the causes of motion and hindrance to the motion of the objects especially with respect to friction.
	CO3	Explain the mechanical energy of bodies like PE, KE and conservation law of energy, the properties of simple harmonic motion.
	CO4	Explain gas laws, ideal gas equation, Isothermal and adiabatic processes, Specific heats, to study the laws of thermodynamics. Causes, consequences and methods to minimise noise pollution, explain beats, Doppler effect, Reverberation, echoes.
	CO5	Explain certain properties of solids, liquids like elastic properties, viscosity and surface tension. Explain Ohm's law, to study Kirchoff's laws, to study the principle of Wheatstone's bridge and its application to meter bridge. To study the magnetic force and understand magnetic field. To compute magnetic field strength on axial and equatorial lines of a bar magnet. To familiarise with modern topics like photoelectric effect, optical fibres, superconductivity and nanotechnology.

COS, POS, PSOS MAPPING

➤ POs mapping strength (as per given table)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3					1		1	1	1
CO2	3		2					1	1	
CO3	3		2					1		
CO4	3	2			2				2	2
CO5	3			2			2	1	1	

3 = strongly mapped 2= moderately mapped 1= slightly mapped

Note:

The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:

i) Seminars ii) Tutorials iii) Guest lectures iv) Assignments v) Quiz competitions vi) Industrial visits vii) Tech Fest viii) Mini project ix) Group discussion x) Virtual classes xi) Library visit for e-books

LEARNING OUTCOMES

1.0 Concept of Units and dimensions

- 1.1 Explain the concept of Units, Physical quantity, Fundamental physical quantities and Derived physical quantities
- 1.2 Define unit, fundamental units and derived units, State SI units with symbols
- 1.3 State Multiples and submultiples in SI system, State Rules of writing S.I. units, State advantages of SI units
- 1.4 Define Dimensions, Write Dimensional formulae of physical quantities
- 1.5 List dimensional constants and dimensionless quantities
- 1.6 State the principle of homogeneity of dimensions
- 1.7 State the applications and limitations of dimensional analysis
- 1.8 Errors in measurement, Absolute error, relative error, percentage error, significant figures
- 1.9 Solve problems

2.0 Concept of Elements of Vectors

- 2.1 Explain the concept of scalars, Vectors and give examples
- 2.2 Represent vectors graphically, Classify the Vectors, Resolve the vectors
- 2.3 Determine the resultant of a vector by component method, represent a vector in Space using unit vectors (i, j, k)
- 2.4 State and explain triangle law, parallelogram law, and polygon law of addition of Vectors
- 2.5 Define Dot product of two vectors with examples (Workdone, Power), mention the Properties of dot product
- 2.6 Define cross product of two vectors with examples (Torque, Linear velocity) Mention the properties of Cross product.
- 2.7 Solve the related numerical problems

3.0 Concept of Dynamics

- 3.1 Write the equations of motion in a straight line. Explain the acceleration due to Gravity.
- 3.2 Explain vertical motion of a body and derive expressions for a) Maximum Height, b) Time of ascent, c) time of descent, and d) time of flight
- 3.3 Derive height of a tower when a body projected vertically upwards from the top of a tower.
- 3.4 Explain projectile motion with examples
- 3.5 Explain horizontal projection and derive an expression for the path of a projectile in horizontal projection
- 3.6 Explain oblique projection and derive an expression for it. Derive formulae for a) Maximum Height b) time of ascent c) time of descent and d) time of flight e) Horizontal Range, f) Maximum range
- 3.7 Define force, momentum, angular displacement, angular velocity, angular acceleration, angular momentum, moment of inertia, torque
- 3.8 Solve the related numerical problems

4.0 Concept of Friction

- 4.1 Define friction and classify the types of friction.
- 4.2 Explain the concept of normal reaction.
- 4.3 State the laws of friction.
- 4.4 Define coefficients of friction, Angle of friction and angle of repose.
- 4.5 Derive expressions for acceleration of a body on a rough inclined plane. (Upwards and downwards)
- 4.6 List the advantages and disadvantages of friction.
- 4.7 Mention the methods of minimizing friction.
- 4.8 Explain why it is easy to pull a lawn roller than to push it.
- 4.9 Solve the related numerical problems.

5.0 Concepts of Work, Power, and Energy

- 5.1 Define the terms Work, Power and Energy. State SI units and dimensional Formulae.
- 5.2 Define potential energy and give examples, derive an expression for potential energy.
- 5.3 Define Kinetic energy and give examples, derive an expression for kinetic energy.
- 5.4 State and derive Work-Energy theorem.
- 5.5 Derive the relation between Kinetic energy and momentum.
- 5.6 State the law of conservation of energy and verify it in the case of a freely falling body.
- 5.7 Solve the related numerical problems.

6.0 Concepts of Simple harmonic motion

- 6.1 Define Simple harmonic motion, Give examples, state the conditions.
- 6.2 Explanation of uniform circular motion of a particle is a combination of two perpendicular S.H.M.s.
- 6.3 Derive expressions for displacement, velocity, acceleration, Frequency, Time period of a particle executing SHM.
- 6.4 Define phase of SHM.
- 6.5 Define Ideal simple pendulum and derive expression for time period of simple pendulum.
- 6.6 State the laws of motion of simple pendulum.
- 6.7 Solve the related numerical problems.

7.0 Concept of heat and thermodynamics

- 7.1 Explain the concept of expansion of gases
- 7.2 State and explain Boyle's and Charles laws.
- 7.3 Define absolute zero temperature, absolute scale of temperature
- 7.4 Define ideal gas and distinguish from real gas
- 7.5 Derive Ideal gas equation. Define specific gas constant and universal gas constant, write S.I unit and dimensional formula. Calculate the value of R.
- 7.6 Explain why universal gas constant is same for all gases
- 7.7 State and explain isothermal process and adiabatic process
- 7.8 State first and second laws of thermodynamics and state applications
- 7.9 Define specific heats and molar specific heats of a gas, Derive $C_p - C_v = R$
- 7.10 Solve the relevant numerical problems

8.0 Concept of Sound

- 8.1 Concept of the sound, Wave motion. (longitudinal and transverse wave)
- 8.2 Distinguish between musical sound and noise.
- 8.3 Explain noise pollution and state SI unit for intensity level of sound.
- 8.4 Explain causes, effects and methods of minimizing of noise pollution.
- 8.5 Explain the phenomenon of beats state the applications.
- 8.6 Define Doppler effect, list the applications.
- 8.7 Define reverberation and reverberation time and write Sabine's formula.
- 8.8 Define and explain echoes state its applications.
- 8.9 State conditions of good auditorium.
- 8.10 Solve the related numerical problems.

9.0 Concepts of properties of matter

- 9.1 Explain the terms elasticity, stress, strain and types of stress and strain.
- 9.2 State and explain Hooke's law.
- 9.3 Definitions of Modulus of elasticity, Young's modulus(Y), Bulk modulus (K), Rigidity modulus (n), Poisson's ratio (σ),
- 9.4 Define surface tension and give examples.
- 9.5 Explain Surface tension with reference to molecular theory.
- 9.6 Define angle of contact and capillarity and write formula for Surface Tension.
- 9.7 Explain the concept of viscosity, give examples, write Newton's formula.
- 9.8 Define co-efficient of viscosity and write its units and dimensional formula and State Poiseuille's equation for Co-efficient of viscosity.
- 9.9 Explain the effect of temperature on viscosity of liquids and gases.
- 9.10 Solve the related numerical problems.

10. Concepts of Electricity and Magnetism

- 10.1 Explain Ohm's law in electricity and write the formula.
- 10.2 Define specific resistance, conductance and state their units.
- 10.3 Explain Kichoff's laws.
- 10.4 Describe Wheatstone's bridge with legible sketch.
- 10.5 Describe Meter Bridge for the determination of resistivity with a circuit diagram.
- 10.6 Explain the concept of magnetism. State the Coulomb's inverse square law of Magnetism.
- 10.7 Define magnetic field and magnetic lines of force and write the properties of magnetic lines of force.
- 10.8 Derive an expression for the moment of couple on a bar magnet placed in a uniform magnetic field.
- 10.9 Derive equations for Magnetic induction field strength at a point on the axial line and on the equatorial line of a bar magnet.
- 10.10 Solve the related numerical problems

11.0 Concepts of modern physics

- 11.1 State and explain Photo-electric effect and Write Einstein's photo electric Equation.
- 11.2 State laws of photo electric effect.
- 11.3 Explain the Working of photo electric cell, write its applications.
- 11.4 Recapitulation of refraction of light and its laws, critical angle, total Internal Reflection.
- 11.5 Explain the principle and working of Optical fiber, mention different types of Optical fiber, state the applications.
- 11.6 Define super conductor and super conductivity and mention examples.
- 11.7 State the properties of super conducting materials and list the applications.
- 11.8 Nanotechnology definition, nano materials, applications.

COURSECONTENT

1. Units and Dimensions:

Introduction, Physical quantity, Fundamental and Derived quantities, Fundamental and Derived units, SI units, Multiples and Sub multiples, Rules for writing S.I. units, Advantages of SI units. Dimensions and Dimensional formulae, Dimensional constants and Dimensionless quantities, Principle of homogeneity, Advantages and limitations of dimensional analysis, Errors in measurement, Absolute error, relative error, percentage error, significant figures, Problems.

2. Elements of Vectors:

Scalars and Vectors, Types of vectors (Proper Vector, Null Vector, Unit Vector, Equal, Negative Vector, Like Vectors, Co-Initial Vectors, Co-planar Vectors and Position Vector). Addition of vectors, Representation of vectors, Resolution of vectors, Parallelogram, Triangle and Polygon laws of vectors, Subtraction of vectors, Dot and Cross products of vectors-Problems.

3. Dynamics

Introduction-Concept of acceleration due to gravity-Equations of motion for a freely falling body and for a body thrown up vertically- Projectiles- Horizontal and Oblique projections- Expressions for maximum height, time of flight, range-Define force, momentum, angular displacement, angular velocity, angular acceleration, angular momentum, moment of inertia, torque-problems.

4. Friction:

Introduction to friction- Causes- Types of friction- Laws of friction- Angle of repose-Angle of friction-rough inclined plane- Advantages and disadvantages of friction-Methods of reducing friction-Problems.

5. Work, Power and Energy:

Work, Power and Energy- Definitions and explanation- potential energy- kinetic energy-Derivations of Potential and Kinetic energies-K.E and Momentum relation - Work-Energy theorem- Law of Conservation of energy- Problems.

6. Simple Harmonic Motion:

Introduction- Conditions of SHM- Definition- Examples- Expressions for displacement, velocity, acceleration, Time period, frequency and phase in SHM- Time period of a simple pendulum- Laws of simple pendulum-seconds pendulum-Problems.

7. Heat and Thermodynamics:

Expansion of Gases, Boyle's law, absolute scale of temperature- Charles laws- Ideal gas equation- Universal gas constant- Differences between gas constant(r) and universal gas constant(R), Isothermal and adiabatic processes, Laws of thermodynamics, Specific heats - molar specific heats of a gas -Different modes of transmission of heat ,laws of thermal conductivity, Coefficient of thermal conductivity-Problems.

8. Sound:

Sound- Nature of sound- Types of wave motion -musical sound and noise- Noise pollution – Causes & effects- Methods of reducing noise pollution- Beats- Doppler effect- Echo- Reverberation- Reverberation time-Sabine 's formula-Conditions of good auditorium- Problems.

9. Properties of matter

Definition of Elasticity –Definition of stress and strain -the units and dimensional formulae for stress and strain-The Hooke's law-Definitions of Modulus of elasticity, Young's modulus(Y), Bulk modulus(K), Rigidity modulus (n),Poisson's ratio (σ), relation between Y , K , n and σ (equations only no derivation)

Definition of surface tension-Explanation of Surface tension with reference to molecular theory - Definition of angle of contact -Definition of capillarity -The formula for surface tension based on capillarity - Explanation of concept of Viscosity - Examples for surface tension and Viscosity - Newton's formula for viscous force- Definition of co-efficient of viscosity- The effect of temperature on viscosity of liquids and gases - Poiseuille's equation for Co-efficient of viscosity- The related numerical problems.

10. Electricity & Magnetism:

Ohm's law and explanation, Specific resistance, Kirchoff's laws, Wheatstone's bridge, Meter bridge, Coulomb's inverse square law, magnetic field, magnetic lines of force, magnetic induction field strength- magnetic induction field strength at a point on the axial line - magnetic induction field strength at a point on the equatorial line–problems.

11. Modern Physics;

Photoelectric effect –Einstein's photoelectric equation-laws of photoelectric effect-photoelectric cell–Applications of photo electric effect- Total internal reflection- fiber optics- -principle and working of an optical fiber-types of optical fibers - Applications of optical fibers- superconductivity–applications-Nanotechnology definition, nano materials, applications

REFERENCEBOOKS

- | | |
|--|------------------------------------|
| 1. Telugu Academy (English version) | Intermediate physics Volume-I & 2 |
| 2. Dr. S. L. Guptha and Sanjeev Guptha | Unified physics Volume 1,2,3 and 4 |
| 3. Resnick& Holiday | Text book of physics Volume I |
| 4. Dhanpath Roy | Text book of applied physics |
| 5. D.A Hill | Fiber optics |
| 6. XI & XII Standard | NCERT Text Books |

➤ **Model Blue Print with Weightage for Blooms category and questions for chapter and Cos mapped**

S. No	Unit Title/Chapter	No of Periods	Weight age of marks	Marks wise distribution of Weightage				Question wise distribution of Weightage				Mapped with CO
				R	U	Ap	An	R	U	Ap	An	
1	Units and Dimensions	08	03	3	0	0	0	1	0	0	0	CO1
2	Elements of Vectors	12	11	3	8	0	0	1	1	0	0	CO1
3	Dynamics	12	11	3	8	0	0	1	1	0	*	CO2
4	Friction	10	11	3	0	8	0	1	0	1	0	CO2
5	Work, Power and Energy	12	11	3	8	0	0	1	1	0	0	CO3
6	Simple harmonic motion	12	11	3	8	0	0	1	1	0	*	CO3
7	Heat and Thermodynamics	12	11	0	8	3	0	0	1	1	*	CO4
8	Sound	10	11	0	8	3	0	0	1	1	0	CO4
9	Properties of matter	10	08	0	8	0	0	0	1	0	0	CO5
10	Electricity and Magnetism	12	14	6	0	8	0	2	0	1	0	CO5
11	Modern physics	10	08	0	8	0	0	0	1	0	0	CO5
Total		120	110	24	64	22	0	8	8	4	* 10	

***One question of HOTs for 10 marks from any of the unit title 3 or 6 or 7**

➤ **Table specifying the scope of syllabus to be covered for Unit Tests**

Unit Test	Learning outcomes to be covered
Unit Test – 1	From 1.1 to 4.9
Unit Test – 2	From 5.1 to 7.10
Unit Test – 3	From 8.1 to 11.8

➤ **Model question paper for Unit Tests I,II,III with COs mapped**

UNIT TEST-I
Model Question Paper (C-20)
ENGINEERING PHYSICS (MNG-103)

TIME: 90 minutes

Total Marks: 40

PART-A

16 Marks

Instructions: (1) Answer all questions.
(2) First question carries 4 marks and others carry 3 marks each.
(3) Answers for the Question numbers 2 to 5 should be brief and straight to the point and shall not exceed five simple sentences.

1. i) The dimensional formula of force is _____ (CO1)
- ii) Which of the following is a scalar [] (CO1)
a) force b) work c) displacement d) velocity
- iii) We can add a scalar to a vector (Yes / No) (CO1)
- iv) Friction is a self-adjusting force. [True / False] (CO2)
2. Define dot product. Give one example. (CO1)
3. A force of 150 N acts on a particle at an angle of 30° to the horizontal. Find the horizontal and vertical components of force. (CO1)
4. Define projectile. Give two examples. (CO2)
5. It is easier to pull a lawn roller than to push it. Explain (CO2)

PART—B

3x8=24

Instructions:(1) Answer all questions. Each question carries 8marks.
(2) Answer should be comprehensive and the criteria for evaluation is content but not the length of the answer.

- 6) (A) Derive an expression for magnitude and direction of resultant of two Vectors using parallelogram law of vectors (CO1)
OR
(B) Write any four properties of dot product and any four properties of Cross product (CO1)
- 7) (A) Show that path of a projectile is a parabola in case of oblique Projection. (CO2)
OR
(B) Derive the expression for range and time of flight of a projectile (CO2)
- 8) (A) State and explain polygon law of vector addition with a neat diagram (CO1)
OR
(B) Derive the equation for acceleration of a body on a rough inclined plane (CO2)

UNIT TEST –II
Model Question Paper (C-20)
ENGINEERING PHYSICS (MNG–103)

TIME: 90 minutes

Total Marks: 40

PART –A

16 Marks

Instructions: (1) Answer all questions.

(2) First question carries 4 marks and others carry 3 marks each.

(3) Answers for the Question numbers 2 to 5 should be brief and straight to the point and shall not exceed five simple sentences.

- 1) i) The value of 100°C is equal to _____ in Kelvin scale of temperature (CO4)
- ii) Write the S.I unit of power (CO3)
- iii) A simple pendulum be used in artificial satellite (Yes / No) (CO3)
- iv) Specific heat of a gas is constant for all gases in nature [True / False] (CO4)
2. Derive the relation between momentum and kinetic energy (CO3)
3. A girl is swinging by sitting in a swing, how the frequency changes if she stands in the swing. (CO3)
4. Write the physical significance of universal gas constant. (CO4)
5. A body is projected in to the air in the vertically upward direction, find the height at which its potential and kinetic energies are equal. (CO3)

PART—B

3x8=24 Marks

Instructions:(1) Answer all questions. Each question carries 8marks.

(2) Answer should be comprehensive and the criteria for evaluation is content but not the length of the answer.

- 6) (A) State the law of conservation of energy and verify it in case of a freely falling body. (CO3)
OR)
(B) State and prove work energy theorem. (CO3)
- 7) (A) Define ideal simple pendulum and derive the equation for time period of a simple pendulum (CO3)
(OR)
(B) State the conditions for S.H.M, derive the equation for velocity for a Particle in S.H.M. (CO3)
- 8) (A) Define ideal gas, show that for an ideal gas the difference in specific heats is equal to universal gas constant (CO4)
(OR)
(B) State gas laws and derive the ideal gas equation (CO4)

UNIT TEST –III
Model Question Paper (C-20)
ENGINEERING PHYSICS (MNG–103)

TIME: 90 minutes

Total Marks: 40

PART –A

16 Marks

Instructions: (1) Answer all questions.

(2) First question carries 4 marks and others carry 3 marks each.

(3) Answers for the Question numbers 2 to 5 should be brief and straight to the point and shall not exceed five simple sentences.

- 1) i) Photo electric cell converts light energy in to _____ energy (CO5)
ii) What is elastic limit ? (CO5)
iii) SI unit of Specific resistance is ----- (CO5)
iv) Inside a bar magnet magnetic line of force will travel from North pole to South pole [True / False] (CO5)
2. Distinguish between Musical sound and Noise (CO4)
3. What is the effect of temperature on Viscosity of liquids and gases (CO5)
4. The values of resistances P, Q, R are $50\ \Omega$, $10\ \Omega$, $15\ \Omega$ respectively in the balanced condition of Wheatstone bridge, find the unknown resistance (CO5)
5. What is nanotechnology and write any two uses. (CO5)

PART—B

3x8=24 Marks

Instructions:(1) Answer all questions. Each question carries 8marks.

(2) Answer should be comprehensive and the criteria for evaluation is content but not the length of the answer.

- 6) (A) Explain Surface Tension based on the molecular theory (CO5)
(OR)
(B) Define Reverberation and Reverberation Time. Derive Sabine formula for reverberation time. (CO4)
- 7) (A) Derive the balancing condition of Wheatstone bridge with neat circuit Diagram. (CO5)
(OR)
(B) Derive an expression for the magnetic induction field strength at a point on the equatorial line of a bar magnet. (CO5)
- 8) (A) Describe an experiment to determine the specific resistance of a wire using meter bridge. (CO5)
(OR)
(B) Explain the principle and working of an optical fiber. (CO5)

BOARD DIPLOMA EXAMINATION, (C-20)
FIRST YEAR EXAMINATION
MNG-103, ENGINEERING PHYSICS

Time : 3 hours]

[Total Marks : 80M

PART—A

3×10=30

Instructions: (1) Answer all questions.
(2) Each question carries three marks.
(3) Answers should be brief and straight to the point and shall not exceed five simple Sentences.

1. Write the dimensional formula of the following physical quantities (CO1)
(a) Velocity (b) Force (c) Angular momentum
2. Write any three properties of scalar product. (CO1)
3. Define projectile. Give two examples. (CO2)
4. It is easier to pull a lawn roller than to push it. Explain. (CO2)
5. Define potential energy and kinetic energy. (CO3)
6. For a body in simple harmonic motion velocity at mean position is 4m/s, if the time period is 3.14 s, find its amplitude. (CO3)
7. State first and second laws of thermodynamics. (CO4)
8. Write any three conditions of good auditorium (CO4)
9. Define ohmic and non-ohmic conductors. (CO5)
10. State Coulomb's inverse square law of magnetism. (CO5)

PART—B

8 ×5= 40

Instructions: (1) Each question carries eight marks.
(2) Answers should be comprehensive and the criterion for valuation is the content But not the length of the answer.

11. A) Derive an expression for magnitude and direction of the resultant of two vectors using Parallelogram law of vectors. (CO1)
OR
B) Show that path of a projectile is parabola in case of oblique projection and derive expression for maximum height. (CO2)
12. A) Derive expression for acceleration of a body sliding downwards on a rough inclined plane. (CO2)
OR
B) Verify the law of conservation of energy in case of a freely falling body. (CO3)

13. A) Derive an expression for velocity and acceleration of a particle performing simple harmonic Motion. **(CO3)**
OR
B) Define ideal gas and derive ideal gas equation. **(CO4)**
14. A) Two tuning forks A and B produce 4 beats per second. On loading B with wax 6 beats are produced. If the quantity of wax is reduced the number of beats drops to 4. If the frequency of A is 326 Hz, find the frequency of B. **(CO4)**
OR
B) Explain surface tension based on molecular theory. Write three examples of surface tension. **(CO5)**
15. A) Derive an expression for balancing condition of Wheat stone's bridge with a neat circuit diagram. **(CO5)**
OR
B) Explain principle and working of optical fibers. Write any three applications. **(CO5)**

PART C

1 x 10 = 10

- 16) Derive relationship between molar specific heat of a gas at constant pressure C_p and molar specific heat of a gas at constant volume C_v and hence show that C_p is greater than C_v . **(CO4)**

Course code	Course Title	No. of Periods per week	Total No. of Periods	Marks for FA	Marks for SA
MNG-104	Engineering Chemistry and Environmental Studies	4	120	20	80

S.No	Unit Title/Chapter	No of Periods	COs Mapped
1	Fundamentals of Chemistry	18	CO1
2	Solutions	10	CO1
3	Acids and bases	10	CO1
4	Principles of Metallurgy	8	CO1
5	Electrochemistry	16	CO2
6	Corrosion	8	CO2
7	Water Treatment	10	CO3
8	Polymers	12	CO4
9	Fuels	6	CO4
10	Chemistry in daily life	6	CO4
11	Environmental Studies	16	CO5
	Total	120	

➤ **Course Objectives**

Course Title: Engineering Chemistry & Environmental Studies	
Course Objectives	<ol style="list-style-type: none"> 1. To familiarize with the concepts of chemistry involved in the process of various Engineering Industrial Applications. 2. To know the various natural and man-made environmental issues and concerns with an interdisciplinary approach that include physical, chemical, biological and socio cultural aspects of environment. 3. To reinforce theoretical concepts by conducting relevant experiments/exercises

➤ **Course outcomes**

Course Outcomes	CO1	Explain Bohr's atomic model, chemical bonding, mole concept, acids and bases, p^H metallurgical process and alloys
	CO2	Explain electrolysis, Galvanic cell, emf and corrosion
	CO3	Explain the chemistry involved in the treatment of water by advanced method
	CO4	Synthesise of Plastics, rubber and applications of fuel chemical compounds used in our daily life.
	CO5	Explain the causes, effects and control methods of air and water pollution and measures to protect the environment

Course code MNG-104	Engg. Chemistry and Environmental studies No of Cos;5				No Of periods 120
POs	Mapped with CO No	CO periods addressing PO in Col 1 NO %		Level 1,2,3	remarks
PO1	CO1,CO2,CO3, CO4,CO5	60	50%	3	>40% level 3 (highly addressed) 25% to 40% level2(moderately addressed 5% to 25% level1 (Low addressed < 5%(not addressed)
PO2	CO1,CO2	13	10.8%	1	
PO3	CO2,CO3	10	8.3%	1	
PO4	CO1	10	8.3%	1	
PO5	CO4,CO5	15	12.5	1	
PO6					
PO7	CO4	12	10%	1	

➤ **COs-POs mapping strength (as per given table)**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	1		1				1	1	
CO2	3	1	2					1	1	
CO3	3		2							
CO4	3				1		2			
CO5	3				3			1		

3 = strongly mapped

2= moderately mapped

1= slightly mapped

Note: The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:

i) Seminars ii) Tutorials iii) Guest Lectures iv) Assignments v) Quiz competitions vi) Industrial visit vii) Tech Fest viii) Mini project ix) Group discussions x) Virtual classes xi) Library visit for e-books

➤ **Model Blue Print with Weightage for Blooms category and questions for each chapter and COs mapped**

S.No	Unit Title/Chapter	No of Periods	Weight age of marks	Marks wise distribution of Weightage				Question wise distribution of Weightage				Mapped with CO
				R	U	Ap	An	R	U	Ap	An	
1	Fundamentals of Chemistry	18	19	8	8	3		1	1	1		CO1
2	Solutions	10	11	0	0	8	3			1	1	CO1
3	Acids and bases	10	11	0	8	0	3		1		1	CO1
4	Principles of Metallurgy	8	8	8	0	0		1				CO1
5	Electrochemistry	16	11	8	3	0		1	1		*	CO2
6	Corrosion	8	8	0	8	0			1			CO2
7	Water Treatment	10	11	8	3	0		1	1			CO3
8	Polymers	12	11	3	8	0		1	1		*	CO4
9	Fuels	6	3	3	0	0		1				CO4
10	Chemistry in daily life	6	3	0	0	3				1		CO4
11	Environmental Studies	16	14	3	11	0		1	2			CO5
Total		120	110	12	6	6	6	20	35	5	* 10	

*One question of HOTs for 10 marks from any of the unit title 5 or 8

Upon completion of the course the student shall be able to learn out

ENGINEERINGCHEMISTRY AND ENVIRONMENTAL STUDIES

1.0 Atomic structure

- 1.1 Explain the charge, mass of fundamental particles of an atom (electron, proton and neutron) and the concept of atomic number and mass number.
- 1.2 State the Postulates of Bohr's atomic theory and its limitations.
- 1.3 Explain the significance of four Quantum numbers.
- 1.4 Explain 1. Aufbau principle, 2 Pauli's exclusion principle 3 Hund's rule.
- 1.5 Define Orbital of an atom and draw the shapes of s, p and d- Orbitals.
- 1.6 Write the electronic configuration of elements up to atomic number 30
- 1.7 Explain the significance of chemical bonding
- 1.8 Explain the Postulates of Electronic theory of valency
- 1.9 Define and explain Ionic and Covalent bonds with examples of NaCl , MgO, *H₂, *O₂ and *N₂. (* Lewis dot method)
- 1.10 List out the Properties of Ionic compounds and covalent compounds and distinguish between their properties.
- 1.11 Structures of ionic solids-define a) Unit cell b) co-ordination number and the structures of NaCl and CsCl unit cells.

2.0 Solutions

- 2.1 Define the terms 1. Solution, 2. Solute and 3. Solvent
- 2.2 Classify solutions based on physical state and solubility
- 2.3 Define mole and problems on mole concept.
- 2.4 Define the terms 1. Atomic weight, 2. Molecular weight and 3. Equivalent weight and calculate Molecular weight and Equivalent weight of the given acids. (HCl , H_2SO_4 , H_3PO_4) Bases (NaOH , $\text{Ca}(\text{OH})_2$, $\text{Al}(\text{OH})_3$) and Salts (NaCl , Na_2CO_3 , CaCO_3)
- 2.5 Define molarity and normality and numerical problems on molarity and normality
 - a) Calculate the Molarity or Normality if weight of solute and volume of solution are given
 - b) Calculate the weight of solute if Molarity or normality with volume of solution are given
 - c) Problems on dilution to convert high concentrated solutions to low concentrated Solutions

3.0 Acids and bases

- 3.1 Explain Arrhenius theory of Acids and Bases and give the limitations of Arrhenius theory of Acids and Bases.
- 3.2 Explain Bronsted–Lowry theory of acids and bases and give the limitations of Bronsted–Lowry theory of acids and bases.
- 3.3 Explain Lewis theory of acids and bases and give the limitations of Lewis theory of acids and bases.
- 3.4 Explain the Ionic product of water
- 3.5 Define pH and explain P^{H} scale and solve the Numerical problems on pH (Strong Acids and Bases)
- 3.6 Define and explain buffer solution and give the examples of buffer solutions.
- 3.7 State the application of buffer solutions

4.0 Principles of Metallurgy

- 4.1 List out the Characteristics of Metals and non-metals
- 4.2 Distinguish between Metals and Non-metals
- 4.3 Define the terms 1. Mineral, 2. Ore, 3. Gangue, 4. Flux 5. Slag
- 4.4 Describe the methods of concentration of Ore; 1. Handpicking 2. Levigation and 3. Froth Floatation
- 4.5 Describe the methods involved in extraction of crude metal- Roasting, Calcination and Smelting.
- 4.6 Explain the purification of Copper by Electrolytic Refining
- 4.7 Define an Alloy and Write the composition and uses of the following alloys. 1. Brass 2. German silver 3. Nichrome.

5.0 Electrochemistry

- 5.1 Define the terms 1. Conductor 2. Semiconductor 3. Insulator, 4. Electrolyte 5. Non-electrolyte. Give two examples each.
- 5.2 Distinguish between metallic conduction and Electrolytic conduction
- 5.3 Explain electrolysis by taking example fused NaCl
- 5.4 Explain Faraday's laws of electrolysis
- 5.5 Define 1. Chemical equivalent (E) 2. Electrochemical equivalent (e) and their relation.
- 5.6 Solve the Numerical problems on Faraday's laws of electrolysis and applications of electrolysis (Electro plating)
- 5.7 Define Galvanic cell and explain the construction and working of Galvanic cell.
- 5.8 Distinguish between electrolytic cell and galvanic cell
- 5.9 Explain the electrode potentials and standard electrode potentials
- 5.10 Explain the electrochemical series and its significance
- 5.11 Explain the emf of a cell and solve the numerical problems on emf of the cell based on standard electrode potentials.

6.0 Corrosion

- 6.1 Define the term corrosion.
- 6.2 state the Factors influencing the rate of corrosion
- 6.3 Describe the formation of a) composition cell b) stress cell c) concentration cell during corrosion.
- 6.4 Define rusting of iron and explain the mechanism of rusting of iron.
- 6.5 Explain the methods of prevention of corrosion
 - a) Protective coatings (anodic and cathodic coatings)
 - b) Cathodic protection (Sacrificial anode process and Impressed-voltage process)

7.0 Water Treatment

- 7.1 Define soft water and hard water with respect to soap action.
- 7.2 Define and classify the hardness of water.
- 7.3 List out the salts that causing hardness of water (with Formulae)
- 7.4 State the disadvantages of using hard water in industries.
- 7.5 Define Degree of hardness and units of hardness (mg/L) or (ppm).
- 7.6 Explain the methods of softening of hard water: a) Ion-exchange process, b) Permutit process or zeolite process
- 7.7 State the essential qualities of drinking water.
- 7.8 Chemistry involved in treatment of water (Coagulation, Chlorination, defluoridation)
- 7.9 Explain Osmosis and Reverse Osmosis with examples.
- 7.10 State the applications of Reverse Osmosis.

8.0 Polymers

- 8.1 Explain the concept of polymerisation
- 8.2 Describe the methods of polymerization a) addition polymerization of ethylene b) condensation polymerization of Bakelite (Only flow chart)
- 8.3 Define thermoplastics and thermosetting plastics with examples.
- 8.4 Distinguish between thermo plastics and thermosetting plastics
- 8.5 List the Characteristics of plastics and state the disadvantages of using plastics.
- 8.6 State the advantages of plastics over traditional materials.
- 8.7 Explain the methods of preparation and uses of the following plastics:
 - 1. PVC, 2. Teflon, 3. Polystyrene 4. Nylon 6,6
- 8.8 Explain processing of Natural rubber and write the structural formula of Natural rubber.
- 8.9 List the Characteristics of raw rubber
- 8.10 Define and explain Vulcanization and List out the Characteristics of Vulcanized rubber.
- 8.11 Define the term Elastomer and describe the preparation and uses of the following synthetic rubbers
 - a) Buna-s and b) Neoprene rubber.

9.0 Fuels

- 9.1 Define the term fuel
- 9.2 Classify the fuels based on physical state and based on occurrence.
- 9.3 List the characteristics of good fuel.
- 9.4 State the composition and uses of gaseous fuels.
 - a) water gas b) producer gas, c) natural gas, d) Coal gas, e) Biogas.

10.0 Chemistry in daily life

- 10.1 Give the basic chemical composition, applications, health aspects and pollution impacts of
 - a) soaps, and detergents b) vinegar c) Insect repellents d) activated charcoal e) Soft drinks

11.0 ENVIRONMENTAL STUDIES

- 11.1 Define the term environment and explain the scope and importance of environmental studies
- 11.2 Define the segments of environment 1).Lithosphere, 2).Hydrosphere, 3).Atmosphere, 4).Biosphere,
- 11.3 Define the following terms 1)Pollutant, 2).Pollution, 3).Contaminant, 4)receptor, 5)sink, 6) particulates, 7)dissolved oxygen (DO), 8)Threshold limit value (TLV), 9).BOD,10).COD 11) eco system12) Producers13) Consumers 14) Decomposers with examples
- 11.4 State the renewable and non renewable energy sources with examples.
- 11.5 Explain biodiversity and threats to biodiversity
- 11.6 Define air pollution and classify the air pollutants-based on origin and physical state of matter.
- 11.7 Explain the causes, effects of air pollution on human beings, plants and animals and control methods of air pollution.
- 11.8 State the uses of forest resources.
- 11.9 Explain causes and effects of deforestation
- 11.10 Explain the causes and effects of the following
1) Greenhouse effect, 2) Ozone layer depletion and 3) Acid rain
- 11.11 Define Water pollution, explain the causes, effects and control methods of Water pollution.

COURSE CONTENT

ENGINEERING CHEMISTRY AND ENVIRONMENTAL STUDIES

1. Fundamentals of Chemistry

Atomic Structure: Introduction - Fundamental particles – Bohr's theory – Quantum numbers – Aufbau principle - Hund's rule - Pauli's exclusion Principle- Orbitals, shapes of s, p and d orbitals - Electronic configurations of elements

Chemical Bonding: Introduction – types of chemical bonds – Ionic and covalent bond with examples– Properties of Ionic and Covalent compounds- structures of ionic crystals (NaCl and CsCl).

2. Solutions

Introduction of concentration methods – mole concept, molarity and normality – Numerical problems on mole, molarity and normality.

3. Acids and Bases

Introduction – Theories of acids and bases and limitations – Arrhenius theory- Bronsted –Lowry theory – Lewis acid base theory – Ionic product of water- pH related numerical problems–Buffer solutions, action of buffer and its applications.

4. Principles of Metallurgy

Characteristics of Metals and non-metals –Distinguish between Metals and Non-metals, Define the terms i) Metallurgy ii) ore iii) Gangue iv) flux v) Slag - Concentration of Ore –Hand picking, Levigation, Froth floatation – Methods of Extraction of crude Metal – Roasting, Calcination, Smelting – Alloys – Composition and uses of brass, German silver and nichrome.

5. Electrochemistry

Conductors, semiconductors, insulators, electrolytes and non-electrolytes – electrolysis – Faraday's laws of electrolysis-application of electrolysis(electroplating) -numerical problems on Faraday's laws – Galvanic cell – standard electrode potential – electrochemical series–emf and numerical problems on emf of a cell .

6. Corrosion

Introduction - factors influencing corrosion - composition, stress and concentration cells–rusting of iron and its mechanism – prevention of corrosion by coating methods, cathodic protection methods.

7. Water technology

Introduction–soft and hard water–causes of hardness–types of hardness
–disadvantages of hard water – degree of hardness (ppm and mg/lit) – softening methods – permutit process – ion exchange process– qualities of drinking water –Chemistry involved in treatment of water (Coagulation, Chlorination, defluoridation) - Osmosis, Reverse Osmosis – Applications of Reverse osmosis.

8. Polymers

Introduction – polymerization – types of polymerization – addition, condensation with examples – plastics – types of plastics – advantages of plastics over traditional materials-Disadvantages of using plastics – Preparation and uses of the following plastics i).PVC ii) Teflon iii) Polystyrene iv) .Nylonn 6,6 –Processing of natural rubber - Vulcanization – Elastomers- Preparation and applications of Buna-s, Neoprene rubbers.

9. Fuels

Definition and classification of fuels–characteristics of good fuel-composition and uses of gaseous fuels.

10. Chemistry in daily life

Basic composition, applications, health aspects and pollution impacts of soaps and detergents, vinegar, insect repellents, soft drinks, activated charcoal.

11. ENVIRONMENTALSTUDIES

Introduction– environment –scope and importance of environmental studies – important terms related to environment– renewable and non-renewable energy sources–Concept of ecosystem – Biotic components –Forest resources – Deforestation -Biodiversity and its threats-Air pollution – causes-effects–Global environmental issues – control measures – Water pollution – causes – effects – control measures.

REFERENCEBOOKS

- | | | |
|----|----------------|---------------------------------|
| 1. | Telugu Academy | Intermediate chemistry Vol 1&2 |
| 2. | Jain & Jain | Engineering Chemistry |
| 3. | O.P. Agarwal, | Hi- Tech. Engineering Chemistry |
| 4. | Sharma | Engineering Chemistry |
| 5. | A.K. De | Engineering Chemistry |

Table specifying the scope of syllabus to be covered for unit test 1, unit test 2 and unit test 3

Unit Test	Learning outcomes to be covered
Unit Test – 1	From 1.1 to 3.7
Unit Test – 2	From 4.1 to 7.10
Unit Test – 3	From 8.1 to 11.11

Model question paper for Unit Test with Cos mapped

UNIT TEST –I
Model Question Paper (C-20)
ENGINEERING CHEMISTRY & ENVIRONMENTAL STUDIES (MNG-104)

TIME: 90 minutes

Total Marks: 40

PART-A

16 Marks

Instructions: (1) Answer all questions.

(2) First question carries 4 marks and each of rest carries 3 marks.

(3) Answers for Q.No. 2 to 5 should be brief and straight to the point and shall not exceed five simple sentences.

1. a. Number of neutrons in ${}_{11}\text{Na}^{23}$ is ----- (CO1)
b. The molarity and normality of HCl is the same (True or False) (CO1)
c. What is the p^{H} range of base? (CO1)
d. Graphite is a good conductor of electricity (Yes or No) (CO1)
2. Distinguish between orbit and orbital. (CO1)
3. Define Covalent bond. Explain the formation of covalent bond in Oxygen and Nitrogen molecules. (CO1)
4. Define mole. Calculate the number of moles present in 50 gm of CaCO_3 and 9.8 gm of H_2SO_4 . (CO1)
5. Define P^{H} . Calculate the P^{H} of 0.001M HCl and 0.01M NaOH solution. (CO1)

PART – B

3x8M = 24M

Answer either (A) or (B) from each questions from Part-B. Each question carries 8 marks.

6. A) Explain Postulations of Bhor's atomic theory. Give its limitations. (CO1)
(OR)
B) Explain the significance of Quantum numbers. (CO1)
7. A) Express molarity normality with mathematical equation. Calculate the molarity and normality of 10gm of NaOH present in 500 ml solution. (CO1)
(OR)
B) Classify solutions based the physical state of solute and solvent and give an example each. (CO1)
8. A) What is buffer solution? Classify with examples and give its applications. (CO1)
(OR)
B) Explain Bronsted-Lowry theory of acids and bases. Give its limitations. (CO1)

UNIT TEST –II
Model Question Paper (C-20)
ENGINEERING CHEMISTRY & ENVIRONMENTAL STUDIES (104)

TIME: 90 minutes

Total Marks:40Marks

PART-A

16 Marks

Instructions:(1) Answer all questions.

(2) First question carries 4 marks and each of rest carries 3 marks.

(3) Answers for Q.No. 2 to 5 should be brief and straight to the point and shall not exceed five simple sentences.

1. a) Bauxite is the ore of metal (CO2)
b) What is the unit of electrochemical equivalent? (CO2)
c) CaSO_4 is the permanent hardness causing salt. (True or False) (CO3)
d) Write the Chemical formula of rust. (CO2)
2. Write any three differences between metallic conduction and electrolytic conduction.(CO2)
3. Write the composition and applications of German silver and Nichrome. (CO1)
4. Mention any three disadvantages of using hard water in industries. (CO3)
5. Define electro chemical equivalent and chemical equivalent. Give the relation between them. (CO2)

PART – B

3x8M = 24M

Answer either (A) or (B) from each questions from Part-B.Each question carries 8 marks.

6. A) What is galvanic cell? Explain construction and working of galvanic cell with neat diagram (CO2)
(OR)
B) State and explain Faraday`s laws of electrolysis. (CO2)
7. A) Explain different types of galvanic cells formed during the corrosion of metals.(CO2)
(OR)
B) What is hard water? Explain zeolite process of softening of hard water. (CO3)
8. A) Explain Froth floatation process. (CO1)
(OR)
B) Explain Electrolytic refining processing of copper. (CO1)

UNIT TEST –III
Model Question Paper (C-20)
ENGINEERING CHEMISTRY & ENVIRONMENTAL STUDIES (MNG-104)

TIME: 90 minutes

Total Marks:40

PART-A

16 Marks

Instructions: (1) Answer all questions.
(2) First question carries 4 marks and each of rest carries 3 marks.
(3) Answers for Q. No. 2 to 5 should be brief and straight to the point and shall not exceed five simple sentences.

1. a) The monomer of PVC..... (CO4)
b) Sulphur is the vulcanising agent. (True/False) (CO4)
c) Give an example for secondary pollutant. (CO5)
d) Presence of ozone in stratosphere is a pollutant.(Yes/No) (CO5)
2. List any three characteristic properties of vulcanised rubber. (CO4)
3. Define primary fuel and secondary fuels give an example each. (CO4)
4. Mention the basic chemical composition and applications of vinegar. (CO4)
5. Write any three threats to the biodiversity. (CO5)

PART – B

3x8M = 24M

Answer either (A) or (B) from each questions from Part-B.Each question carries 8 marks.

6. A) A) Explain addition and condensation polymerisation with an example each. (CO4)
(OR)
B) Give a method of preparation and applications of the following
i) Buna-S ii) Neoprene (CO4)
7. A) What is air pollution? Explain any three causes of air pollution. (CO5)
(OR)
B) Briefly explain ozone layer depletion and greenhouse effect. (CO5)
8. A) What is water pollution? Explain any three controlling methods of water pollution.(CO5)
(OR)
B) What are thermoplastics and thermo setting plastic? Write any four differences between these two plastics. (CO4)

MODEL QUESTION PAPER (C-20)
ENGINEERING CHEMISTRY & ENVIRONMENTAL STUDIES (MNG-104)

TIME: 3hrs

Total Marks:80

PART-A

Instructions: (1) Answer all questions. Answer all questions.

3x10=30M

(2) Each question carries 3 marks.

1. Draw the shapes of s and p orbitals. (CO1)
2. Define mole. Find the mole number of 10 g of CaCO_3 (CO1)
3. Define Buffer solution. Give any two examples. (CO1)
4. Define chemical equivalent and electrochemical equivalent. Give their relation. (CO2)
5. State name of the salts and their formulae that cause hardness. (CO3)
6. Write any three disadvantages of using plastics. (CO4)
7. Classify the fuels based on their occurrence. (CO4)
8. Mention the basic chemical composition and applications of vinegar. (CO4)
9. List out any three threats to biodiversity. (CO5)
10. Define pollutant and contaminant. Give an example each. (CO5)

PART – B

Each question carries eight marks.

8x5=40M

11. A) Explain Bohr's atomic theory and give its limitations. (CO1)
(OR)
B) Explain ionic bond formation and covalent bond formation with one example each (CO1)
12. A) Calculate the molarity and normality of 250 ml of sodium carbonate solution that contains 10.6 gm of sodium carbonate. (CO1)
(OR)
B) Explain Bronstead and Lowry theory of acids and bases. Give its limitations. (CO1)
13. A) Explain froth floatation and electrolytic refining of copper with neat diagrams. (CO1)
(OR)
B) Explain the construction and working of galvanic cell. (CO2)
14. A) Explain Cathode protection methods. (CO2)
(OR)
B) Explain ion-exchange of softening of hard water with a neat diagram. (CO3)
15. A) Explain addition and condensation polymerisation with an example each. (CO4)
(OR)
B) Explain the causes and effects of air pollution. (CO5)

PART –C

Question carries ten marks

10x1 =10M

16. Analyse the products formed at cathode and anode with electrode reactions during the Electrolysis of aqueous NaCl in compare with fused NaCl. (CO2)

ELEMENTS OF MINING

Course Code	Course Title	No of periods / week	Total no of periods	Marks for FA	Marks for SA
MNG-105	Elements of Mining	6	180	20	80

TIME SCHEDULE

S. No.	Major Topics	Periods	CO's Mapped
1	Introduction & stages of Mining	20	CO1
2	Concepts of Mining Methods	20	CO1, CO2
3	Drilling Methods	40	CO1, CO2, CO3, CO5
4	Explosives	40	CO2, CO3, CO4
5	Blasting practice in mines	30	CO3, CO4, CO5
6	Shaft sinking	30	CO3, CO4, CO5
	Total	180	

Course Objectives and Course Outcomes

Course Objectives	<p>Upon completion of the course the student shall be able to:</p> <ul style="list-style-type: none"> i) To familiarize the various methods of accessing the deposits and different mining activities ii) To familiarize various Mining methods iii) Explain Different methods of drilling iv) Explain Various types of explosives and their field use v) Describe various methods of shaft sinking and their field applicability
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Course outcomes	CO1	Fundamental concepts of mining, Mining methods, drilling methods, methods of shaft sinking
	CO2	Explain Pre-mining, post mining operations, various types of explosives
	CO3	Explain Different types of drilling methods, blasting practices in mines
	CO4	Determination of efficiency of blasting operations, Mining methods under various conditions, usage of explosives in a given conditions
	CO5	Computation of powder factor, Shaft sinking methods under various mining conditions

PO-CO Mapping

Course Code: MNG-105		Course Title: Elements of Mining			No of Periods: 180
PO No	Mapped with CO no	CO Periods addressing PO in Col 1		Level (1,2,3)	Remarks
		No	%		
PO1	CO1,CO2,CO3	78	44	3	>40% Level 3 Highly addressed 25% to 40% Level 2 Moderately Addressed 5 to 25% Level 1 Low addressed <5% Not addressed
PO 2	CO3	35	19	1	
PO 3					
PO 4					
PO 5	CO2,CO3	67	37	2	
PO 6					
PO 7					

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3									1
CO2	3				2				1	1
CO3	3	1			2			1	1	
CO4										
CO5										

3: High, 2: Moderate, 1: Low

LEARNING OUTCOMES

Upon completion of the course, student shall be able to:

1.0 Know the various Fundamental concepts of Mining and stages/phases in Mining

- 1.1 Explain the contribution of Mining activity in the cause of human civilization, national economy.
- 1.2 Status of mineral resources in India and in the world.
- 1.3 State the role of Mining engineer in the industry
- 1.4 List the various Mining industries in the state and in the country
- 1.5 Define the terms mine, mining, mining engineering, ore, ore deposits, waste/gangue, mineral, mineral deposits, Shaft, Incline and Adit, Haul road
- 1.6 List the various stages of mining operations: Pre- mining, Mining and Post-mining.

- 1.7 List the various pre-mining operations-Exploration, land acquisition, prospecting licence, de-vegetation, and initial ground treatment for future (Next stage) of Mining operations – Forming approach Roads.
- 1.8 List the various mining operation (Entry to deposit, development, exploitation, stopping/depillaring.)
- 1.9 List the various ancillary mining operations – (Strata control, transportation, ventilation, drainage, lighting, reclamation, soil or back filling.)
- 1.10 List the various post mining operations (beneficiation of mineral, concentration techniques, assaying and metallurgical operations.)
- 1.11 List different types of mode of entry to mineral deposits, and state applicability, limitations of the above

2.0 Know the concepts of Mining Methods.

- 2.1 Define the following terms with sketches
- 2.2 Out crop, Cover, overburden, back, vein, lode, ore shoot, coal measures, pit top, pit-bank, pit-bottom, shaft station, reserve station, rest station, mineral reserves, tunnel, cross cut, level, drive, staple pit, inset, gallery, heading, blind heading, face, dip, closures, slice, split, stook, barrier, sump, shaft, auxiliary shaft.
- 2.3 Give the classification of coal seams based on the thickness, depth, inclination, gassiness and wateriness.
- 2.4 Give the classification of methods of working coal in respect of underground and open cast mining
- 2.5 Compare underground mining vs opencast mining
- 2.6 Compare Shaft vs Incline

3.0 Know the Drilling methods.

- 3.1 State the purpose of drill holes in Mining.
- 3.2 Give the classification of drilling methods, selection criteria of each method and limitations
- 3.3 State the applicability of percussive and rotary drilling methods.
- 3.4 List the drilling tools and accessories used in percussive and rotary drilling and their purpose
- 3.5 Explain methods of percussive drilling, rotary drilling with sketches.
- 3.6 Describe the feed mechanism – Screw Feed and Hydraulic feed with sketches.
- 3.7 Define the terms mud flushing, sludge and core.
- 3.8 State the purpose of mud flushing and core recovery.
- 3.9 List the different methods of core recovery.
- 3.10 Explain principle of working of single tube, double tube and wire line core barrel with sketch
- 3.11 Explain wire-line tube barrel and its working with sketch
- 3.12 State the reasons for deviation of bore holes.

4.0 Understand the explosives

- 4.1 Define the term explosive, low explosive, high explosive, booster, primer, Permitted explosive and detonator.
- 4.2 State the uses of explosives for mining industry.
- 4.3 List and explain the characteristics of explosives
- 4.4 Classify the explosives based on strength, density
- 4.5 State the composition of low explosives and high explosives.
- 4.6 List the properties of low explosives and high explosives.

- 4.7 State their field of applications of low explosives and high explosives.
- 4.8 Compare the Low explosive vs High explosive.
- 4.9 Classify the Permitted explosives, the tests that a permitted explosive should pass through and state their applicability
- 4.10 Give the composition of permitted explosives with the examples un- sheathed, sheathed, ultra safe, and Blasting off the Solid (BOS) explosives.
- 4.11 List the types of initiation of explosives.
- 4.12 Describe the safety fuse and mention the field application of Safety fuse and Cordtex
- 4.13 Classify the detonators and state the composition of different detonators.
- 4.14 Describe the constructional details of a) Ordinary b) electric c) delay d) Nonel detonators and field application

5.0 Blasting practice in mines

- 5.1 Define solid blasting and state field of application
- 5.2 Define the term blasting
- 5.3 Explain the solid blasting and state rules and provisions related to solid blasting
- 5.4 Define the term induced blasting
- 5.5 Explain different blasting patterns for underground excavations
- 5.6 List the blasting tools used in the fuse and electric blasting and state their functions
- 5.7 Explain direct and inverse initiation with sketches
- 5.8 Define Blown-out shot, Socket, Misfire, Powder factor, Drilling ratio, Yield / Kg
- 5.9 State the causes, remedial measures, procedure for treating misfires
- 5.10 List the dangers associated with underground blasting
- 5.11 List precautions to be taken before and after blasting
- 5.12 Simple numerical problems to calculate a) Power factor b) yield per Kg of explosive.

6.0 Know the Method of shaft sinking.

- 6.1 List the factors to be considered for the selection of a shaft as a mode of entry
- 6.2 State the factors consider for selection of a site for shaft sinking.
- 6.3 List the necessary equipment required for sinking a shaft
- 6.4 List the different stages of shaft sinking.
- 6.5 Explain the different stages of sinking through normal strata.
- 6.6 Explain temporary supporting while sinking shaft.
- 6.7 List different permanent supporting methods of sinking shaft.
- 6.8 Explain the permanent supporting of the shaft sides by a) brick walling b) Concrete curbing c) Tubbing
- 6.9 Classify the special methods of shaft sinking and their applicability's.
- 6.10 Explain the RCC piling method of shaft sinking
- 6.11 Define the terms a) Pre-Silicatization b) Silicatization c) Product holes d) Thawing e) Water garland f) Weep holes
- 6.12 Explain the Cementation and freezing methods of shaft sinking
- 6.13 List the modern techniques used in shaft sinking

COURSE CONTENT:

1. Introduction and stages of Mining

Contribution of Mining activities of civilization-Definitions of terms –Mining Industries in the state and in the country.– Pre mining, mining and post-mining – ancillary mining operations, Types of entries to mineral deposits – Shaft, Incline, Adit –applicable conditions- limitations, compare shaft vs incline.

2. Concepts and Definition of terms commonly used in coal and non-coal mining

Classification of the mineral deposits basing on various factors, shallow, deep, very deep, steeply inclined, moderately inclined, inclined vein, massive deposits. Classification of coal seams- Thick, moderately thick, thin seams, I, II, III degree gassy seams. Classification of methods of working coal-opencast, underground-Bord and Pillar/ longwall-Advancing and retreating.

3. Drilling methods

Use of drill holes – (Classification) methods – applicable conditions – tools used for drilling – percussive and rotary, feed mechanism – Screw feed and hydraulic feed mechanism – mud flushing – sludge and core, core recovery methods of core recovery – reasons for deviation of bore holes. Single tube, double tube and wire line core barrel.

4. Explosives

Uses of explosives in mining industry, characteristics classification basing on strength, speed and application, low and high explosives, their composition, properties – explosives used in underground in opencast workings including LOX, slurries, boosters, primer – their composition application permitted explosives – tools, applicability, examples with their composition. Selection of explosives – factors, Initiation of explosives – fuses – safety fuse, cortex fuse. Detonators – types, composition, constructional details and applications.

5. Blasting practice in mines

Solid blasting- rules and provisions related-induced blasting-different types of blasting practice-different types of drill bits- tools –Reconditioning-Dangers and precaution measures of blasting, fuse and electric blasting and misfire dealing.

6. Shaft Sinking

Uses, factors for selection of site, different stages of sinking through subsoil, temporary, permanent supporting, special methods .Purpose of widening and deepening- special methods- modern trends

REFERENCE BOOKS:

- | | |
|-------------------------------------|----------------------------------|
| 1. Elements of Mining | : D.J.DeshmukhVol-I |
| 2. Winning and working coal | : R.T.Deshmukh&D.J.DeshmukhVol-I |
| 3. Explosives & Blasting Practice | : Samir Kumar Das |
| 4. Elements of Mining | : D.J.Deshmukh Vol.-II |
| 5. Explosives and Blasting practice | : G.K.Pradhan |
| 6 UMS. | : VOLUME-I,II, III |

Blue Print of Question Paper

S. No	Chapter Name	Periods Allocated	Weightage Allocated	Marks Wise Distribution of Weightage				Question Wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	Introduction & stages of Mining	20	06	03	03			01	01			CO1
2	Concepts of Mining Methods	20	11	03		08		01		01		CO2, CO3
3	Drilling Methods	40	11		03	08			01	01		CO2, CO3
4	Explosives	40	14	03	03	08		01	01	01		CO3
5	Blasting practice in mines	30	14	03	03		08	01	01		01	CO2, CO3, CO4, CO5
6	Shaft sinking	30	14	03	03	08		01	01	01		CO3, CO4, CO5
Higher order question from any chapters			10				10				01	CO2, CO4, CO5
TOTAL		180	80	15	15	32	18	05	05	04	02	

R-Remember; U-Understanding; Ap-Application; An- Analysing

Table specifying the scope of syllabus to be covered for Unit Tests

Unit Test	Learning outcomes to covered
Unit Test –I	From 1.1 to 3.5
Unit Test –II	From 3.6 to 5.3
Unit Test -III	From 5.4 to 6.13

Model Paper for Unit Test-I :

**State Board of Technical Education and Training, A.P.
Diploma in Mining Engineering (DMNGE)
First Year :: MNG-105 ELEMENTS OF MINING**

Time: 90 Minutes

Unit Test –I

Maximum Marks : 40

PART- A

16 Marks

Instructions: (i) Answer all questions
(ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1. (a) An ore is the aggregate of mineral and gangue.
– True/False (CO1)
- (b) Mining is the art of excavation of wood from the earth's crust.
---- True/False (CO1)
- (c) The mineral deposit is exposed at the surface is known as _____ (CO3)
- (d) _____ are used for blasting of ore deposit in mining activity. (CO2)
2. List the various pre-mining operations (CO1)
3. Define the terms mine and mining (CO1)
4. Define the terms shaft station and reserve station (CO2)
5. List the tools used in drilling (CO3)

PART- B

3x8=24 Marks

Instructions:(i) Answer all questions
(ii) Each question carries EIGHT marks
(iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A) Explain the contribution of Mining activity in the cause of human civilization and national economy (CO1)
- (OR)
- (B) State the role of Mining engineer in the industry (CO1)
7. (A) Compare underground mining with opencast mining (CO3)
- (OR)
- (B) Compare Shaft with Incline (CO2)
8. (A) Explain methods of percussive drilling with sketches (CO2)
- (OR)
- (B) Explain methods of rotary drilling with sketches (CO3)

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Model Paper for Unit Test-II :

**State Board of Technical Education and Training, A.P.
Diploma in Mining Engineering (DMNGE)
First Year :: MNG-105ELEMENTS OF MINING**

Time: 90 Minutes

Unit Test –II

Maximum Marks : 40

PART- A

16 Marks

Instructions: (i) Answer all questions
(ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1. (a) Mud flushing is the process of filling cracks of drill holes
– True/False (CO3)
(b) Sheathed explosives doesn't come under permitted explosives.
---- True/False (CO2)
(c) VOD stands for _____ (CO3)
(d) Shaft, adit and incline are the types of _____ (CO2)
2. State the reasons for deviation of bore holes (CO2)
3. List the characteristics of explosives (CO3)
4. List the types of initiation of explosives (CO5)
5. Define the term induced blasting (CO4)

PART- B

3 x 8 = 24 Marks

Instructions:(i) Answer all questions
(ii) Each question carries EIGHT marks
(iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A) Describe the Screw Feed mechanism with sketch (CO2)
(OR)
(B) Explain principle of working of single tube with sketch (CO3)
7. (A) Compare the Low explosive with High explosive (CO3)
(OR)
(B) Describe the safety fuse and mention the field application of Safety fuse (CO3)
8. (A) Explain different blasting patterns for underground excavations (CO5)
(OR)
(B) Explain direct and inverse initiation with sketches (CO4)

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Model Paper for Unit Test-III :

**State Board of Technical Education and Training, A.P.
Diploma in Mining Engineering (DMNGE)
First Year :: MNG-105 ELEMENTS OF MINING**

Time: 90 Minutes

Unit Test –III

Maximum Marks : 40

PART- A

16 Marks

Instructions: (i) Answer all questions
(ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1. (a) Consumption of entire explosive by blasting without doing any useful work is called as misfire.
– True/False (CO5)
- (b) Powder factor determines the quantity of explosive required to break one cubic meter of strata.
---- True/False (CO3)
- (c) RCC in RCC piling method stands for _____ (CO4)
- (d) The location for sinking shaft must be above _____ (CO3)
2. List the blasting tools used in the fuse and electric blasting (CO3)
3. List the dangers associated with underground blasting (CO4)
4. List the different stages of shaft sinking (CO2)
5. List the modern techniques used in shaft sinking (CO3)

PART- B

3 x 8 = 24 Marks

Instructions: (i) Answer all questions
(ii) Each question carries EIGHT marks
(iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A) Explain direct and inverse initiation with sketches (CO4)
(OR)
(B) State the causes, remedial measures, procedure for treating misfires (CO3)
7. (A) Explain the different stages of sinking through normal strata (CO2)
(OR)
(B) Explain the permanent supporting of the shaft sides by brick walling (CO5)
8. (A) Explain temporary supporting while sinking shaft (CO4)
(OR)
(B) Explain the Cementation methods of shaft sinking (CO3)

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**BOARD DIPLOMA EXAMINATION,
D.MNG.E. – IYEAR EXAMINATION
ELEMENTS OF MINING**

Time : 3 Hours

Total Marks: 80

PART – A**10X3 = 30**

Instructions: Part A consists of **10** questions. Answer **all** questions and each question carries **three** marks.

1. Define the terms: a) Mine b) Mining (CO1)
2. List the various stages of mining operations (CO2)
3. Define the terms a) Out crop b) Sump (CO1)
4. List the uses of drill holes (CO2)
5. Define the terms a) explosive b) low explosive (CO1)
6. State the uses of explosives for mining industry (CO2)
7. Define solid blasting and state field of application (CO4)
8. Define Blown-out shot, Socket (CO2)
9. List the different stages of shaft sinking (CO4)
10. List the modern techniques used in shaft sinking (CO5)

PART – B**5 X 8 = 40**

Instructions: Part B consists of **5** Units. Answer any one full question from each unit. Each question carries 8 marks and may have sub questions.

11. A) Compare underground mining vs open cast mining. (CO2)
(OR)
B) Compare Shaft vs Incline (CO2)
12. A) Explain method of rotary drilling with sketches. (CO2)
(OR)
B) Explain method of percussive drilling with sketches (CO2)
13. A) Describe the constructional details electric detonator with sketch (CO4)
(OR)
B) Explain the characteristics of explosives (CO3)
14. A) Explain different blasting patterns for underground excavations (CO2)
(OR)
B) Explain direct and inverse initiation with sketches (CO4)

15. A) Explain the different stages of sinking through normal strata. (CO2)
(OR)
B) Explain the freezing method of shaft sinking (CO5)

PART – C

1 X 10 = 10 Marks

Instructions: *Part C consists of 1 question which carries 10 marks.*

16. The management of the mine proposed to carry out the mining operations by sinking shaft. The location of mine site is associated with fractured and fissured strata, without running sand. Which method of shaft sinking is used and explain. (CO5)

FUNDAMENTALS OF GEOLOGY

Course Code	Course Title	No of periods / week	Total no of periods	Marks for FA	Marks for SA
MNG-106	Fundamentals of Geology	05	150	20	80

TIME SCHEDULE

S. No.	Major Topics	Periods	CO's Mapped
1	Introduction	06	CO1
2	Physical Geology	42	CO1, CO2
3	Mineralogy	30	CO2, CO3, CO5
4	Petrology	36	CO3, CO4, CO5
5	Structural Geology	36	CO4, CO5
	Total	150	

Course Objectives and Course Outcomes

Course Objectives	<p>Upon completion of the course the student shall be able to:</p> <p>Understand the scope and importance of Geology in mining</p> <p>Explain the formation of earth and its internal structure</p> <p>Understand various types of minerals and their composition</p> <p>Understand the formation of minerals and their mode of formation</p> <p>Explain the structural formation of minerals such as faults, folds, joints etc.</p>
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Course Outcomes	CO1	Explain the Scope of geology, branches of Geology, applicability in Mining
	CO2	Explain Internal structure of earth, and nature of formation. Different methods of formation of minerals and their composition
	CO3	Describe the Categorization of various minerals, nature of formation, and their composition
	CO4	Explain Formation of minerals under various conditions
	CO5	Describe the Structural formation of minerals such as faults, folds. Dykes, sill discontinuity,

PO-CO Mapping

Course Code: MNG 106		Course Title: Fundamentals of Geology			No of Periods: 150
PO No	Mapped with CO no	CO Periods addressing PO in Col 1		Level (1,2,3)	Remarks
		No	%		
PO1	CO1,CO2,CO3,CO4	71	47	3	>40% Level 3 Highly addressed 25% to 40% Level 2 Moderately Addressed 5 to 25% Level 1 Low addressed <5% Not addressed
PO 2	CO3,CO5	39	26	2	
PO 3					
PO 4					
PO 5					
PO 6					
PO 7	CO3,CO5	40	27	2	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3									1
CO2	3									1
CO3	3	2					2		2	1
CO4	3									1
CO5		2					2		2	

3: High, 2: Moderate,1: Low

LEARNING OUTCOMES

Upon completion of the course, student shall be able to:

1.0 Know the scope and uses of Geology

- 1.1 Define the term Geology
- 1.2 Explain the scope of Geology
- 1.3 Mention the different branches of Geology
- 1.4 State the uses of geology in Mining field.
- 1.5 Define the terms Erosion, Deflation, Abrasion, Attrition and Denudation
- 1.6 Define the terms Weathering
- 1.7 Explain types of Weathering (Mechanical and Chemical Weathering)

2.0 Understand the physical Geology

- 2.1 Define the physical Geology
- 2.2 Explain the origin of the Earth
- 2.3 Explain the Nebular hypothesis of Kant and Laplace
- 2.4 Name the important methods to determine the age of the Earth.
- 2.5 Explain the Age of the earth.
- 2.6 List the common radio metric methods – Potassium-Argon, Rubidium-Strontium, Uranium-Lead and Radiocarbon method

- 2.7 Describe the internal structure of the Earth
- 2.8 Explain different factors responsible for Weathering.
- 2.9 Describe the Geological work of wind, River.
- 2.10 Define the Earthquakes and related terms
- 2.11 Explain the formation of an earth quake
- 2.12 State the different types and effects of earth quakes
- 2.13 Define the Volcanoes and related terms
- 2.14 State the classification of Volcanoes.

3.0 Develop the Fundamental concepts of Mineralogy

- 3.1 Define the terms Mineral and Mineralogy
- 3.2 Explain the Physical properties of minerals- Form, Colour, Streak, Cleavage, Luster, Fracture, Specific Gravity and Hardness
- 3.3 List the important Minerals of Quartz, Olivine, Amphiboles, Pyroxenes, Feldspar and Mica family
- 3.4 Explain the megascopic properties of Minerals viz., Form, Colour, Streak, Cleavage, Lustre, Fracture, Specific gravity, Hardness with suitable examples.
- 3.5 List the industrial uses of following Metallic Minerals: Corundum, Chromite, Hematite, Magnetite, Bauxite, Chalcopyrite, Malachite, and Kyanite.
- 3.6 List the industrial uses of following Non-Metallic Minerals.
Mica, Barites, Graphite, Calcite, Gypsum, Apatite, Ball clay, China clay, Fire clay, Quartz
- 3.7 List the industrial uses of following Precious and Atomic Minerals: Diamond, Topaz, Uranium, Zirconium Monazite, Beryllium.
- 3.8 State the occurrence and distribution of important Minerals in India and A. P.
- 3.9 List the various mineral based Industries in India and A.P.

4.0 Develop the fundamental concepts of Petrology

- 4.1 Define the terms Petrology, lava and magma
- 4.2 State the characteristics of Igneous, Sedimentary and Metamorphic rocks.
- 4.3 Explain the origin of Igneous Rocks.
- 4.4 Explain Forms, Textures and structures of Igneous rocks.
- 4.5 State the classification of Igneous rocks
- 4.6 Describe the following rocks 1) Granite 2) Rhyolite 3) Gabbros 4) Basalt 5) Dolerite 6) Pegmatite
- 4.7 State the classification of Sedimentary rocks and explain the structure , formation of Sedimentary rocks.
- 4.8 Describe the following Sedimentary rocks
1) Breccia 2) Conglomerate 3) Sand stone 4) Shale 5) Lime stone 6) Dolomite
- 4.9 Define the terms Metamorphism and Metamorphic rocks.
- 4.10 State the different kinds of Metamorphism and metamorphic agents
- 4.11 Describe important textures and structures of metamorphic rocks.
- 4.12 Describe the following Metamorphic rocks
i) Gneisses ii) Schist iii) Phyllite iv) Slate v) Quartzite vi) Charnockite

5.0 Develop the Fundamental concepts of structural Geology

- 5.1 Define the term Structural Geology.
- 5.2 Describe the primary structures of rock formations.
- 5.3 State the terms Bedding, Dip, True Dip, Apparent Dip, Strike, Overlap, Inlier, Outlier.
- 5.4 Explain the Fold and its components with sketches.
- 5.5 Describe different kinds of Folds
- 5.6 Describe the Fault and its components with sketches.
- 5.7 Describe different kinds of Faults with sketches.
- 5.8 Define the term Joints and Unconformities.
- 5.9 Explain various kinds of Unconformities
- 5.10 State the significance of Unconformities.

COURSE CONTENT:

1. **Introduction:** Definition, Scope, Classification & Uses of Geology in Mining field.
2. **Physical Geology:** Definition, Origin, Nebular hypothesis of Kant and Laplace, Age of earth, its determination internal structure of earth, weathering, erosion denudation, Attrition, Erosion – Geological work of wind, river and their products, Earth quakes, volcanoes.
3. **Mineralogy:** Terms-Minerals-Mineralogy-Important Minerals- Quartzite-Olivine, Amphiboles, Pyroxenes, Feldspar, Mica Group. Megascopic Properties of minerals, Form, Colour, Streak, Cleavage, Lustre, Fracture, Specific Gravity, Hardness. Industrial Uses of Metallic Minerals: Corundum, Chromite, Hematite, Magnetite, Bauxite, Barites Chalcopyrite, Malachite, Kyanite. Industrial uses of Non-Metallic Minerals: Mica, Graphite, Calcite, Gypsum, Apatite, Ball clay, China clay, Fire clay, Quartz. Industrial uses of Precious and Atomic Minerals viz.,Diamond, Topaz, Uranium, Zirconium Monazite, and Beryllium. Occurrence and Distributions of Minerals in Andhra Pradesh. Minerals based industries in A.P. Occurrence and Distributions of Minerals India. Minerals based industries in India.
4. **Petrology:** Lava, Magma, Petrology. Classification of Rocks-Igneous, Sedimentary and Metamorphic .Forms, textures and structures of Igneous Rocks-Granite, Rhyolite, Gabbros, Basalt, Dolomite, Pegmatite. Formation of Sedimentary Rocks – Classification – Breccia, Conglomeration, Sandstone, Shale, Limestone, Dolomite- Metamorphosis – Metamorphic Rocks – Gneiss, Schist, Phyllite, Slate, Quartzite, Charnockite
5. **Structural Geology:** Primary and secondary structure of rock formation, terms-bedding, Dip, True Dip, Apparent Dip, Strike, Overlap, Inlier, and Outlier. Fold and its components.Types of Folds.Different Kinds of faults, joints, Unconformities and their types.

REFERENCE BOOKS:

1. Physical Geology : A.K.Datta.
2. Engg. Geology : Parbinsingh.
3. Introduction to Geology : A.K. Mukharjee.
4. Principles of petrology : G.W. Tyrell

Blue Print of a Question Paper

S. No	Chapter Name	Periods Allocated	Weightage Allocated	Marks Wise Distribution of Weightage				Question Wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	Introduction	06	03	3				1				CO1
2	Physical Geology	42	25	9	8		8	3	1		1	CO3,CO4
3	Mineralogy	30	14	3		3	8	1		1	1	CO4,CO5
4	Petrology	36	14	6	8			2	1			CO3,CO4
5	Structural Geology	36	14	3	3		8	1	1		1	CO2,CO5
Higher order question from any chapters			10				10				1	CO3
TOTAL		150	80	24	19	3	34	8	3	1	4	

R-Remember; U-Understanding; Ap-Application; An- Analysing

Table specifying the scope of syllabus to be covered for Unit Tests

Unit Test	Learning outcomes to covered
Unit Test –I	From 1.1 to 2.10
Unit Test –II	From 2.11 to 4.3
Unit Test –III	From 4.4 to 5.10

Model Paper for Unit Test-I :

**State Board of Technical Education and Training, A.P.
Diploma in Mining Engineering (DMNGE)
First Year :: MNG-106 FUNDAMENTALS OF GEOLOGY**

Time: 90 Minutes

Unit Test –I

Maximum Marks : 40

PART- A

16 Marks

Instructions :

- (i) Answer all questions
- (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

- 1.(a) Tidal hypothesis was formulated by Georges Buffon
– True/False (CO1)
- (b) The Nebular hypothesis was propounded by Kant and Laplace
---- True/False (CO1)
- (c) Age of the earth is _____ (CO3)
- (d) Physical geology is a branch of _____. (CO2)
2. Define the term Geology (CO1)
3. Define the physical Geology (CO1)
4. Define the terms Erosion, Deflation (CO1)
5. Define the physical Geology (CO1)

PART- B

3 x 8 = 24 Marks

Instructions :

- (i) Answer all questions
- (ii) Each question carries EIGHT marks
- iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A) Explain the scope of Geology (CO1)
- (OR)
- (B) Explain types of Weathering (CO2)
7. (A) Explain the origin of the Earth (CO2)
- (OR)
- (B) Explain the Nebular hypothesis of Kant and Laplace (CO2)
8. (A) Describe the internal structure of the Earth (CO4)
- (OR)
- (B) Describe the Geological work of wind and River (CO5)

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Model Paper for Unit Test-II :

**State Board of Technical Education and Training, A.P.
Diploma in Mining Engineering (DMNGE)
First Year :: MNG-106 FUNDAMENTALS OF GEOLOGY**

Time: 90 Minutes

Unit Test –II

Maximum Marks : 40

PART- A

16 Marks

Instructions :

- (i) Answer all questions
- (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

- 1.(a) Rose colour owes its colour by presence of Fe
– True/False (CO2)
- (b) Andhra Pradesh state is the second largest producer of mica in the country
---- True/False (CO1)
- (c) P, S and L-waves together are called as _____ (CO3)
- (d) The purple varieties of Quartz is _____ . (CO2)
2. State the classification of Volcanoes (CO2)
3. Define the terms Mineral and Mineralogy (CO1)
4. Define the terms lava and magma (CO2)
5. State the characteristics of Igneous rocks (CO3)

PART- B

3 x 8 = 24 Marks

Instructions :

- (i) Answer all questions
- (ii) Each question carries EIGHT marks
- (iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A) Explain the formation of an earth quake (CO4)
- (OR)
- (B) Explain the megascopic properties of Minerals (CO2)
7. (A) List the industrial uses of following Metallic Minerals: Corundum, Chromite, Hematite, Magnetite, Bauxite (CO3)
- (OR)
- (B) List the industrial uses of following Non-Metallic Minerals Mica, Barites, Graphite, Calcite, Gypsum (CO2)
8. (A) Explain the origin of Igneous Rocks (CO2)
- (OR)
- (B) List the various mineral based Industries in India and A.P (CO3)

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Model Paper for Unit Test-III :

**State Board of Technical Education and Training, A.P.
Diploma in Mining Engineering (DMNGE)
First Year :: MNG-106 FUNDAMENTALS OF GEOLOGY**

Time: 90 Minutes

Unit Test –III

Maximum Marks : 40

PART- A

16 Marks

Instructions :

- (i) Answer all questions
- (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

- 1.(a) The most powerful natural weathering agent is Running Water
– True/False (CO1)
- (b) Dynamo thermal metamorphism produced by combination of Heat and Uniform pressure
---- True/False (CO4)
- (c) The dip of a bed is always _____ (CO3)
- (d) Folds in which an incompetent bed lies between two competent beds are called _____
(CO2)
2. State the classification of Igneous rocks (CO4)
3. Define the terms Metamorphism and Metamorphic rocks (CO1)
4. Define the term Structural Geology (CO1)
5. Define the term Joints and Unconformities (CO1)

PART- B

3 x 8 = 24 Marks

Instructions :

- (i) Answer all questions
- (ii) Each question carries EIGHT marks
- (iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A) Explain Forms, Textures and structures of Igneous rocks (CO2)
(OR)
- (B) Describe the following rocks 1) Granite 2) Rhyolite 3) Gabbros (CO2)
7. (A) Describe important textures and structures of metamorphic rocks (CO3)
(OR)
- (B) Describe the following Metamorphic rocks
i) Gneisses ii) Schist iii) Phyllite (CO2)
8. (A) Describe different kinds of Folds with sketch (CO2)
(OR)
- (B) Describe different kinds of Faults with sketches (CO3)

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**BOARD DIPLOMA EXAMINATION,
D.MNG.E. – IYEAR EXAMINATION
FUNDAMENTALS OF GEOLOGY**

Time : 3 Hours

Total Marks: 80

PART – A

10 X 3 = 30

Instructions: Part A consists of 10 questions. Answer all questions and each question carries three marks.

1. Define the term Geology (CO1)
2. Draw the figure of Nebular hypothesis regarding origin of earth (CO4)
3. List out different kinds of weathering (CO3)
4. Distinguish between iso seismal lines and coseismal lines (CO3)
5. Define the terms mineral and mineralogy (CO1)
6. Write a short note on magma (CO1)
7. List out various agents of metamorphism (CO1)
8. State the moh's scale of hardness (CO1)
9. Define the terms strike and dip of rock beds with a neat sketch (CO1)
10. State the significance of unconformities in the field (CO4)

PART – B

5 X 8 = 40

Instructions: Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 8 marks and may have sub questions.

11. A) Explain the various radiometric methods of determining the age of earth (CO4)
(OR)
B) Explain the origin of earth (CO4)
12. A) Describe the various factors responsible for weathering (CO2)
(OR)
B) Describe the geological work carried by running water (CO2)
13. A) State the occurrence and distribution of economic minerals in India (CO1)
(OR)
B) Describe the different physical or megascopic properties of minerals with suitable examples (CO1)

14. A) Explain the formation of igneous rocks (CO4)

(OR)

B) State the classification of sedimentary rocks (CO2)

15 A) Describe the various primary structures of rock formations (CO4)

(OR)

B) Describe the different kinds of unconformities (CO5)

PART – C

Instructions:Part C consists of 1 question which carries 10 marks.

1X 10 = 10

16) Discuss the characteristics of igneous, sedimentary and metamorphic rocks (CO1)

Course Code	Course Title	No. of Periods per Week	Total No. of Periods	Marks for Formative Assessment	Marks for Summative Assessment
MNG-107	ENGINEERING DRAWING	06	180	40	60

S.No	Major Topics	Periods	COs Mapped
1	Importance of Engineering Drawing	01	CO1
2	Engineering Drawing Instruments	05	CO1
3	Free hand lettering & Numbering	06	CO1
4	Dimensioning Practice	09	CO1
5	Geometrical constructions	21	CO2
6	Projections of points, Lines, Planes & Solids	21	CO3
7	Auxiliary views	6	CO3
8	Sections of Solids	27	CO3
9	Orthographic Projections	33	CO3
10	Isometric Views	30	CO4
11	Development of surfaces	21	CO5
	Total	180	

COURSE OBJECTIVES:

Upon completion of the course the student shall able to	
Course Objectives	understand the basic graphic skills and use them in preparation of engineering drawings, their reading and interpretation

COURSE OUTCOMES:

Course Outcomes	CO1	MNG-107.1	Practice the use of engineering drawing instruments and Familiarise with the conventions to be followed in engineering drawing as per BIS
	CO2	MNG-107.2	Construct the i) basic geometrical constructions ii) engineering curves
	CO3	MNG-107.3	Visualise and draw the orthographic projections of i) Points ii) Lines iii) Regular Planes iv) Regular Solids V) Sections of Regular Solids .
	CO4	MNG-107.4	Visualise and draw the isometric views of objects .
	CO5	MNG-107.5	Draw the developments of surfaces of regular solids and thereby the components used in daily applications

LEARNING OUTCOMES:

Learning Outcomes	<p>1.0 Understand the basic concepts of Engineering Drawing</p> <p>1.1 State the importance of drawing as an engineering communication medium</p> <p>1.2 State the necessity of B.I.S. Code of practice for Engineering Drawing.</p> <p>1.3 Explain the linkages between Engineering drawing and other subjects of Mechanical Engineering</p> <p>2.0 Use of Engineering Drawing Instruments</p> <p>2.1 Select the correct instruments to draw the different lines / curves</p> <p>2.2 Use correct grade of pencil to draw different types of lines and for different purposes</p> <p>2.3 Select and use appropriate scales for a given application.</p> <p>2.4 Identify different drawing sheet sizes as per I.S. and Standard Lay- outs.</p> <p>2.5 Prepare Title block as per B.I.S. Specifications.</p> <p>2.6 Identify the steps to be taken to keep the drawing clean and tidy.</p> <p>Drawing Plate 1: (Having two exercises)</p> <p>3.0 Write Free Hand Lettering and Numbers</p> <p>3.1 Write titles using sloping lettering and numerals of 7mm, 10mm and 14mm height</p> <p>3.2 Write titles using vertical lettering and numerals of 7mm, 10mm and 14mm height</p> <p>3.3 Select suitable sizes of lettering for different layouts and applications</p> <p>Drawing plate 2: (Having 5 to 6 exercises)</p>
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	<p>4.0 Understand Dimensioning Practice</p> <p>4.2 Acquaint with the conventions, notations, rules and methods of dimensioning in engineering drawing as per the B.I.S.</p> <p>4.5 Dimension a given drawing using standard notations and desired system of dimensioning.</p> <p>Drawing Plate 3: (Having 08 to 10 exercises)</p> <p>5.0 Apply Principles of Geometric Constructions</p> <p>5.1 Practice the basic geometric constructions like</p> <ul style="list-style-type: none"> i) dividing a line into equal parts ii) exterior and interior tangents to the given two circles iii) tangent arcs to two given lines and arcs <p>5.2 Draw any regular polygon using general method when</p> <ul style="list-style-type: none"> i) side length is given ii) inscribing circle radius is given iii) describing circle radius is given <p>2.2 Draw the conics using general and special methods,</p> <p>2.3 Draw the engineering curves like i) involute</p> <ul style="list-style-type: none"> ii) cycloid iii) helix <p>5.4 Identify the applications of the above constructions in engineering practice.</p> <p>Drawing Plate -4: Having problems up to construction of polygon</p> <p>Drawing Plate -5: Having problems of construction of conics</p> <p>Drawing Plate -6: Having problems of construction of involutes, cycloid and helix</p> <p>6.0 Apply Principles of Projection of points, lines, planes & auxiliary planes</p> <p>6.1 Explain the basic principles of the orthographic projections</p> <p>6.2 Visualise and draw the projection of a point with respect to reference planes (HP & VP)</p> <p>6.3 Visualise and draw the projections of straight lines with respect to two reference planes (up to lines parallel to one plane and inclined to other plane)</p> <p>6.4 Visualise and draw the projections of planes (up to planes perpendicular to one plane and inclined to other plane)</p> <p>6.5 Identify the need of Auxiliary views for a given engineering drawing.</p> <p>6.5 Draw the auxiliary views of a given engineering component</p> <p>Drawing Plate -7: Having problems up to projection of points and Lines (15 exercises)</p> <p>Drawing Plate -8: Having problems of projection of planes (6 exercises)</p> <p>Drawing Plate -9: Having problems on auxiliary planes (Having 4 exercises)</p> <p>7.0 Draw the Projections of Solids</p> <p>7.1 Visualise and draw the projections of solids (up to axis of solids parallel to one plane and inclined to other plane)</p> <p>Drawing plate No.10: Having problems of projection of solids (10 exercises)</p>
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	<p>8.0 Appreciate the need of Sectional Views</p> <p>8.1 Identify the need to draw sectional views.</p> <p>8.4 Differentiate between true shape and apparent shape of section</p> <p>8.5 Draw sectional views and true sections of regular solids by applying the principles of hatching.</p> <p>Drawing Plate–11: Having problems of section of solids (6 exercises)</p> <p>9.0 Apply principles of orthographic projection</p> <p>9.1 Draw the orthographic views of an object from its pictorial drawing.</p> <p>9.2 Draw the minimum number of views needed to represent a given object fully.</p> <p>Drawing Plate 12 : (Having 10 to 12 exercises)</p> <p>10.0 Prepare pictorial drawings</p> <p>10.1 identify the need of pictorial drawings.</p> <p>10.2 Differentiate between isometric scale and true scale.</p> <p>10.3 Prepare Isometric views for the given orthographic drawings.</p> <p>Drawing plate 13: (Having 10 to 12 exercises)</p> <p>11.0 Interpret Development of surfaces of different solids</p> <p>11.1 State the need for preparing development drawing.</p> <p>11.2 Draw the development of simple engineering objects (cubes, prisms, cylinders, cones, pyramid) using parallel line and radial line method.</p> <p>11.3 Prepare development of surface of engineering components like i) funnel ii) 90° elbow</p> <p>Drawing plate No. 14: (Having 05 exercises)</p>
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PO-CO Mapping

Course Code : MNG-107	Course Title ENGINEERING DRAWING Number of Course Outcomes: 06			No. of Periods 180	
POs	Mapped with CO No.	CO Periods addressing PO in Column 1		Level (1,2,3)	Remarks
		No	%		
PO1	CO1, CO2, CO3, CO4, CO5	12	7	1	>40% Level.3 (Highly addressed) 25% - 40% Level.2 (Moderately addressed)
PO2	CO1, CO2, CO3, CO4, CO5	12	7	1	
PO3	CO1, CO2, CO3, CO4, CO5	72	40	3	
PO4	CO1, CO2, CO3, CO4, CO5	72	40	3	
PO5					5% - 25% Level.1 (Low addressed) <5% Not addressed
PO6	CO1, CO2, CO3, CO4, CO5	12	6	1	
PO7					

CO-PO Mapping

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	2	3	3		2		1	2	2
CO2	2	3	3	3		2		1	2	2
CO3	3	2	3	3		3		1	2	2
CO4	3	2	3	3		3		2	2	2
CO5	3	2	3	3		3		2	2	2
Average	2.6	2.2	3	3		2.6		1.4	2	2

Note : The gaps in CO-PO mapping will be met by one or more appropriate activities from the following:

- (i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest lectures (v) Group discussions (vi) Quiz
(vii) Industrial visits (viii) Tech fests (ix) Mini project works (x) Library visits etc

Key competencies to be achieved by the student

S.No	Major topic	Key Competency
1.	Importance of Engineering Drawing	<ul style="list-style-type: none"> Explain the linkages between Engineering drawing and other subjects of study in Diploma course.
2.	Engineering Drawing Instruments	<ul style="list-style-type: none"> Select the correct instruments to draw various entities in different orientation
3.	Free hand lettering & Numbering	<ul style="list-style-type: none"> Write titles using sloping and vertical lettering and numerals as per B.I.S (Bureau of Indian standards)
4.	Dimensioning Practice	<ul style="list-style-type: none"> Dimension a given drawing using standard notations and desired system of dimensioning
5.	Geometrical construction	<ul style="list-style-type: none"> Construct ellipse, parabola, rectangular hyperbola, involute, cycloid and helix from the given data.
6.	Projection of points, Lines, Planes & Solids	<ul style="list-style-type: none"> Draw the projections of points, straight lines, planes & solids with respect to reference planes (HP& VP)
7.	Auxiliary views	<ul style="list-style-type: none"> Draw the auxiliary views of a given Engineering component Differentiate between Auxiliary view and apparent view
8.	Sections of Solids	<ul style="list-style-type: none"> Differentiate between true shape and apparent shape of section Apply principles of hatching. Draw simple sections of regular solids
9.	Orthographic Projection	<ul style="list-style-type: none"> Draw the minimum number of views needed to represent a given object fully.
10.	Pictorial Drawings	<ul style="list-style-type: none"> Differentiate between isometric scale and true scale. Draw the isometric views of given objects,.
11.	Development of surfaces	<ul style="list-style-type: none"> Prepare development of Surface of regular solids and other components like i) funnel ii) 90° elbow

COURSE CONTENT

NOTES: 1. B.I.S Specification should invariably be followed in all the topics.

2. A-3 Size Drawing Sheets are to be used for all Drawing Practice Exercises.

1.0 The importance of Engineering Drawing

Explanation of the scope and objectives of the subject of Engineering Drawing Its importance as a graphic communication -Need for preparing drawing as per standards – SP-46 –1988 – Mention B.I.S - Role of drawing in -engineering education – Link between Engineering drawing and other subjects of study.

2.0 Engineering drawing Instruments

Classifications: Basic Tools, tools for drawing straight lines, tools for curved lines, tools for measuring distances and special tools like mini drafter & drafting machine – Mentioning of names under each classification and their brief description -Scales: Recommended scales reduced & enlarged -Lines: Types of lines, selection of line thickness - Selection of Pencils -Sheet Sizes: A0, A1, A2, A3, A4, A5, Layout of drawing sheets in respect of A0, A1, A3 sizes, Sizes of the Title block and its contents - Care and maintenance of Drawing Sheet, Drawing plate: Lay out of sheet – as per SP-46-1988 to a suitable scale - Simple Exercises on the use of Drawing Instruments. Importance of Title Block.

3.0 Free hand lettering & numbering

Importance of lettering – Types of lettering -Guide Lines for Lettering - Practicing of letters & numbers of given sizes (7mm, 10mm and 14mm) -Advantages of single stroke or simple style of lettering - Use of lettering stencils

4.0 Dimensioning practice

Purpose of engineering Drawing, Need of B.I.S code in dimensioning -Shape description of an Engineering object -Definition of Dimensioning size description -Location of features, surface finish, fully dimensioned Drawing -Notations or tools of dimensioning, dimension line extension line, leader line, arrows, symbols, number and notes, rules to be observed in the use of above tools -Placing dimensions: Aligned system and unidirectional system (SP-46-1988)-Arrangement of dimensions Chain, parallel, combined progressive, and dimensioning by co-ordinate methods-The rules for dimensioning standard, features “Circles (holes) arcs, angles, tapers, chamfers, and dimension of narrow spaces.

5.0 Geometric Construction

Division of a line: to divide a straight line into given number of equal parts -Construction of tangent lines: to draw interior and exterior tangents to two circles of given radii and centre distance - Construction of tangent arcs: -i) To draw tangent arc of given radius to touch two lines inclined at given angle (acute, right and obtuse angles)-ii)Tangent arc of given radius touching a circle or an arc and a given line-iii)Tangent arcs of radius R, touching two given circles internally and externally - Construction of polygon: construction of any regular polygon by general method for given side length, inscribing circle radius and describing/superscribing circle radius - Conics: Explanation of Ellipse, Parabola, Hyperbola, as sections of a double cone and a loci of a moving point, Eccentricity of above curves – Their Engg. Applicationsviz.,Projectiles, reflectors, P-V Diagram of a Hyperbolic process - Construction of any conic section of given eccentricity by general method -Construction of ellipse by concentric circles method, Oblong Method and Arcs of circles method -Construction of parabola by rectangle method and Tangent method -Construction of rectangular hyperbola - General Curves: Involute, Cycloid and Helix, explanations as locus of a moving point -their engineering application, viz., Gear tooth profile, screw threads, springs etc. –their construction

6.0 Projection of points, lines and planes & solids

Classification of projections, Observer, Object, Projectors, Projection, Reference Planes, Reference Line, Various angles of projections – Differences between first angle and third angle projections - Projections of points in different quadrants - Projections of straight line – (a) Parallel to both the planes (b) Perpendicular to one of the planes (c) Inclined to one plane and parallel to other planes - Projections of regular planes - (a) Plane parallel to one of the reference planes - (b) Plane perpendicular to HP and inclined to VP and vice versa - Projections of regular solids - (a) Axis perpendicular to one of the planes (b) Axis parallel to VP and inclined to HP and vice versa.

7.0 Auxiliary views

Need for drawing auxiliary views - Explanation of the basic principles of drawing an auxiliary view explanation of reference plane and auxiliary plane - Partial auxiliary view.

8.0 Sections of Solids

Need for drawing sectional views – what is a sectional view - Hatching – Section of regular solids inclined to one plane and parallel to other plane

9.0 Orthographic Projections

Meaning of orthographic projection - Using a viewing box and a model – Number of views obtained on the six faces of the box, - Legible sketches of only 3 views for describing object - Concept of front view, top view, and side view sketching these views for a number of engg objects - Explanation of first angle projection. – Positioning of three views in First angle projection - Projection of points as a means of locating the corners of the surfaces of an object – Use of miter line in drawing a third view when other two views are given - Method of representing hidden lines - Selection of minimum number of views to describe an object fully.

10.0 Pictorial Drawings

Brief description of different types of pictorial drawing viz., Isometric, oblique, and Perspective and their use - Isometric drawings: Iso axis, angle between them, meaning of visual distortion in dimensions - Need for an isometric scale, difference between Isometric scale, and ordinary scale difference between Isometric view and Isometric projection - Isometric and non-Isometric lines - Isometric drawing of common features like rectangles, circular - shapes, non-isometric lines - Use of box and offset methods.

11.0 Development of Surfaces

Need for preparing development of surface with reference to sheet metal work - Concept of true length of a line with reference to its orthographic projection when the line is (i) parallel to the plane of projection (ii) inclined to one principal and parallel to the other - Development of simple solids like cubes, prisms, cylinders, cones, pyramid and truncation of these solids - Types of development: Parallel line and radial line development - Procedure of drawing development of funnels, 90° elbow pipes.

REFERENCE BOOKS:

- | | |
|---|---|
| 1. P I Varghese | : Engineering Graphics – (McGraw-hill) |
| 2. Basant Agarwal & C.M Agarwal | : Engineering Drawing - (McGraw-hill) |
| 3. N.D.Bhatt | : Engineering Drawing . |
| 4. T.S.M. & S.S.M on “ Technical Drawing” | : T.T.T.I., Madras. |
| 5. SP-46-1998 | : Bureau of Indian Standards. |

MODEL BLUE PRINT

S. No	Major Topics	No. of periods	Weightage of marks	Marks wise Distribution of Weightage				Question wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	Importance of Engineering Drawing	01	-									CO1
2	Engineering Drawing Instruments	05	-									CO1
3	Free hand lettering & Numbering	06	5		5				1			CO1
4	Dimensioning Practice	09	5		5				1			CO1
5	Geometrical constructions	21	15		5	10			1	1		CO2
6	Projections of points, Lines, Planes & Solids	21	10			10				1		CO3
7	Auxiliary views	6	5		5				1			CO3
8	Sections of Solids	27	10			10				1		CO3
9	Orthographic Projections	33	10			10				1		CO3
10	Isometric Views	30	10			10				1		CO4
11	Development of surfaces	21	10			10				1		CO5
Total		180	80		20	60			4	6		

Note : Students have to write four out of six 10 marks questions.

Model Paper for End Examination:
MODEL PAPER – BOARD DIPLOMA EXAMINATION, (C-20)
DCE—FOURTH SEMESTER EXAMINATION
ENGINEERING DRAWING (MNG-107)

Time: 3 hours]

[Total Marks: 80

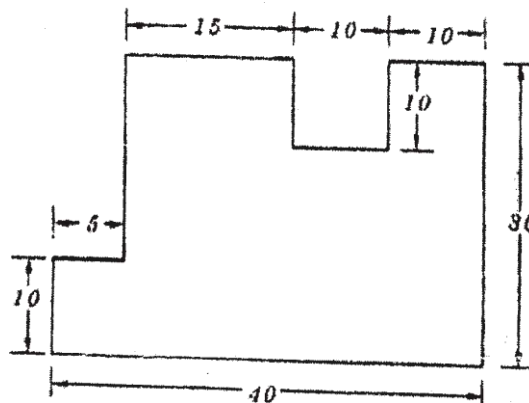
PART—A (5 X 4 = 20 Marks)

Instructions:(1) Answer all questions.

(2) Each question carries five marks.

(3) All dimensions are in mm.

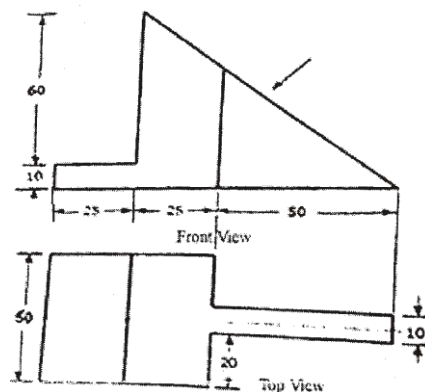
1. Write the following in single-stroke vertical lettering of size 10 mm in capital letters: "CLEAN AND GREEN IS OUR PERFECT DREAM"
(CO1)
2. Redraw the following figure to full-scale and dimension it according to SP : 46—1988 by using aligned system:
(CO1)



3. Draw a common external tangent to two circles of radii 25 mm and 20 mm. The distance between the centres of circles is 75 mm.
(CO2)

4. Draw the auxiliary view of the object shown below:

(CO3)



PART—B (10 x 4=40)

Instructions: (1) Answer *any* four questions.

(2) Each question carries ten marks.

(3) All dimensions are in mm.

5. Draw a helix of cylinder diameter 50 mm and pitch 70 mm.

(CO2)

6. Draw the top view and front view of a circular plane, if the surface of the plane is perpendicular to HP and inclined at 30° to VP.

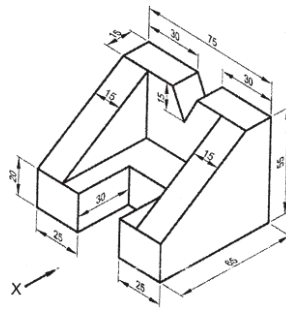
(CO3)

7. A hexagonal pyramid of base side 30 mm and axis 75 mm long is resting on its base in HP having a base side parallel to VP. It is cut by a section plane which is inclined at 30° to HP, perpendicular to VP and passing through a point on the axis at a distance of 35 mm from the vertex. Draw its sectional front view and sectional top view.

(CO3)

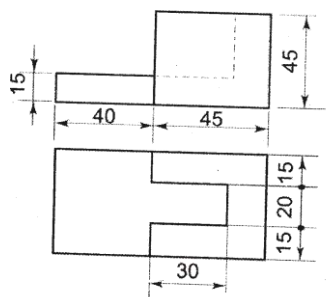
8. Draw the Front view, top view and side view of the given figure:

(CO3)



9. Draw the isometric view of the object for the views given below.

(CO4)



10. A right circular cone of diameter 50 mm and axis 75 mm long is resting on its base in HP. It is cut by a section plane which is perpendicular to VP, inclined at 60° to HP and passing through a point on the axis at a height of 40 mm from the base. Draw the surface development of the bottom position of truncated cone.

(CO5)

Course code	Course title	No. of periods/week	Total no.of periods	Marks for FA	Marks for SA
MNG-108	Workshop practice	6	180	40	60

S.No.	Major Topics	No. of periods
1.	Carpentry	24
2.	Fitting and welding	36
3.	Basic machine operations	22
4.	Plumbing	08
TOTAL		90

Course title : Workshop Practice		
Course Objectives	(i) To familiarize with the knowledge different materials tools used in general Engineering processes	
	(ii) To use various basic implements used in general Engineering processes	
	(iii) To know the etiquette of working with the fellow workforce	
	(iv) To reinforce theoretical concepts by conducting relevant experiments/exercises	
Course Outcomes	C01	Demonstrate the skill of planning and organizing experimental set up for a desired purpose
	C02	Perform precise operations/tasks with Engineering equipment or instrument for investigation of Engineering problems
	C03	Observe various parameters, their variations and graphically represent the same
	C04	Analyse the experimental results to draw inferences to make recommendations
	C05	Practice ethics & etiquette while working in a group and display professionalism while communicating as a member and leader in a group

Learning outcome

- 1.0 Use of different tools in Carpentry, Fitting, Welding and Turning section of workshop.
- 2.0 Prepare various carpentry joints, panel boards and cabinet boxes.
- 3.0 Hacksaw cutting, grinding, thread cutting for metal conduit; G.I. Pipes and rods etc, in fitting section.
- 4.0 Handle welding transformer and make lap and butt joints.
- 5.0 Exercise on lathe like simple turning, step turning, taper turning and knurling.
- 6.0 Exercise on thread cutting for pipes and rods on Lathes.
- 7.0 Hand drilling machines and grinding machine.
- 8.0 Know the basics of plumbing work and applications.
- 8.1 Know the types of pipe joints.
 - Understand the symbols.
 - Know the materials used pipes.
 - Assembling, threading, joining of pipes.
 - Able to understand cross, T, L joints etc.

COURSE CONTENT

Following list of experiments are to be made by every student in the workshop

1. CARPENTRY

1. Exercises on planning, sawing and chiseling
2. Prepare a half lap joint
3. Prepare a Dovetail joint.
4. Prepare a Mortise joint.
5. Prepare a 20 cm X 15 cm Teakwood switch board with hinges and bottom hook.
6. Fix the laminate sheet to the above box and cut suitable holes to mount tone flush type switch, socket.

2. FITTING AND WELDING

1. Exercises to cut a metal conduit, G.I. Pipe and solid rod using hack saw.
2. 3 & 4 Thread cutting of G.I. pipe, metal conduit and solid rod using Die set.
5. & 6. Internal thread cutting using Tap set and cleaning the threads using reamers and make a hexagonal nut from a round rod.

WELDING

1. Prepare a job and to make a lap joint and finish it using grinder.
2. Prepare a job and make a butt joint and finish it with grinder.
3. Prepare the job and make 'T' joint.

3. MACHINE SHOP

Exercise on turning the given rod to get three different diameters using lathe.

Make a bolt and cut threads using lathe.

Cut the threads to G.I. Pipe using lathe.

Prepare a centre punch and knurl its head.

Make a square plate using power hack saw, remove sharp edges using grinder, make triangle and drill three holes of different diameters at the vertices.

4. PLUMBING

Plumbing work and applications

1. Types of pipe joints.
2. Symbols
3. Materials used for pipes
4. Assembling, Threading, Joining of pipes.
5. Different fittings such as cross, L, T etc.,

Scheme of Valuation for end Lab Practical Examination :

A. Writing Aim, Apparatus, Formula, Graph, Precautions carries	10 (Ten) Marks
B. For Drawing the table, taking Readings, Calculation work, Drawing the graph, finding result carries	15 (Fifteen) Marks
C. Viva Voice	05 (Five) Marks
Total	30 (Thirty) Marks

➤ **Course outcomes**

Course Outcomes	CO1	Experiments with Vernier calipers, Screw gauge, Parallelogram law and Triangle law
	CO2	Experiments with Simple pendulum, Resonance apparatus (Velocity of sound in air)
	CO3	Experiments with Convex lens, Refractive index of solid by travelling microscope
	CO4	Experiments with quill tube (Boyles law verification), Meter bridge, Mapping of magnetic lines of force
	CO5	Experiments with Surface tension and Viscosity

➤ **COs-PO mapping strength (as per given table)**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3			1	1	1	1
CO2	3	2	2		1		
CO3	3		2			1	2
CO4	3	2			2		
CO5	3		1	2		1	2

3 = strongly mapped

2= moderately mapped

1= slightly mapped

Subject Code	Subject Title	Periods per week	Total periods per year
MNG-109 A	Physics Laboratory	03	45

TIMESCHEDULE

S.No	Name of the Experiment	No.of
1.	Hands on practice on Vernier Calipers	03
2.	Hands on practice on Screw gauge	03
3.	Verification of Parallelogram law of forces and Triangle law of forces	03
4.	Simple pendulum	03
5.	Velocity of sound in air – (Resonance method)	03
6.	Focal length and Focal power of convex lens (Separate & Combination) (Single lens)	03
7.	Refractive index of solid using traveling microscope	03
8.	Boyle's law verification	03
9.	Meter bridge	03
10.	Mapping of magnet lines of force and locate null points	03
	DEMONSTRATION EXPERIMENTS	
11.	Surface tension of liquid using traveling microscope	03
12.	Coefficient of viscosity by capillary method	03
	Revision	06
	Test	03
	Total	45

Objectives:

Upon completion of the course the student shall be able to

- 1.0 Practice with Vernier calipers to determine the volumes and areas of a cylinder and sphere and their comparison etc.
- 2.0 Practice with Screw gauge to determine thickness of a glass plate, cross sectional area of a wire and volumes of sphere and also their comparison etc
- 3.0 Verify the parallelogram law and Triangle law
- 4.0 Determine the value of acceleration due to gravity using Simple Pendulum
- 5.0 Determine the velocity of sound in air at room temperature and its value at zero degree centigrade.
- 6.0 Calculate the Focal length and focal power of convex lenses using distant object method, U-V method, U-V graph and $1/U - 1/V$ graph methods and their comparison.
- 7.0 Determine the refractive index of a solid using travelling microscope.
- 8.0 Verify the Boyle's law employing a Quill tube.
- 9.0 Determine the specific resistance of material of a wire using Meter Bridge.
- 10.0 Drawing magnetic lines of force under N-S and N-N methods and locate null points.
- 11.0 Determine the surface tension of a liquid using travelling Microscope (**Demo**)
- 12.0 Determine the viscosity of a liquid using capillary method (**Demo**)

Competencies and Key competencies to be achieved by the student

Name of the Experiment	Competencies	Key competencies
1. Hands on practice on Vernier Calipers(03)	<ul style="list-style-type: none"> • Find the Least count • Fix the specimen in posit • Read the scales • Calculate the physical quantities of given object 	<ul style="list-style-type: none"> • Read the scales • Calculate the requisite physical quantities of given objects
2. Hands on practice on Screw gauge(03)	<ul style="list-style-type: none"> • Find the Least count • Fix the specimen in posit • Read the scales • Calculate thickness of glass place and cross section of wire and other quantities 	<ul style="list-style-type: none"> • Read the scales • Calculate thickness of given glass plate • Calculate cross section of wire and other quantities
3. Verification of Parallelogram law of forces and Triangle law of forces(03)	<ul style="list-style-type: none"> • Fix suitable weights • Note the positions of threads on drawing sheet • Find the angle at equilibrium point • Construct parallelogram • Compare the measured diagonal • Construct triangle • Find the length of sides • Compare the ratios 	<ul style="list-style-type: none"> • Find the angle at equilibrium point • Constructing parallelogram • Construct triangle • Compare the ratios of force and length
4. Simple pendulum(03)	<ul style="list-style-type: none"> • Fix the simple pendulum to the stand • Adjust the length of pendulum • Find the time for number of oscillations • Find the time period • Calculate the acceleration due to gravity • Draw I-T and I-T² graph 	<ul style="list-style-type: none"> • Find the time for number of oscillations • Find the time period • Calculate the acceleration due to gravity • Draw I-T and I-T² graph
5. Velocity of sound in air –Resonance method (03)	<ul style="list-style-type: none"> • Arrange the resonance apparatus • Adjust the reservoir level for booming sound • Find the first and second resonating lengths • Calculate velocity of sound 	<ul style="list-style-type: none"> • Adjust the reservoir level • Find the first and second resonating lengths • Calculate velocity of sound at room temperature • Calculate velocity of sound at 0° C

6. Focal length and Focal power of convex lens (Separate & Combination) (03)	<ul style="list-style-type: none"> • Fix the object distance • Find the Image distance • Calculate the focal length and power of convex lens and combination of convex lenses • Draw u-v and $1/u - 1/v$ graphs 	<ul style="list-style-type: none"> • Calculate the focal length and power of convex lens • Draw u-v and $1/u - 1/v$ graphs
7. Refractive index of solid using traveling microscope(03)	<ul style="list-style-type: none"> • Find the least count of vernier on microscope • Place the graph paper below microscope • Read the scale • Calculate the refractive index of glass slab 	<ul style="list-style-type: none"> • Read the scale • Calculate the refractive index of glass slab
8. Boyle's law verification (03)	<ul style="list-style-type: none"> • Note the atmospheric pressure • Fix the quill tube to retort stand • Find the length of air column • Find the pressure of enclosed air • Find and compare the calculated value $P \times l$ 	<ul style="list-style-type: none"> • Find the length of air column • Find the pressure of enclosed air • Find the value $P \times l$
9. Meter bridge(03)	<ul style="list-style-type: none"> • Make the circuit connections • Find the balancing length • Calculate unknown resistance • Find the radius of wire • Calculate the specific resistance 	<ul style="list-style-type: none"> • Find the balancing length • Calculate unknown resistance • Calculate the specific resistance

10. Mapping of magnet lines of force(03)	<ul style="list-style-type: none"> • Draw magnetic meridian • Placed the bar magnet in NN and NS directions • Draw magnetic lines of force • Locate the neutral points along equatorial and axial lines 	<ul style="list-style-type: none"> • Draw magnetic lines of force • Locate the neutral points along equatorial and
11. Surface tension of liquid using traveling microscope(03)	<ul style="list-style-type: none"> • Find the least count of vernier on microscope • Focus the microscope to the lower meniscus & bent pin • Read the scale • Calculate height of liquid rise • Calculate the surface tension of water 	<ul style="list-style-type: none"> • Read the scale • Calculate height of liquid rise • Calculate the surface tension of water
12.. Coefficient of viscosity by capillary method(03)	<ul style="list-style-type: none"> • Find the least count of vernier • Fix the capillary tube to aspiratory bottle • Find the mass of collected water • Find the pressure head • Calculate rate of volume of liquid collected • Find the radius of capillary tube • Calculate the viscosity of water using capillary method 	<ul style="list-style-type: none"> • Find the pressure head • Calculate rate of volume of liquid collected • Find the radius of capillary tube • Calculate the viscosity of water

Scheme of Valuation for end Lab Practical Examination :

D. Writing Aim, Apparatus, Formula, Graph, Precautions carries	10 (Ten) Marks
E. For Drawing the table, taking Readings, Calculation work, Drawing the graph, finding result carries	15 (Fifteen) Marks
F. Viva Voice	05 (Five) Marks
Total	30 (Thirty) Marks

➤ **Course outcomes**

Course Outcomes	CO1	Experiments with Vernier calipers, Screw gauge, Parallelogram law and Triangle law
	CO2	Experiments with Simple pendulum, Resonance apparatus (Velocity of sound in air)
	CO3	Experiments with Convex lens, Refractive index of solid by travelling microscope
	CO4	Experiments with quill tube (Boyles law verification), Meter bridge, Mapping of magnetic lines of force
	CO5	Experiments with Surface tension and Viscosity

➤ **COs-PO mapping strength (as per given table)**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3			1	1	1	1
CO2	3	2	2		1		
CO3	3		2			1	2
CO4	3	2			2		
CO5	3		1	2		1	2

3 = strongly mapped

2= moderately mapped

1= slightly mapped

CHEMISTRY LABORATORY
(C-20 curriculum common to all Branches)

Subject Code	Subject Title	Periods per week	Total periods per year
MNG-109B	Chemistry Laboratory	03	45

CO1	Operate and practice volumetric apparatus and preparation of standard solution
CO2	Evaluate and judge the neutralization point in acid base titration
CO3	Evaluate the end point of reduction and oxidation reaction
CO4	Judge the stable end point of complex formation, stable precipitation
CO5	Judge operate and demonstrate and perform precise operations with instrument for investigation of water pollution parameters

PO CO mapping

Course code C-109B	Chemistry Laboratory No of Cos;5				No Of periods 45
POs	Mapped with CO No	CO periods addressing PO in Col 1 NO %		Level 1,2,3	remarks
PO1	CO1,CO2,CO3, CO4,CO5	12	26.66	2	>40% level 3 (highly addressed) 25% to 40% level2(moderately addressed 5% to 25% level1 (Low addressed < 5%(not addressed)
PO2	CO1,CO2,CO3, CO4,CO5	9	20	1	
PO3					
PO4	CO1,CO2,CO3, CO4,CO5	12	26.66	2	
PO5	CO2,CO3, CO4,CO5	12	26.66	2	
PO6					
PO7					

COs-POs mapping strength (as per given table)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	3		1				1		
CO2	2	3		2	2			1		
CO3	2	3		2	2			1		
CO4	2	3		2	2			1		
CO5	2	3		2	2			1		

3=strongly mapped

2= moderately mapped

1= slightly mapped

Note:

The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:

i) Seminars ii) Tutorials iii) Guest Lectures iv) Assignments v) Quiz competitions vi) Industrial visit vii) Tech Fest viii) Mini project ix) Group discussions x) Virtual classes xi) Library visit for e-books

TIMESCHEDULE

S.No	Name of the Experiment	No.of Periods	Mapped with COs
1.	a) Recognition of chemical substances and solutions used in the laboratory by senses. b) Familiarization of methods for Volumetric analysis	03	CO1
2.	Preparation of Std Na_2CO_3 and making solutions of different dilution	03	CO1
3.	Estimation of HCl solution using Std. Na_2CO_3 solution	03	CO2
4.	Estimation of NaOH using Std.HCl solution	03	CO2
5.	Estimation of H_2SO_4 using Std.NaOH solution	03	CO2
6.	Estimation of Mohr's Salt using Std. KMnO_4	03	CO3
7.	Determination of acidity of water sample	03	CO2
8.	Determination of alkalinity of water sample	03	CO2
9.	Determination of total hardness of water using Std. EDTA solution	03	CO4
10.	Estimation of Chlorides present in water sample	03	CO4
11.	Estimation of Dissolved Oxygen(D.O)in water sample	03	CO5
12.	Determination of pH using pH meter	03	CO5
13.	Determination of conductivity of water and adjusting ionic strength	03	CO5
14.	Determination of turbidity of water	03	CO5
15.	Estimation of total solids present in water sample	03	CO5
Total:		45	

Objectives:

Upon completion of the course the student shall be able to

- 1.0 Practice volumetric measurements (using pipettes, measuring jars, volumetric flask, burettes) and gravimetric measurements (using different types of balances), making dilutions, etc. To identify the chemical compounds and solutions by senses.
- 2.0 Practice making standard solutions with pre weighed salts and to make solutions of desired dilutions using appropriate techniques.
- 3.0 Conduct titrations adopting standard procedures and using Std. Na_2CO_3 solution for estimation of HCl
- 4.0 Conduct titrations adopting standard procedures and using Std. HCl solution for estimation of NaOH
- 5.0 Conduct titrations adopting standard procedures and using Std. NaOH solution for estimation of H_2SO_4
- 6.0 Conduct titrations adopting standard procedures and using Std. KMnO_4 solution for estimation of Mohr's Salt
- 7.0 Conduct titrations adopting standard procedures to determine the acidity of given samples of water (One ground water and one surface / tap water, and rain water if available)
- 8.0 Conduct titrations adopting standard procedures to determine the alkalinity of given samples of water (One ground water and one surface / tap water)

- 9.0 Conduct titrations adopting standard procedures to determine the total hardness of given samples of water (One ground water and one surface / tap water) using Std. EDTA solution
- 10.0 Conduct titrations adopting standard procedures to determine the chlorides present in the given samples of water and wastewater (One ground water and one surface / tap water)
- 11.0 Conduct the test using titrimetric / electrometric method to determine Dissolved Oxygen (D.O) in given water samples (One sample from closed container and one from open container / tap water)
- 12.0 Conduct the test on given samples of water / solutions (like soft drinks, sewage, etc.) to determine their pH using standard pH meter
- 13.0 Conduct the test on given samples of water / solutions
- To determine conductivity
 - To adjust the ionic strength of the sample to the desired value
- 14.0 Conduct the test on given samples of solutions (coloured and non coloured) to determine their turbidity in NTU
- 15.0 To determine the total solids present in given samples of water (One ground water and one surface / tap water)

Competencies and Key competencies to be achieved by the student

Name of the Experiment (No of Periods)	Competencies	Key competencies
Familiarization of methods for Volumetric analysis. Recognition of chemical substances And solutions (03)	-	--
Preparation of Std Na_2CO_3 and making solutions of different dilution(03)	<ul style="list-style-type: none"> ▪ Weighing the salt to the accuracy of .01 mg ▪ Measuring the water with volumetric flask, measuring jar, volumetric pipette and graduated pipette ▪ Making appropriate dilutions 	<ul style="list-style-type: none"> ▪ Weighing the salt to the accuracy of .01 mg ▪ Measuring the water with volumetric flask, measuring jar, volumetric pipette and graduated pipette ▪ Making appropriate dilutions
Estimation of HCl solution using Std. Na_2CO_3 solution (03)	<ul style="list-style-type: none"> ▪ Cleaning the glassware and rinsing with appropriate solutions 	<ul style="list-style-type: none"> ▪ Making standard solutions ▪ Measuring accurately the standard solutions and titrants ▪ Effectively Controlling the flow of the titrant ▪ Identifying the end point ▪ Making accurate observations
Estimation of NaOH using Std.HCl solution (03)	<ul style="list-style-type: none"> ▪ Making standard solutions ▪ Measuring accurately the standard solutions and titrants 	
Estimation of H_2SO_4 using Std.NaOH solution (03)	<ul style="list-style-type: none"> ▪ Filling the burette with titrant 	
Estimation of Mohr's Salt using Std. KMnO_4 (03)	<ul style="list-style-type: none"> ▪ Fixing the burette to the stand 	
Determination of acidity of water sample (03)	<ul style="list-style-type: none"> ▪ Effectively Controlling the flow of the titrant 	

Determination of alkalinity of water sample (03)	<ul style="list-style-type: none"> ▪ Identifying the end point ▪ Making accurate observations ▪ Calculating the results 	
Determination of total hardness of water using Std. EDTA solution (03)		
Estimation of Chlorides present in water sample (03)		
Estimation of Dissolved Oxygen(D.O) in water sample (By titration method) (03)		
Determination of pH using pH meter (03)	<ul style="list-style-type: none"> ▪ Familiarize with instrument ▪ Choose appropriate 'Mode' / 'Unit' ▪ Prepare standard solutions / buffers, etc. ▪ Standardize the instrument with appropriate standard solutions ▪ Plot the standard curve ▪ Make measurements accurately ▪ Follow Safety precautions 	<ul style="list-style-type: none"> ▪ Prepare standard solutions / buffers, etc. ▪ Standardize the instrument with appropriate standard solutions ▪ Plot the standard curve ▪ Make measurements accurately
Determination of conductivity of water and adjusting ionic strength to required level (03)		
Determination of turbidity of water (03)		
Estimation of total solids present in water sample (03)	<ul style="list-style-type: none"> ▪ Measuring the accurate volume and weight of sample ▪ Filtering and air drying without losing any filtrate ▪ Accurately weighing the filter paper, crucible and filtrate ▪ Drying the crucible in an oven 	<ul style="list-style-type: none"> ▪ Measuring the accurate volume and weight of sample ▪ Filtering and air drying without losing any filtrate ▪ Accurately weighing the filter paper, crucible and filtrate

SCHEME OF VALUATION

A) Writing Chemicals, apparatus ,principle and procedure	5M
B) Demonstrated competencies	20M
Making standard solutions	
Measuring accurately the standard solutions and titrants	
Effectively controlling the flow of the titrant	
Identifying the end point	
Making accurate observations	
C) Viva-voce	5M

Total	30M

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
MNG-110 (common to all branches)	Computer Fundamentals Lab	3	90	40	60

Time schedule:

S.No.	Chapter/Unit Title	No. of sessions each of 3 periods duration	No. of Periods
1.	Computer hardware Basics	2	6
2.	Windows Operating System	2	6
3.	MS Word	8	24
4.	MS Excel	7	21
5.	MS PowerPoint	5	15
6.	Adobe Photoshop	6	18
Total periods		30	90

S.No.	Chapter/Unit Title	No. of Periods	CO's Mapped
1.	Computer hardware Basics	6	CO1
2.	Windows Operating System	6	CO1
3.	MS Word	24	CO2
4.	MS Excel	21	CO3
5.	MS PowerPoint	15	CO4
6.	Adobe Photoshop	18	CO5
Total periods		90	

Course Objectives	i) To know Hardware Basics ii) To familiarize operating systems iii) To use MS Office effectively to enable to students use these skills in future courses iv) To use Adobe Photoshop in image editing.
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Course Outcomes	At the end of the course students will be able to		
	CO1	MNG-110.1	Identify hardware and software components
	CO2	MNG-110.2	Prepare documents with given specifications using word processing software
	CO3	MNG-110.3	Use Spread sheet software to make calculation and to draw various graphs / charts.
	CO4	MNG-110.4	Use Power point software to develop effective presentation for a given theme or topic.
	CO5	MNG-110.5	Edit digital or scanned images using Photoshop

CO-PO/PSO MATRIX

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
C-110.1	3	3	3	3	3	3	3	3	2	3
C-110.2	3	3	3	3	3	3	3	3	2	3
C-110.3	3	3	3	3	3	3	3	3	2	3
C-110.4	3	3	3	3	3	3	3	3	2	3
C-110.5	3	3	3	3	3	3	3	3	2	3
Average	3	3	3	3	3	3	3	3	2	3

3=Strongly mapped , 2=moderately mapped, 1=slightly mapped

Learning Outcomes:**I. Computer Hardware Basics**

1. a).To Familiarize with Computer system and hardware connections
b).To Start and Shut down Computer correctly
c).To check the software details of the computer
2. To check the hardware present in your computer

II. Windows's operating system

3. To Explore Windows Desktop
4. Working with Files and Folders
5. Windows Accessories: Calculator – Notepad – WordPad – MS Paint

III. Practice with MS-WORD

6. To familiarize with Ribbon layout of MS Word
Home – Insert- Page layout – References – Review- View.
7. To practice Word Processing Basics
8. To practice Formatting techniques
9. To insert a table of required number of rows and columns
10. To insert Objects, Clipart and Hyperlinks
11. To use Mail Merge feature of MS Word
12. To use Equations and symbols features

IV.Practice with MS-EXCEL

13. To familiarize with MS-EXCEL layout
14. To access and enter data in the cells
15. To edit a spread sheet- Copy, Cut, Paste, and selecting Cells
16. To use built in functions and Formatting Data
17. To create Excel Functions, Filling Cells
18. To enter a Formula for automatic calculations
19. To sort and filter data in table.
20. To present data using Excel Graphs and Charts.
21. To develop lab reports of respective discipline.
22. To format a Worksheet in Excel, Page Setup and Print

V. Practice with MS-POWERPOINT

23. To familiarize with Ribbon layout features of PowerPoint 2007.
24. To create a simple PowerPoint Presentation
25. To set up a Master Slide in PowerPoint
26. To insert Text and Objects
27. To insert a Flow Charts
28. To insert a Table
29. To insert a Charts/Graphs
30. To insert video and audio
31. To practice Animating text and objects
32. To Review presentation

VI. Practice with Adobe Photoshop

33. To familiarize with standard toolbox
34. To edit a photograph.
35. To insert Borders around photograph.
36. To change Background of a Photograph.
37. To change colors of Photograph.
38. To prepare a cover page for the book in your subject area.
39. To adjust the brightness and contrast of the picture so that it gives an elegant look.
40. To type a word and apply the shadow emboss effects.

Key competencies:

Expt No	Name of Experiment	Competencies	Key competencies
1 (a).	To familiarize with Computer system and hardware connections	<ol style="list-style-type: none">a. Identify the parts of a Computer system: i). CPU ii). Mother Board iii) Monitor iv) CD/DVD Drive v) Power Switch vi) Start Button vii) Reset Buttonb. Identify and connect various peripheralsc. Identify and connect the cables used with computer systemd. Identify various ports on CPU and connect Keyboard & Mouse	Connect cables to external hardware and operate the computer
1 (b).	To Start and Shut down Computer correctly	<ol style="list-style-type: none">a. Log in using the passwordb. Start and shut down the computerc. Use Mouse and Key Board	<ol style="list-style-type: none">a. Login and logout as per the standard procedureb. Operate mouse & Key Board
1 (c).	To Explore Windows	<ol style="list-style-type: none">a. Familiarize with Start Menu,	<ol style="list-style-type: none">a. Access application

	Desktop	<p>Taskbar, Icons and Shortcuts</p> <p>b. Access application programs using Start menu, Task manager</p> <p>c. Use Help support</p>	<p>programs using Start menu</p> <p>b. Use taskbar and Task manager</p>
2.	To check the software details of the computer	<p>a. Find the details of Operating System being used</p> <p>b. Find the details of Service Pack installed</p>	Access the properties of computer and find the details
3.	To check the hardware present in your computer	<p>a. Find the CPU name and clock speed</p> <p>b. Find the details of RAM and Hard disk present</p> <p>c. Access Device manager using Control Panel and check the status of devices like mouse and key board</p> <p>d. Use My Computer to check the details of Hard drives and partitions</p> <p>e. Use the Taskbar</p>	<p>a. Access device manager and find the details</p> <p>b. Type /Navigate the correct path and Select icon related to the details required</p>
4.	Working with Files and Folders	<p>a. Create folders and organizing files in different folders</p> <p>b. Use copy / paste move commands to organize files and folders</p>	a. Create files and folders Rename , arrange and search for the required folder/file
	Working with Files and Folders Continued....	<p>c. Arrange icons – name wise, size, type, Modified</p> <p>d. Search a file or folder and find its path</p> <p>e. Create shortcut to files and folders (in other folders) on Desktop</p> <p>f. Familiarize with the use of My Documents</p> <p>g. Familiarize with the use of Recycle Bin</p>	b. Restore deleted files from Recycle bin

5.	To use Windows Accessories: Calculator – Notepad – WordPad – MS Paint	<ul style="list-style-type: none"> a. Familiarize with the use of Calculator b. Access Calculator using Run command c. Create Text Files using Notepad and WordPad and observe the difference in file size d. Use MS paint and create .jpeg, .bmp files using MS Paint 	<ul style="list-style-type: none"> a. Use windows accessories and select correct text editor based on the situation. b. Use MS paint to create /Edit pictures and save in the required format.
6.	To familiarize with Ribbon layout of MS word. – Home – Insert- page layout- References-Review- View	<ul style="list-style-type: none"> a. Create/Open a document b. Use Save and Save as features c. Work on two Word documents simultaneously d. Choose correct Paper size and Printing options 	<ul style="list-style-type: none"> a. Create a Document and name appropriately and save b. Set paper size and print options
7.	To practice Word Processing Basics	<ul style="list-style-type: none"> a. Typing text b. Keyboard usage c. Use mouse (Left click / Right click / Scroll) d. Use Keyboard shortcuts e. Use Find and Replace features in MS- word f. Use Undo and Redo Features g. Use spell check to correct Spellings and Grammar 	<ul style="list-style-type: none"> a. Use key board and mouse to enter/edit text in the document. b. Use shortcuts c. Use spell check/ Grammar features for auto corrections.
8.	To practice Formatting techniques	<ul style="list-style-type: none"> a. Formatting Text b. Formatting Paragraphs c. Setting Tabs d. Formatting Pages e. The Styles of Word f. Insert bullets and numbers g. Themes and Templates h. Insert page numbers, header and footer 	<ul style="list-style-type: none"> a. Format Text and paragraphs and use various text styles. b. Use bullets and numbers to create lists c. Use Templates /Themes d. Insert page numbers date, headers and footers
9.	To insert a table of required number of rows and columns	<ul style="list-style-type: none"> a. Edit the table by adding the fields – Deleting rows and columns – inserting sub table – marking borders. Merging and splitting of cells in a Table b. Changing the background colour of the table c. Use table design tools 	<ul style="list-style-type: none"> a. Insert table in the word document and edit b. Use sort option for arranging data.

		d. Use auto fit – fixed row/ column height/length – Even distribution of rows / columns features e. Convert Text to table and Table to Text f. Use Sort feature of the Table to arrange data in ascending/descending order	
10.	To Insert objects, clipart and Hyperlinks	a. Create a 2-page document. & Insert hyperlinks and t Bookmarks. b. Create an organization chart c. Practice examples like preparing an Examination schedule notice with a hyperlink to Exam schedule table.	a. Insert hyperlinks & Bookmarks b. Create organization charts/flow charts
11.	To Use Mail merge feature of MS Word	a. Use mail merge to prepare individually addressed letters b. Use mail merge to print envelopes.	Use Mail merge feature
12.	To use Equations and symbols features.	a. Explore various symbols available in MS Word b. Insert a symbol in the text c. Insert mathematical equations in the document	Enter Mathematical symbols and Equations in the word document
13.	To Practice with MS-EXCEL	a. Open /create an MS Excel spreadsheet and familiarize with MS Excel 2007 layout like MS office Button- b. Use Quick Access Toolbar- Title Bar- Ribbon-Worksheets- Formula Bar-Status Bar	a. Familiarize with excel layout and use b. Use various features available in toolbar
14.	To access and Enter data in the cells	a. Move Around a Worksheets- Quick access -Select Cells b. Enter Data-Edit a Cell-Wrap Text-Delete a Cell Entry-Save a File-Close Excel	a. Access and select the required cells by various addressing methods b. Enter data and edit
15.	To edit spread sheet Copy, Cut, Paste, and selecting cells	a. Insert and Delete Columns and Rows-Create Borders-Merge and Center b. Add Background Color-Change the Font, Font Size, and Font Color	Format the excel sheet

		c. Format text with Bold, Italicize, and Underline-Work with Long Text-Change a Column's Width	
16.	To use built in functions and Formatting Data	a. Perform Mathematical Calculations verify -AutoSum b. Perform Automatic Calculations-Align Cell Entries	Use built in functions in Excel
17.	To enter a Formula for automatic calculations	a. Enter formula b. Use Cell References in Formulae c. Use Automatic updating function of Excel Formulae d. Use Mathematical Operators in Formulae e. Use Excel Error Message and Help	Enter formula for automatic calculations
18.	To Create Excel Functions, Filling Cells	a. Use Reference Operators b. Work with sum, Sum if , Count and Count If Functions c. Fill Cells Automatically	a. Create Excel sheets involving cross references and equations b. Use the advanced functions for conditional calculations
19.	To sort and filter data in table	a. Sort data in multiple columns b. Sort data in a row c. Sort data using Custom order d. Filter data in work sheet	a. Refine the data in a worksheet and keep it organized b. Narrow a worksheet by selecting specific choice
20.	To Practice Excel Graphs and Charts	a. Produce an Excel Pie Chart b. Produce c. Excel Column Chart	a. Use data in Excel sheet to Create technical charts and graphs Produce Excel Line Graph b. Produce a Pictograph in Excel
21.	To develop lab reports of respective discipline	Create Lab reports using MS Word and Excel	a. Insert Practical subject name in Header and page numbers in Footer
22.	To format a Worksheet in Excel, page setup and print	a. Shade alternate rows of data b. Add currency & percentage symbols c. Change height of a row and width of a column d. Change data alignment e. Insert Headers and Footers f. Set Print Options and Print	a. Format Excel sheet b. Insert headers & footers and print

23.	To familiarize with Ribbon layout & features of PowerPoint 2007.	Use various options in PowerPoint a. Home b. Insert c. Design d. Animation e. Slideshow f. View g. Review	Access required options in the tool bar
24.	To create a simple PowerPoint Presentation	a. Insert a New Slide into PowerPoint b. Change the Title of a PowerPoint Slide c. PowerPoint Bullets d. Add an Image to a PowerPoint Slide e. Add a Textbox to a PowerPoint slide	a. Create simple PowerPoint presentation with photographs/ClipArt and text boxes b. Use bullets option
25.	To Set up a Master Slide in PowerPoint and add notes	a. Create a PowerPoint Design Template b. Modify themes c. Switch between Slide master view and Normal view d. Format a Design Template Master Slide e. Add a Title Slide to a Design Template f. The Slide Show Footer in PowerPoint g. Add Notes to a PowerPoint Presentation	a. Setup Master slide and format b. Add notes
26.	To Insert Text and Objects	a. Insert Text and objects b. Set Indents and line spacing c. Insert pictures/ clipart d. Format pictures e. Insert shapes and word art f. Use 3d features g. Arrange objects	Insert Text and Objects Use 3d features
27.	To insert a Flow Chart / Organizational Charts	a. Create a Flow Chart in PowerPoint b. Group and Ungroup Shapes c. Use smart art	Create organizational charts and flow charts using smart art
28.	To insert a Table	a. PowerPoint Tables b. Format the Table Data c. Change Table Background d. Format Series Legend	Insert tables and format
29.	To insert a Charts/Graphs	a. Create 3D Bar Graphs in PowerPoint b. Work with the PowerPoint Datasheet	Create charts and Bar graphs, Pie Charts and format.

		<ul style="list-style-type: none"> c. Format a PowerPoint Chart Axis d. Format the Bars of a Chart e. Create PowerPoint Pie Charts f. Use Pie Chart Segments g. Create 2D Bar Charts in PowerPoint h. Format the 2D Chart e. Format a Chart Background 	
30.	To Insert audio & video, Hyperlinks in a slide Add narration to the slide	<ul style="list-style-type: none"> a. Insert sounds in the slide and hide the audio symbol b. Adjust the volume in the settings c. Insert video file in the format supported by PowerPoint in a slide d. Use automatic and on click options e. Add narration to the slide f. Insert Hyperlinks 	<ul style="list-style-type: none"> a. Insert Sounds and Video in appropriate format. b. Add narration to the slide c. Use hyperlinks to switch to different slides and files
31.	To Practice Animation effects	<ul style="list-style-type: none"> a. Apply transitions to slides b. To explore and practice special animation effects like Entrance, Emphasis, Motion Paths & Exit 	Add animation effects
32.	Reviewing presentation	<ul style="list-style-type: none"> a. Checking spelling and grammar b. Previewing presentation c. Set up slide show d. Set up resolution e. Exercise with Rehearse Timings feature in PowerPoint f. Use PowerPoint Pen Tool during slide show g. Saving h. Printing presentation <ul style="list-style-type: none"> (a) Slides (b) Hand-out 	<ul style="list-style-type: none"> a. Use Spell check and Grammar feature b. Setup slide show c. Add timing to the slides d. Setup automatic slide show
33	To familiarize with standard toolbox	<ul style="list-style-type: none"> a. Open Adobe Photoshop b. Use various tools such as <ul style="list-style-type: none"> i. The Layer Tool ii. The Color & Swatches Tool iii. Custom Fonts & The Text Tool iv. Brush Tool v. The Select Tool vi. The Move Tool vii. The Zoom Tool viii. The Eraser ix. The Crop Tool x. The Fill Tool 	Open a photograph and save it in Photoshop

34	To edit a photograph	<ul style="list-style-type: none"> a. Use the Crop tool b. Trim edges c. Change the shape and size of a photo d. Remove the part of photograph including graphics and text 	a. Able to edit image by using corresponding tools.
35	To insert Borders around photograph	<ul style="list-style-type: none"> a. Start with a single background layer b. Bring the background forward c. Enlarge the canvas d. Create a border color e. Send the border color to the back f. Experiment with different colors 	Able to create a border or frame around an image to add visual interest to a photo
36	To change Background of a Photograph	<ul style="list-style-type: none"> a. open the foreground and background image b. Use different selection tools to paint over the image c. Copy background image and paste it on the foreground. d. Resize and/or drag the background image to reposition. e. In the Layers panel, drag the background layer below the foreground image layer. 	Able to swap background elements using the Select and Mask tool and layers.
37	To change colors of Photograph	<ul style="list-style-type: none"> a. Change colors using: <ul style="list-style-type: none"> i) Color Replacement tool ii) Hue/Saturation adjustment layer tool 	Able to control color saturation
38	To prepare a cover page for the book in subject area	<ul style="list-style-type: none"> a. open a file with height 500 and width 400 for the cover page. b. apply two different colors to work area by dividing it into two parts using Rectangle tool. c. Copy any picture and place it on work area→ resize it using free transform tool. d. Type text and apply color and style e. Apply effects using blended options 	Able to prepare cover page for the book
39	To adjust the brightness and contrast of picture to give an elegant look	<ul style="list-style-type: none"> a. open a file. b. Go to image→ adjustments→ Brightness/Contrast. c. adjust the brightness and contrast. d. Save the image. 	Able to control brightness/contrast.

40	To type a word and apply the shadow emboss effects	a. open a file b. Select the text tool and type text. c. Select the typed text go to layer→ layer style→ blended option→ drop shadow, inner shadow, bevel and emboss→ contour→ satin→ gradient overlay d. Save the image.	Able to apply shadow emboss effects
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Table specifying the scope of syllabus to be covered for unit tests

Unit Test	Learning outcomes to be covered
Unit test-1	From 1 to 8
Unit test-2	From 9 to 22
Unit test-3	From 23 to 40

**I YEAR INTERNAL LAB EXAMINATION
UNIT TEST - I
MODEL QUESTION PAPER
COMPUTER FUNDAMENTALS LAB**

**SCHEME: C-20
MAX MARKS:40**

**SUBJ CODE: MNG-110
Time:90Min**

1. Identify the internal hardware components of a PC and assemble them.
2. Identify the external components or peripherals of a PC and connect them.
3. Identify the components on motherboard.
4. Perform the process of placing processor on CPU slot.
5. Perform the process of removing and placing the RAM in the corresponding slot.
6. Identify the CMOS battery and test whether it is working it or not.
7. Find details of following:
 - a) Operating System being used.
 - b) Processor name
 - c) RAM
 - d) Hard disk
8. Create a folder by your name, search a file or folder and find its path.
9. Draw the National Flag using MS Paint.
10. Create a word document that contains TEN names of your classmates (boys-5 & girls-5) and perform the following tasks:
 - a) Save the document to your desktop.
 - b) Sort the names in each list alphabetically.
 - c) Set line spacing to 1.15.
 - d) Use bullet points for the names in both lists separately.

I Year Internal Lab Examination
UNIT TEST - II
MODEL QUESTION PAPER
COMPUTER FUNDAMENTALS LAB

SCHEME: C-20
MAX MARKS:40

SUBJ CODE:MNG-110
Time:90Min

1. Write individually addressed letters to your friends about the Republic Day celebration using Mail Merge.
2. Create a Word document about your college and insert page numbers in footer and College Name in header.
3. Create your class time table using Tables in MS Word.
4. Create a 2-page document about your College& insert hyperlinks for courses offered in the college and insert Bookmarks next to College Name.
5. Write individually addressed letters to your friends (at least 5 members) to intimate the External Examination time table using Mail Merge.
6. Write an equation $\frac{(x+y)^2}{(x-y)^2} = \frac{x^2+2xy+y^2}{x^2-2xy+y^2}$ in MS word.
7. Create the organizational structure of your college in MS Word.
8. Create a spreadsheet by totaling marks of 3 or more subjects, then calculate percentage and hence find grade based on boundary conditions of FIVE students:
Grades O >= 90%, A >=80%, B >=70%, C >=60%, D >=50%, E >=40%, F <40%
9. Create a Excel spreadsheet for the following data, making sure that the cell marked with Category (A1) is pasted in cell A1 in the spreadsheet and perform the questions below.

Category (A1)	Product Name	Quantity	Inventory	Price per Unit	Total Price
Office Supplies	Binder	2	20	12.99	25.98
Office Supplies	Pencil	20	20	0.99	
Electronics	Samsung 4K Smart TV	1	5	399.00	
Electronics	Bluetooth Speakers	4	5	44.49	
Computers	Lenovo X230 12in Laptop	2	2	279.90	

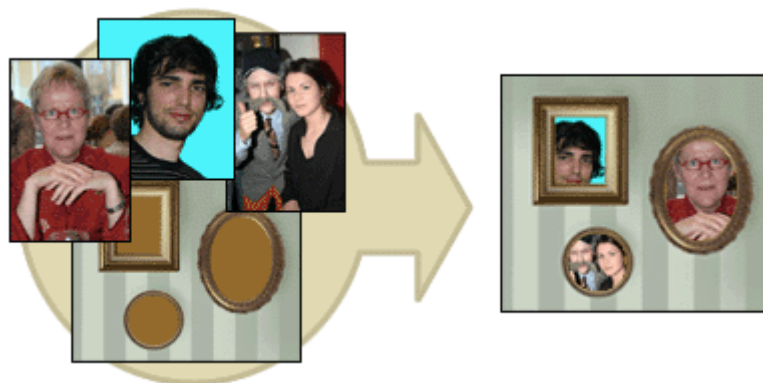
- a) Change the format of the “Total Price” column to “Currency” format.
 - b) Calculate Total Price by writing formula.
 - c) Turn on filtering for the table.
 - d) Sort the table by column “Category” from A to Z.
10. Create a spreadsheet to calculate Cumulative monthly attendance for a period of Three months.

Year Internal Lab Examination
UNIT TEST - III
MODEL QUESTION PAPER
COMPUTER FUNDAMENTALS LAB

SCHEME: C-20
MAX MARKS:40

SUBJ CODE: MNG-110
Time:90Min

1. Create a PowerPoint Presentation about your College in 5 slides only.
2. Create a PowerPoint Presentation on Computer Hardware in minimum 5 slides.
3. Create a PowerPoint Presentation on Computer Fundamentals with *Entrance, Emphasis* effects in minimum 5 slides.
4. Create a PowerPoint Presentation on any topic with special animation effects like *Entrance, Motion Paths & Exit*.
5. Resize the image using Photoshop.
6. Change the background of a Photograph.
7. Edit an image by using
 - a) Crop tool.
 - b) Resize the image
 - c) Save the new image with new name keeping original image as it is.
8. A Picture of two parrots (parrots.jpg) is given to you. Make anyone of one of the parrots in Black & White.
9. Convert a color image to monochrome and improve quality of photograph.
10. Copy three pictures and fit into the empty frames.



BOARD DIPLOMA EXAMINATIONS
DIPLOMA IN COMPUTER ENGINEERING
MODEL PRACTICAL QUESTION PAPER-YEAR END EXAM
COMPUTER FUNDAMENTALS LAB

SCHEME: C-20

SUBJ CODE:MNG-110

MAX MARKS:60

TIME: 3HOURS

1. Identify the internal hardware components of a PC and assemble them.
2. Identify the external components or peripherals of a PC and connect them.
3. Write the procedure to create the files and folders
4. Write the procedure to access Calculator, Paint and Notepad application
5. Write the procedure to perform the following in MS Word
 - (a) Change the Font Size
 - (b) Change the Font Style
 - (c) Change the Text Size
6. Write the procedure to perform the following in MS Word
 - (a) Change the Font Color. (b) Use Various Text Alignment Options.
 - (c) Format text in Bold, Italic and Underline.
7. Create the hierarchy of your family in MS Word.
8. Write the procedure to perform the following in MS Word:
 - (a) Insert a Table (b) Add a Row (c) Add a column
 - (d) Delete a Row (e) Delete a column
9. Write the procedure to use Equation $\frac{(x+y)^2}{(x-y)^2} = \frac{x^2+2xy+y^2}{x^2-2xy+y^2}$ and Symbols.
10. Write the procedure to perform the following in MS Excel
 - (a) To Modify Column Width (b) To Modify Row Height
 - (c) Format text in Bold, Italic, and Underline.
11. Write the procedure to create charts and Graphs in MS Excel.
12. Write the procedure to create simple Power Point Presentation on your college in Three slides.
13. Write the procedure to perform Animation on Text and Objects in your presentation.
14. Take a photographic image. Give a title for the image. Put the border. Write your names. Write the Name of Institution and Place.
15. Prepare a cover page for the book in your subject area. Plan your own design.
16. You are given a picture of a flower and associated background (Extract.jpg). Extract the Flower only from that and organize it on a background. Select your own background for organization.
17. You are given a picture (BrightnessContrast.jpg). Adjust the brightness and contrast of the picture so that it gives an elegant look.
18. You are given a picture (position.jpg). Position the picture preferably on a plain background of a color of your choice - Positioning include rotation and scaling.
19. Remove the arrows and text from the given photographic image (Filename: photo.jpg).
20. Type a word; apply the following effects. Shadow Emboss.

III SEMESTER

DIPLOMA IN MINING ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATIONS
III SEMESTER(SECOND YEAR)

Subject Code	Name of the Subject	Instruction period / week		Total Period / Sem	Scheme of Examination			
		Theory	Practical/Tutorial		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
THEORY								
MNG-301	Engineering Mathematics – II	4	-	60	3	20	80	100
MNG-302	Basic Electrical Engineering	5	-	75	3	20	80	100
MNG-303	Basic Mechanical Engineering	5	-	75	3	20	80	100
MNG-304	Underground Coal Mining Methods	5	-	75	3	20	80	100
MNG-305	Mine Surveying-I	5	-	75	3	20	80	100
MNG-306	Mining Geology	5	-	75	3	20	80	100
PRACTICAL								
MNG-307	Basic Electrical Engineering Laboratory Practice	-	3	45	3	40	60	100
MNG-308	Basic Mechanical Engineering Laboratory Practice	-	3	45	3	40	60	100
MNG-309	Mine Surveying Practice –I	-	4	60	3	40	60	100
MNG-310	Mining Geology Laboratory Practice	-	3	45	3	40	60	100
	TOTAL	29	13	630		280	720	1000

ENGINEERING MATHEMATICS-II

Course Code	Course Title	No. of Periods/week	Total No. of periods	Marks for FA	Marks for SA
MNG-301	Engineering Mathematics-II	4	60	20	80

S.No.	Unit Title	No. of periods	COs mapped
1	Indefinite Integration	22	CO1
2	Definite Integration and its applications	24	CO2
3	Differential Equations of first order	14	CO3
Total Periods		60	

Course Objectives	<ul style="list-style-type: none"> (i) To understand the concepts of indefinite integrals and definite integrals with applications to engineering problems. (ii) To understand the formation of differential equations and learn various methods of solving them.
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Course Outcomes	CO1	Integrate various functions using different methods.
	CO2	Evaluate definite integrals with applications.
	CO3	Obtain differential equations and solve differential equations of first order and first degree.

ENGINEERING MATHEMATICS – II

Learning Outcomes

Unit-I

C.O. 1 Integrate various functions using different methods.

L.O.1.1. Explain the concept of Indefinite integral as an anti-derivative.

1.2. State the indefinite integral of standard functions and properties of Integrals $\int (u + v) dx$ and $\int ku dx$ where k is constant and u, v are functions of x .

1.3. Solve integration problems involving standard functions using the above rules.

1.4. Evaluate integrals involving simple functions of the following type by the method of substitution.

i) $\int f(ax + b) dx$ where $f(x)dx$ is in standard form.

ii) $\int [f(x)]^n f'(x) dx$

iii) $\int f'(x)/[f(x)] dx$

iv) $\int f\{g(x)\} g'(x) dx$

1.5. Find the integrals of $\tan x$, $\cot x$, $\sec x$ and $\operatorname{cosec} x$ using the above.

1.6. Evaluate the integrals of the form $\int \sin^m x \cos^n x dx$ where m and n are suitable positive integers.

1.7. Evaluate integrals of suitable powers of $\tan x$ and $\sec x$.

1.8. Evaluate the Standard integrals of the functions of the type

$$\frac{1}{x^2}$$

1.9. Evaluate the integrals of the type

$$\sinh x = \frac{e^x - e^{-x}}{2}.$$

1.10. Evaluate integrals using decomposition method.

1.11. Solve problems using integration by parts.

1.12 Use Bernoulli's rule for evaluating the integrals of the form $\int \frac{f'(x)}{f(x)} dx$.

1.13. Evaluate the integrals of the form $\int e^x [f(x) + f'(x)] dx$.

Unit-II

C.O.2 Evaluate definite integrals with applications.

L.O.2.1. State the fundamental theorem of integral calculus

2.2. Explain the concept of definite integral.

2.3. Solve problems on definite integrals over an interval using the above concept.

2.4. State various properties of definite integrals.

2.5. Evaluate simple problems on definite integrals using the above properties.

Syllabus for Unit test-I completed

2.6. Explain definite integral as a limit of sum by considering an area.

2.7. Find the areas under plane curves and area enclosed between two curves using integration.

2.8. Obtain the mean value and root mean square value of the functions in any given interval.

2.9. Obtain the volumes of solids of revolution.

2.10. Solve some problems using Trapezoidal rule, Simpson's 1/3 rule for approximation of integrals.

Unit -III

C.O. 3 Form differential equations and solve differential equations of first order and first degree.

L.O. 3.1 Define a Differential equation, its order and degree

3.2 Find order and degree of a given differential equation.

3.3 Form a differential equation by eliminating arbitrary constants.

3.4 Solve the first order and first degree differential equations by variables separable method.

3.5 Solve Homogeneous differential equation of first order and first degree.

3.6 Solve exact differential equation of first order and first degree.

3.7 Solve linear differential equation of the form $dy/dx + Py = Q$, where P and Q are functions of x or constants.

3.8 Solve Bernoulli's differential equation reducible to linear form.

3.9 Solve simple problems arising in engineering applications.

Syllabus for Unit test-II completed

C-20

Engineering Mathematics – II

CO/PO – Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	2				3	1	2
CO2	3	3	3	3				3	3	3
CO3	3	3	3	3				3	3	3
Avg	3	2.6	2.6	2.6				3	2.3	2.6

3 = Strongly mapped (High), 2 = Moderately mapped (Medium), 1 = Slightly mapped (Low)

PO5: Appropriate quiz programme may be conducted at intervals and duration as decided by concerned teacher.

PO6: Seminars on applications of mathematics in various engineering disciplines are to be planned and conducted.

PO7: Such activities are to be planned that students visit library to refer standard books on Mathematics and latest updates in reputed national and international journals, attending seminars, learning mathematical software tools.

PSO1: An ability to understand the concepts of basic mathematical techniques and to apply them in various areas like computer programming, civil constructions, fluid dynamics, electrical and electronic systems and all concerned engineering disciplines.

PSO2: An ability to solve the Engineering problems using latest software tools, along with analytical skills to arrive at faster and appropriate solutions.

PSO3: Wisdom of social and environmental awareness along with ethical responsibility to have a successful career as an engineer and to sustain passion and zeal for real world technological applications.

Engineering Mathematics – II
PO- CO – Mapping strength

PO no	Mapped with CO no	CO periods addressing PO in column I		Level (1,2 or 3)	Remarks
		Number	%		
1	CO1, CO2, CO3	60	100%	3	>40% Level 3 Highly addressed
2	CO1, CO2, CO3	60	100%	3	
3	CO1, CO2, CO3	60	100%	3	
4	CO2, CO3	38	63.3%	3	25% to 40% Level 2 Moderately addressed
5					
6					
7					
PSO 1	CO1, CO2, CO3	60	100%	3	5% to 25% Level 1 Low addressed
PSO 2	CO1, CO2, CO3	40	66.6%	3	
PSO 3	CO1, CO2, CO3	48	75%	3	

ENGINEERING MATHEMATICS – II
COURSE CONTENTS

Unit-I

Indefinite Integration.

1. Integration regarded as anti-derivative – Indefinite integrals of standard functions. Properties of indefinite integrals. Integration by substitution or change of variable. Integrals of $\tan x$, $\cot x$, $\sec x$, $\operatorname{cosec} x$. Integrals of the form $a + ib$ where at least one of m and n is odd positive integers. Integrals of suitable powers of $\tan x$, $\sec x$ and $\operatorname{cosec} x$. $\cot x$ by substitution.

Evaluation of integrals which are reducible to the following forms:

$$(1,1)$$

Integration by decomposition of the integrand into simple rational, algebraic functions.

Integration by parts, Bernoulli's rule and integrals of the form $\int e^x [f(x) + f'(x)] dx$.

Unit-II

Definite Integral and its applications:

2. Definite integral-fundamental theorem of integral calculus, properties of definite integrals, evaluation of simple definite integrals. Definite integral as the limit of a sum. Area under plane curves – Area enclosed between two curves. Mean and RMS values of a function on a given interval Volumes of solids of revolution. Trapezoidal rule, Simpson's 1/3 rule to evaluate an approximate value of a definite integral.

Unit -III

Differential Equations:

3. Definition of a differential equation-order and degree of a differential equation- formation of differential equations-solutions of differential equations of first order and first degree using methods, variables separable, homogeneous, exact, linear differential equation, Bernoulli's equation.

Textbook:

Engineering Mathematics-II, a textbook for third semester diploma courses, prepared & prescribed by SBTET, AP.

Reference Books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
2. Schaum's Outlines Differential Equations, Richard Bronson & Gabriel B. Costa
3. M.Vygodsky, Mathematical Handbook: Higher Mathematics, Mir Publishers, Moscow.

BLUE PRINT

S. No	Chapter/Unit title	No of Periods	Weight age allotted	Marks wise distribution of weight age				Question wise distribution of weight age				COs mapped
				R	U	Ap	An	R	U	Ap	An	
1	Unit – I: Indefinite Integration	22	28	11	11	06	0	2	2	2	0	CO1
2	Unit – II: Definite Integration and its applications	24	33	11	03	11	08	2	1	2	1	CO2
3	Unit – III: Differential Equations of first order	14	19	03	03	03	10	1	1	1	1	CO3
Total		60	80	25	17	20	18	5	4	5	2	

R: Remembering Type : 25 Marks

U: understanding Type : 17 Marks

Ap: Application Type : 20 Marks

An: Analysing Type : 18 Marks

Engineering Mathematics – II
Unit Test Syllabus

Unit Test	Syllabus
Unit Test-I	From L.O 1.1 to L.O 2.5
Unit Test-II	From L.O 2.6 to L.O 3.9

State Board of Technical Education and Training, A. P

UNIT TEST MODEL PAPERS

Unit Test I

First Year

Subject Name: Engineering Mathematics-II

Sub Code: MNG-301

Time : 90 minutes

Max.marks:40

Part-A

16Marks

Instructions: (1) Answer **all** questions.(2) First question carries **four** marks and the remaining questions carry **three** marks each.

1. Answer the following.

Evaluate $2x + 3y - 1 = 0$ (CO1)

Evaluate $2x - y + 3 = 0$ (CO1)

$x + y - 2 = 0$ is true/false (CO1)

a. Evaluate $x^2 + y^2 - 2x + 4y - 4 = 0$ (CO2)

2. Evaluate $\frac{\sin 2\theta + \sin 4\theta + \sin 6\theta}{\cos 2\theta + \cos 4\theta + \cos 6\theta} = \tan 4\theta$ (CO1)

3. Evaluate $\tan^{-1} \frac{1}{2} + \tan^{-1} \frac{1}{5} + \tan^{-1} \frac{1}{8} = \frac{\pi}{4}$ (CO1)

4. Evaluate $2\sin^2 \theta - \sin \theta - 1 = 0$ (CO1)

5. Evaluate ΔABC (CO2)

Part-B

3×8=24

Instructions: (1) Answer **all** questions.(2) Each question carries **eight** marks

(3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. A) Evaluate $\angle B = 60^\circ$ (CO1)

OR

B) Evaluate $\frac{c}{a+b} + \frac{a}{b+c} = 1$ (CO1)

7. A) Evaluate (2,3) (CO1)

OR

B) Evaluate (6,9) (CO1)

8. A) Evaluate (1, -1) (CO2)

OR

B) Evaluate $x - y + 3 = 0$ (CO2)

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Unit Test II
State Board of Technical Education and Training, A. P
First Year
Subject Name: Engineering Mathematics-II
Sub Code: MNG-301

C –20, MNG-301

Time : 90 minutes

Max.Marks:40

Part-A

16Marks

Instructions: (1) Answer **all** questions.
(2) First question carries **four** marks and the remaining questions carry **three** marks each.

1. Answer the following.

- a. Volume of the curve $\lim_{x \rightarrow 1} \frac{x^2 + 1}{x + 5}$ over the interval $\lim_{\theta \rightarrow 0} \frac{\sin 2\theta}{\theta} = 2$ when rotated about X-axis is _____ (CO2)
- b. Mean value of $\frac{d}{dx}(3 \tan^{-1} x) = ?$ over the interval x is _____ (CO2)
- c. Order of differential equation $\lim_{x \rightarrow 2} \frac{x^5 - 32}{x^2 - 4}$ is _____ (CO3)
- d. Integrating factor of $3 \tan x - 4 \log x + 7^x$ is _____ (CO3)

2. Find the mean value of $x^2 \sin x$ over the interval x (CO2)

3. Find the area enclosed by curve $\frac{2x+3}{3x+4}$ between the lines $\sin^{-1}\left(\frac{2x}{1+x^2}\right)$ and $\tan^{-1}\left(\frac{2x}{1-x^2}\right)$ (CO2)

4. Form the differential equation by eliminating the arbitrary constants from $\frac{dy}{dx}$ (CO3)

5. Solve $y = x^{\cos x}$ (CO3)

Part-B

3×8=24

- Instructions:** (1) Answer **all** questions.
(2) Each question carries **eight** marks
(3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. A) Find the area bounded between the curve $u(x, y) = \frac{x^4 + y^4}{x - y}$ and the line $3y = x^2 - 6x + 17$

(CO2)

OR

- B) Find the R.M.S value of $(4, 3)$ between the lines $8 \text{ sqcm} / \text{min}$ to 5 cm

(CO2)

7. A) Find the volume of the solid obtained by revolving the ellipse $f(x) = x^3 - 6x^2 + 9x + 15$. about x axis

(CO2)

OR

- B) Calculate the approximate value of $A = \left\{ 0, \frac{\pi}{6}, \frac{\pi}{4}, \frac{\pi}{3}, \frac{\pi}{2} \right\}$ by taking $f : A \rightarrow B$ using Trapezoidal rule

(CO3)

8. A) Solve $f(x) = \cos x$,

(CO3)

OR

- B) Solve f .

(CO3)

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END EXAM MODEL PAPERS
STATE BOARD OF TECHNICAL EDUCATION, A.P
ENGINEERING MATHEMATICS MNG-301

TIME : 3 HOURS

MODEL PAPER- I

MAX.MARKS : 80M

PART-A

Answer All questions. Each question carries THREE marks.

10x3=30M

1. Evaluate $\frac{x}{(x-1)(x-2)}$ **CO1**
2. Evaluate $A = \begin{bmatrix} 3 & 9 & 0 \\ 1 & 8 & -2 \end{bmatrix}$ **CO1**
3. Evaluate $B = \begin{bmatrix} 4 & 0 & 2 \\ 7 & 1 & 4 \end{bmatrix}$, **CO1**
4. Evaluate $A + B$ **CO1**
5. Evaluate $A - B$. **CO2**
6. Find the mean value of $\frac{\cos 16^\circ + \sin 16^\circ}{\cos 16^\circ - \sin 16^\circ} = \tan 61^\circ$. from $\frac{\sin 2\theta}{1 - \cos 2\theta} = \cot \theta$. to $\left(\frac{1-i}{2+i}\right)$. **CO2**
7. Find the area of the region bounded by the curve $x + 2y + 3 = 0$ from $x + 2y + 8 = 0$. to $\lim_{x \rightarrow 0} \frac{\sin 77x}{\sin 11x}$. **CO2**
8. Find the order and degree of the differential equation $3 \tan x - 4 \log x - 7x^2$ **CO3**
9. Solve x . **CO3**
10. Solve $x = at^2, y = 2at$, **CO3**

PART-B

Answer All questions. Each question carries EIGHT marks.

5x8=40M

11. A) Evaluate $\frac{dy}{dx}$. **CO1**
- OR
- B) Evaluate $\begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$. **CO1**

12. A) Evaluate $x + y + z = 6, x - y + z = 2$ CO1

Or

B) Evaluate $2x - y + 3z = 9$ CO1

13. A) Evaluate $\cos x + \cos y = \frac{3}{5}$ CO2

Or

B) Evaluate $\cos x - \cos y = \frac{2}{7}$, CO2

14. A) Find the area of the region bounded by the curves $21 \tan\left(\frac{x-y}{2}\right) + 10 \cot\left(\frac{x+y}{2}\right) = 0$.

and $\tan^{-1} x + \tan^{-1} y + \tan^{-1} z = \pi$. CO2

Or

B) Find the R.M.S values of $x + y + z = xyz$. from $\sqrt{3} \cos \theta - \sin \theta = 1$. to ΔABC , CO2

15. A) Find the volume of the solid generated by revolution of the ellipse

$\cot \frac{A}{2} + \cot \frac{B}{2} + \cot \frac{C}{2} = \frac{s^2}{\Delta}$. about X-axis CO2

Or

B) Calculate the approximate value of $(4, 2)$ by using Simpson's $1/3^{\text{rd}}$ rule by dividing the range into 10 equal parts. CO2

PART-C

Answer the following question. Question carries TEN marks.

1x10=10M

16. Solve $(1, 5)$ CO3

STATE BOARD OF TECHNICAL EDUCATION, A.P
ENGINEERING MATHEMATICS MNG- 301

TIME : 3 HOURS

MODEL PAPER-II

MAX.MARKS : 80M

PART-A

Answer All questions. Each question carries THREE marks.

10x3=30M

1. Evaluate $4x^2 + 16y^2 = 1$. CO1
2. Evaluate $\sin^{-1}\left(\frac{2x}{1+x^2}\right)$ CO1
3. Evaluate $\tan^{-1}\left(\frac{2x}{1-x^2}\right)$ CO1
4. Evaluate $u = \tan^{-1}\left(\frac{x^3 - y^3}{x + y}\right)$, CO1
5. Evaluate $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \sin 2u$. CO2
6. Find the mean value of $f : R \rightarrow R$ over the complete wave. CO2
7. Find the volume generated by revolving the circle $f(x) = ax + b$, from $f^{-1}(x)$. to $\frac{1}{(x+1)(x-2)}$ about x-axis CO2
8. Obtain the differential equation by eliminating the arbitrary constants A and B from the curve $A = \begin{bmatrix} 0 & -1 & 3 \\ 1 & 0 & 7 \\ -3 & x & 0 \end{bmatrix}$ CO3
9. Solve x . CO3
10. Solve $\sin^2 82 \frac{1}{2} - \sin^2 22 \frac{1}{2}$. CO3

PART-B

Answer All questions. Each question carries EIGHT marks.

5x8=40M

11. A) Evaluate $\frac{\cos 3A}{2\cos 2A - 1} = \cos A.$ **CO1**

Or

B) Evaluate $(3 - 2i).(4 + 7i)$ **CO1**

12. A) Evaluate $(1, 2)$ **CO1**

OR

B) Evaluate $(3, -4).$ **CO1**

13. A) Evaluate $\lim_{x \rightarrow 2} \frac{x^5 - 32}{x - 2}.$ **CO2**

OR

B) Evaluate $\sqrt{x} - \sec x + \log x$ **CO2**

14. A) Find the area bounded between the curves $X.$ and the line $u(x, y) = x^3 - 3axy + y^3, .$ **CO3**

OR

B) Find the R.M.S value of $\frac{\partial u}{\partial x}$ between the lines $\frac{\partial u}{\partial y}$.to $\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{vmatrix} = (a-b)(b-c)(c-a).$

CO2

15. A) Find the volume of right circular cone using integration. **CO2**

OR

B) Find the approximate value of $x + 2y + 3z = 6, 3x - 2y + 4z = 5$ from $x - y - z = -1$

using Trapezoidal rule by dividing $\frac{\sin 2\theta + \sin 4\theta + \sin 6\theta}{\cos 2\theta + \cos 4\theta + \cos 6\theta} = \tan 4\theta.$ into 5 equal sub-intervals.

CO2

PART-C

Answer the following question. Question carries TEN marks.

1x10=10M

16. Solve $\tan^{-1} \frac{1}{3} + \tan^{-1} \frac{1}{5} + \tan^{-1} \frac{1}{7} + \tan^{-1} \frac{1}{8} = \frac{\pi}{4}.$ **CO3**

Course Code	Course Title	No. of periods / Week	Total No. of Periods	Marks for FA	Marks for SA
MNG302	BASIC ELECTRICAL ENGINEERING	5	75	20	80

COURSE OUTCOMES MAPPING

S.No	Major Topics	No. of periods	CO's Mapped
1.	Electrical Engineering Fundamentals	12	CO1
2.	Electrical Circuits	14	CO2
3.	Electrical Machines	22	CO3
4	Electrical Measuring Instruments	15	CO4
5.	Electrical Safety Procedures	12	CO5
	Total	75	

COURSE OBJECTIVES	To familiarize the basic concepts and working principles of electrical engineering to solve various electrical circuits.
	To understand the construction and working of different electrical machines and measuring instruments.
	To acquire the knowledge to operate different electrical equipment with safety.

COURSE OUTCOMES	CO1	MNG302.1	Recognizing the basic concepts of electrical engineering and their applications.
	CO2	MNG302.2	Analyse the various parameters of electrical circuits to know their importance in electrical engineering.
	CO3	MNG302.3	Analyzing the usage of various electrical machines for different applications.
	CO4	MNG302.4	Comparing various electrical measuring instruments.
	CO5	MNG302.5	Identifying and using suitable safety measures and tools at different situations.

LEARNING OUTCOMES

Electrical Engineering Fundamentals

- 1.1 Define electric current and state its properties.
- 1.2 Define Ohm's Law and state the laws of resistance.
- 1.3 Define the terms: (a) Magnetic Flux (b) Permeability and (c) Inductance.
- 1.4 Define the terms: (a) Electric Flux (b) Permittivity and (c) Capacitance.
- 1.5 State and explain (a) Faradays laws of Electro Magnetic Induction and (b) Lenz's law.
- 1.6 State and explain dynamically induced EMF and statistically induced EMF.
- 1.7 State and explain Self inductance, Mutual inductance and Coefficient of coupling.
- 1.8 Define the terms
 - (a) Alternating Quantity (b) Instantaneous Value (c) Maximum Value
 - (d) Time Period (e) Frequency (f) Average Value
 - (g) R.M.S Value (h) Form Factor (i) Peak Factor
 - (j) Power (k) Power Factor
- 1.9 State power and power factor in
 - (a) Pure resistor (b) Pure inductor (c) Pure capacitor
- 1.10 State and explain (a) Fleming's right hand rule and (b) Fleming's left hand rule

Electrical Circuits

- 2.1 Explain the procedure to calculate equivalent resistance of DC series circuits and parallel circuits.
- 2.2 Solve simple problems on equivalent resistance of DC series circuits and parallel circuits.
- 2.3 State and explain Kirchhoff's laws.
- 2.3 Solve simple problems on Kirchhoff's laws.
- 2.4 Explain the procedure to calculate domestic monthly energy bill.
- 2.5 Solve simple problems on domestic monthly energy bill.
- 2.6 Explain single phase A.C. RL series circuit.
- 2.7 Explain single phase A.C. RC series circuit.
- 2.8 Explain single phase A.C. RLC series circuit.
- 2.9 Explain three phase system with voltage, current and power equations.
- 2.10 State the advantages of three phase system over single phase system.

Electrical Machines

- 3.1 Explain the construction and working of D.C. Generator.
- 3.2 List the type of D.C. Generators and draw the schematic diagram of each type.
- 3.3 Write the currents and voltages equations for different types of D.C. Generators.

- 3.4 Explain the construction and working of D.C. Motor.
- 3.5 List the type of D.C. Motors and draw the schematic diagram of each type.
- 3.6 Write the currents and voltages equations for different types of D.C. Motors.
- 3.7 Explain various methods of speed control of D.C. Motors.
- 3.8 List the applications of DC Motor.
- 3.9 Explain the construction and working of Transformer.
- 3.10 List the applications of Transformer.
- 3.11 Explain the construction and working of Three Phase Induction Motor.
- 3.12 List the applications of Three Phase Induction motor.
- 3.13 Explain the construction and working of Single Phase Induction Motor.
- 3.14 List the types of Single Phase Induction Motors.
- 3.15 List the applications of Single Phase Induction motor.

Electrical Measuring Instruments

- 4.1 List the types of electrical measuring instruments.
- 4.2 Explain the construction and working of Moving Coil Measuring Instrument.
- 4.3 Explain construction and working of Attraction Type Moving Iron Measuring Instrument.
- 4.4 Explain construction and working of Repulsion Type Moving Iron Measuring Instrument.
- 4.5 Explain the construction and working of Dynamometer Type Measuring Instrument.
- 4.6 Explain the construction and working of Induction Type Single Phase Energymeter.

Electrical Safety Procedures.

- 5.1 Explain the effects of electrical shock and burn.
- 5.2 Explain the procedures to be adopted to avoid electric shock.
- 5.3 Explain the first aid methods to be followed after electrocuted.
- 5.4 State the need of earthing of electrical equipment and machinery and mention its types.
- 5.5 Explain the procedure of pipe earthing with diagram.
- 5.6 Explain the procedure of plate earthing with diagram.

CO'S – PO'S – PSO'S MAPPING STRENGTH

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
MNG302.1	3							3		
MNG302.2	3	2	1					3	2	
MNG302.3	3							3	1	
MNG302.4	3		2					3		
MNG302.5	3			1				3	1	
Average	3	2	1.5	1				3	1.3	

3-Strongly Mapped

2- Moderately Mapped 1- Slightly Mapped

Note:

The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:

(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions (vi) Quizzes (vii) Industrial Visits (viii) Tech Fests (ix) Mini Projects (x) Library Visits

HYPONATED COURSE CONTENTS

Electrical Engineering Fundamentals

Electric current and its properties - Ohm's Law and laws of resistance – Magnetic Flux, Permeability and Inductance – Electric Flux, Permittivity and Capacitance - Faradays laws of Electro Magnetic Induction - Lenz's law - dynamically induced EMF and statistically induced EMF - Self inductance, Mutual inductance and Coefficient of coupling - Alternating Quantity - Instantaneous Value - Maximum Value - Time Period - Frequency - Average Value - R.M.S Value - Form Factor – Peak Factor - Phase Difference – Power - Power Factor - Power and power factor in Pure resistor, Pure inductor and Pure capacitor - Fleming's right hand rule - Fleming's left hand rule.

Electrical Circuits

Procedure to calculate equivalent resistance of DC series circuits and parallel circuits - simple problems on equivalent resistance of DC series circuits and parallel circuits - Kirchhoff's laws - simple problems on Kirchhoff's laws - procedure to calculate domestic monthly energy bill - simple problems on domestic monthly energy bill - single phase A.C. RL series circuit - single phase A.C. RC series circuit - single phase A.C. RLC series circuit - three phase system with voltage, current and power equations - advantages of three phase system over single phase system.

Electrical Machines

Construction and working of D.C. Generator - type of D.C. Generators and the schematic diagram of each type - currents and voltages equations for different types of D.C. Generators - construction and working of D.C. Motor - type of D.C. Motors and schematic diagram of each type - currents and voltages equations for different types of D.C. Motors - methods of speed control of D.C. Motors - construction and working of Transformer - construction and working of Three Phase Induction Motor - construction and working of Single Phase Induction Motor - types of Single Phase Induction Motors - application of the DC Motor, Three Phase Induction motor, Single Phase Induction Motor.

Electrical Measuring Instruments

Types of electrical measuring instruments - construction and working of Moving Coil Measuring Instrument - construction and working of Attraction Type Moving Iron Measuring Instrument - construction and working of Repulsion Type Moving Iron Measuring Instrument - Compare Moving Coil Measuring Instrument and Moving Iron Measuring Instrument - construction and working of Dynamometer Type Measuring Instrument - construction and working of Induction Type Single Phase Energymeter.

Electrical Safety Procedures

Effects of electrical shock and burn - procedures to be adopted to avoid electric shock - first aid methods to be followed after electrocuted - need of earthing of electrical equipment and machinery - types of earthing of electrical equipment and machinery - procedure of pipe earthing with diagram - procedure of plate earthing with diagram.

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S.No	Chapter / Unit Title	No. of periods	Weightage Allocated	Markswise Distribution of Weightage				Questionwise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	Electrical Engineering Fundamentals	12	14	3	3	8	10	1	1	1	1	CO1
2	Electrical Circuits	14	14	3	3	8		1	1	1		CO2
3	Electrical Machines	22	14	3	3	8		1	1	1		CO3
4	Electrical Measuring Instruments	15	14	3	3	8		1	1	1		CO4
5	Electrical Safety Procedures	12	14	3	3	8		1	1	1		CO5
Total		75	70 + 10	15	15	40	10	5	5	5	1	

Note: 10 Marks Question may be given either from CO2 OR CO3.

REFERENCE BOOKS

- | | | |
|---|---|---|
| 1. Text Book of Electrical Engineering | - | JB Gupta |
| 2. A Text Book of Electrical Engineering | - | BL Theraja & AK Theraja |
| 3. Basic Electrical and Electronics Engineering | - | DP Kothari & IJ Nagrath |
| 4. Electrical Machinery | - | P.S. Bimbra |
| 5. Electrical Power Systems | - | Chakrabarthy, Sony, Gupta and Bhatnagar |

SYLLABUS TO BE COVERED FOR UNIT TEST-I AND UNIT TEST-II

Unit Test	Learning Outcomes to be covered
Unit Test-I	From 1.1 to 3.8
Unit Test-II	From 3.9 to 5.6

MODEL PAPER – FORMATIVE ASSESSMET – 1
C-20-MNG-302
BOARD DIPLOMA EXAMINATION, (C-20)
DMNGE – THIRD SEMESTER EXAMINATION
MNG-302 : BASIC ELECTRICAL ENGINEERING

Time: 90 Minutes

Total Marks: 40

PART-A

(1 x 4) + (4 x 3) = 16

Instructions:

- 1) Answer all five questions.
- 2) First question carries four marks and remaining each question carries three marks.
- 3) Answers should be brief and straight to the point and shall not exceed five simple sentences

1. (a) Electrical unit for permittivity is _____. **CO1**
(b) Formula for Form Factor = _____. **CO1**
(c) Power factor of a pure inductor is unity : True / False **CO1**
(d) R.M.S. value stands for _____. **CO1**
2. State Fleming's Right Hand Rule. **CO1**
3. State Kirchhoff's laws. **CO2**
4. State any three advantages of three phase system over single phase system. **CO2**
5. List the types of DC Generators. **CO3**

PART-B

3 X 8 = 24

Instructions:

- 1) Answer all three questions.
- 2) Each question carries eight marks.
- 3) The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.

6. State and explain Faraday's Laws of Electromagnetic Induction with legible sketches. **CO1**
(OR)
State and explain Selfinductance, Mutual inductance and Coefficient of coupling. **CO1**

7. A circuit consists of five resistors: 10 ohm, 20 ohm, 30 ohm, 40 ohm and 50 ohm which are connected in parallel to each other. Calculate the current passing through 30 ohm resistor, when a DC voltage of 100 volt is applied across the circuit. **CO2**

(OR)

A domestic consumer uses two 100 watt lamps for 3 hours, three 60 watt fans for 8 hours, four 40 watt tube lights for 6 hours and one 300 watt pump for 2 hours, every day. Calculate the monthly energy bill, if the cost per unit of energy is three rupees. **CO2**

8. List the type of D.C. Generators and draw the schematic diagram of each type. **CO3**
(OR)

Explain the construction and working of DC Motor. **CO3**

MODEL PAPER – FORMATIVE ASSESSMET – 2
C-20-MNG-302
BOARD DIPLOMA EXAMINATION, (C-20)
DMNGE – THIRD SEMESTER EXAMINATION
MNG-302 : BASIC ELECTRICAL ENGINEERING

Time: 90 Minutes

Total Marks: 40

PART-A

(1 x 4) + (4 x 3) = 16

Instructions:

- 1) Answer all five questions.
 - 2) First question carries four marks and remaining each question carries three marks.
 - 3) Answers should be brief and straight to the point and shall not exceed five simple sentences
-
1. (a) Working principle of Induction Motor is _____. **CO3**
 (b) Output side of a transformer is called as _____. **CO3**
 (c) Transformer converts electrical energy into mechanical energy : True / False **CO3**
 (d) Type of motor used in wet grinder is _____. **CO3**
 2. List any three electrical measuring instruments. **CO4**
 3. Compare moving coil measuring instrument with moving iron measuring instrument in any three aspects. **CO4**
 4. State any three effects of electric shock. **CO5**
 5. State the need of earthing of electrical equipment and machinery. **CO5**

PART-B

3 X 8 = 24

Instructions:

- 1) Answer all three questions.
 - 2) Each question carries eight marks.
 - 3) The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.
-
6. Explain the construction and working of Transformer. **CO3**
 (OR)
 Explain the construction and working of Three Phase Induction Motor. **CO3**
 7. Explain construction and working of Repulsion Type Moving Iron Measuring Instrument. **CO4**
 (OR)
 Explain the construction and working of Dynamometer Type Measuring Instrument. **CO4**
 8. Explain the first aid methods to be followed after electrocuted. **CO5**
 (OR)
 Explain the procedure of pipe earthing with diagram. **CO5**

**MODEL PAPER – SUMMATIVE ASSESSMENT
C-20-MNG-302**

BOARD DIPLOMA EXAMINATION, (C-20)
DMNGE – THIRD SEMESTER EXAMINATION
MNG-302 : BASIC ELECTRICAL ENGINEERING

Time: 3 hours

Total Marks: 80

PART-A

10 X 3 = 30

Instructions:

- 1) Answer all questions.
- 2) Each question carries three marks.
- 3) Answers should be brief and straight to the point and shall not exceed five simple sentences

1. Define Ohm's law and state the laws of resistance. **CO1**
2. State Fleming's Right Hand Rule. **CO1**
3. State Kirchhoff's laws. **CO2**
4. State any three advantages of three phase system over single phase system. **CO2**
5. List the types of DC Generators. **CO3**
6. List any three applications of Single Phase Induction Motors. **CO3**
7. List any three electrical measuring instruments. **CO4**
8. Compare moving coil measuring instrument with moving iron measuring instrument in any three aspects. **CO4**
9. State any three effects of electric shock. **CO5**
10. State the need of earthing of electrical equipment and machinery. **CO5**

PART-B

5 X 8 = 40

Instructions:

- 1) Answer all five questions.
- 2) Each question carries eight marks.
- 3) The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.

11. State and explain Faraday's Laws of Electromagnetic Induction with legible sketches. **CO1**
(OR)

State and explain Self inductance, Mutual inductance and Coefficient of coupling. **CO1**

12. A circuit consists of five resistors: 10 ohm, 20 ohm, 30 ohm, 40 ohm and 50 ohm which are connected in parallel to each other. Calculate the current passing through 30 ohm resistor, when a DC voltage of 100 volt is applied across the circuit. **CO2**

(OR)

A domestic consumer uses two 100 watt lamps for 3 hours, three 60 watt fans for 8 hours, four 40 watt tube lights for 6 hours and one 300 watt pump for 2 hours, every day. Calculate the monthly energy bill, if the cost per unit of energy is three rupees. **CO2**

13. Explain the construction and working of DC Motor. **CO3**
(OR)

Explain the construction and working of Three Phase Induction Motor. **CO3**

14. Explain construction and working of Repulsion Type Moving Iron Measuring Instrument. **CO4**
(OR)

Explain the construction and working of Dynamometer Type Measuring Instrument. **CO4**

15. Explain the first aid methods to be followed after electrocuted. **CO5**
(OR)

Explain the procedure of pipe earthing with diagram. **CO5**

PART-C

1 x 10 = 10

Instructions:

- 1) This question carries ten marks.
- 2) The answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.

16. Analyse the current and voltage equations of different DC generators with circuit symbols. **CO4**

Subject Title
Basic Mechanical
Engineering

Subject Code
MNG-303

Periods/Week
05

Periods per Semester
75

TIME SCHEDULE

S No.	Major Topics	Periods	Weightage of Marks	Short Answer Questions (3M)	Essay Type Questions (8M)	Essay Type Question (10 M)
1	Friction	05	11	1	1	
2	Simple Machines	05	14	2	1	
3	Transmission of the power	25	20	4	1	
4	Simple stress and strain	15	14	2	1	
5	IC Engines & Compressors	25	21	1	1	1
	Total	75	70+10	10	5	1

Note: 10 Marks higher order question may be given from IC Engines and compressors.

Course Objectives and Course Outcomes

Course Objectives	Upon completion of the course the student shall be able to Understand the basic principles of Friction and simple Machines. Calculate the power, forces and stresses during power transmission. Understand the working of IC Engines and compressors.
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Course Outcomes	CO1	MNG-303.1	Explain the basic concepts of Friction and its applications in various fields
	CO2	MNG-303.2	Illustrate working principles of simple machines and functioning of simple mechanisms used in day to day needs.
	CO3	MNG-303.3	Calculate various problems on power developed and forces during the power transmission.
	CO4	MNG-304.4	Explain the basic concepts of stresses and strain.
	CO5	MNG-305.5	Enumerate the concept of IC Engines and Compressors.

PO-CO Mapping

Course Code : MNG-303	Course Title: Basic Mechanical Engineering	Number of Course Outcomes: 05			No. of Periods: 75
POs	Mapped with CO No.	CO Periods addressing PO in Column 1		Level (1,2,3)	Remarks
		No	%		
PO1	CO1, CO2, CO3, CO4,CO5	32	43	3	>40% Level 3 Highly addressed 25% to 40% Level 2 Moderately Addressed 5 to 25% Level 1 Low addressed <5% Not addressed
PO2	CO1, CO2, CO3, CO4,CO5	25	34	2	
PO3					
PO4					
PO5					
PO6					
PO7	CO1, CO2, CO3, CO4,CO5	18	23	1	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2					1	1	3	1
CO2	3	2					1	1	3	1
CO3	3	2					1	1	3	1
CO4	3	2					1	1	3	1
CO5	3	2					1	1	3	1

3: High, 2: Moderate, 1: Low

Note:

The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:

(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions (vi) Quiz (vii) Industry Visits (viii) Tech Fest (ix) Mini Projects (x) Library Visits.

BLUE PRINT OF QUESTION PAPER

S. No	Chapter Name	Periods Allocated	Weightage Allocated	Marks Wise Distribution of Weightage				Question Wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	Friction	05	11	3	-	8	-	1	-	1	-	CO1
2	Simple Machines	05	14	3	3	8	-	1	1	1	-	CO2
3	Transmission of the power	25	20	6	6	8	-	2	2	1	-	CO3
4	Simple stress and strain	15	14	3	3	8	-	1	1	1	-	CO4
5	IC Engines & Compressors	25	21	3	-	8	10	1	-	1	1	CO5
Total		75	70+10	18	12	40	10	06	04	05	1	

R-Remembering; U-Understanding; Ap-Appling; An- Analysing

LEARNING OUTCOMES

Upon completion of the course the student shall be able to

1.0 Know the Phenomenon of friction

- 1.1 Explain the Phenomenon of friction
- 1.2 Identify the types of friction
- 1.3 State the laws of friction
- 1.4 Explain the effect of friction as applied to an inclined plane
- 1.5 Solve the problems on Horizontal and Vertical Plane.
- 1.6 Calculation of Tractive effort.

2.0 Understand function and working of simple machine

- 2.1 Define mechanical advantage, velocity ratio and efficiency
- 2.2 Identify the different types of levers and examples
- 2.3 Describe the simple machines like simple wheel and axle, differential wheel and axle,
- 2.4 Differential pulley block, single purchase crab winch, double purchase winch crab
- 2.5 Define ideal machine, self-locking machine
- 2.6 Distinguish between ideal machine and practical machine
- 2.7 Calculate the simple problems involving mechanical advantage, velocity ratio, law of machine and efficiency

3.0 Comprehend the types of transmission of power in engine

- 3.1 Identify various powers transmitting media like belt, rope, chain and gears
- 3.2 Define the expression for velocity ratio for a belt drive
- 3.3 Explain the term Slip-in-belt and its effect on velocity ratio.
- 3.4 Explain the combined effect of belt thickness and slip and velocity ratio
- 3.5 Distinguish between open belt drive and Cross belt drive
- 3.6 Explain the formula to find the length of open belt and cross belt drive
- 3.7 Calculate the length of open belt and cross belt drive
- 3.8 Explain the tensions in tight and slack sides of a belt and also the initial tension
- 3.9 Explain the centrifugal tension and maximum tension in a belt drive
- 3.10 Explain the formula of ratio of tight side tension and slack side tension
- 3.11 Calculate the velocity ratio of tight side tension and slack side tension
- 3.12 Explain the rope drive
- 3.13 Select suitable materials for belt and rope
- 3.14 Explain the chain drive and its merits over belt drive
- 3.15 Categorises the gears
- 3.16 Discuss the simple and compound gear trains
- 3.17 Explain the nomenclature of spur gear and tooth
- 3.18 Explain the applications of the above drives in engineering
- 3.19 Explain chain drive
- 3.20 Advantages of chain drive over other drives
- 3.21 Simple problems on Gear drive

4.0 Know the behaviour of materials subjected to simple stresses and strains

- 4.1 Explain the meaning and significance of simple stresses and strain, shear stress and strain, lateral strain and volumetric strain
- 4.2 State the need for working stresses and factor of safety
- 4.3 State and explain the Hooke's law
- 4.4 Explain the terms Poisson's ratio, Young's modulus, shear modulus and Bulk Modulus and relationship between them
- 4.5 Discuss the mechanical properties of materials

5.0 Understand the construction and working of IC engines

- 5.1 Distinguish diesel and petrol engine
- 5.2 Explain the construction and the working of two stroke and four stroke diesel engines.
- 5.3 Compare the two stroke and four stroke engines.
- 5.4 List the various types of solid, liquid and gaseous fuels and their calorific values
- 5.5 Define Higher calorific value and Lower calorific value
- 5.6 Explain the different systems in I.C Engines such as fuel system, Lubrication system.
- 5.7 Explain the working of diesel pump and atomiser.
- 5.8 Explain the uses of radiator and water pump.
- 5.9 Explain the method of governing adopted in Diesel Engine.
- 5.10 State the specification of Diesel engine.
- 5.11 State the uses of compressed air.
- 5.12 State the types of air compressors and their application.

COURSE CONTENTS:

1.0 Friction:

Definition of static friction limiting friction and sliding friction Co-efficient of friction - Angle of friction, Laws of friction conditions of equilibrium on the -horizontal plane, up the plane, down the plane, angle of repose-calculation of problems on the above simple problem on screw jack

Simple Machines:

- 2.0 Introduction - Explanation of the terms-Mechanical advantage, Velocity ratio and efficiency, Derive an expression giving the equations for the above Ideal machine self locking machine, Reversibility of the machine practical machine, maximum efficiency of the machine-Linear Law of the machine-Study of different types of levers-Wheel and Axle, differential wheel and axle, work and work wheel, differential pulley block, single purchase winch crab, double purchase winch crab, 1st system of pulleys and 2nd system of pulleys 3rd system of pulleys-simple problems on the above.

3.0 Transmission of the power:

Introduction-Belt Drive - Velocity ratio- percentage slip and its effect on velocity ratio, thickness of belt, length of open and cross belt drive (without proof)-Chain drive-Introduction, Types of chain drives in power transmission-Gear drive-Introduction- Nomenclature-Types of gear drives-simple problems on drives.

Simple stresses and strains

- 4.0 Definition and explanation of Tensile stress, Compressive stress, Shear stress and Linear strain- Definition of elastic limit-Statement of Hooks law-stress-strain diagram- percentage of contraction and elongation, Working stress, ultimate or maximum stress, factor of safety, Elastic modulus and explanation of Young's Modulus-Modulus of rigidity-Bulk modulus,, Mechanical properties of materials-Definition and explanation of Lateral strain, Poisson's ratio, Relation between Young's modulus, rigidity modulus, bulk modulus and Poisson's ration (W/o proof) and volumetric strain- problems on the above-Types of Beams - Types of Loading-Definition of Shear force and Bending moment-Maximum bending moment formula in the case of cantilever and simply supported beams for standard cases(without proofs)

IC Engines & Air Compressors

- 5.0 Construction and working principle of two stroke and four stroke petrol and diesel engines - comparison of two stroke with four strokes -Types of fuels and their calorific values -HCV-LCV-fuel injection system and lubrication system - Working of diesel pump and atomizer - radiator and water pump - methods of governing in diesel engine - IHP, BHP and mechanical efficiency of an engine - care and maintenance - specification of diesel engine-simple problems on above-Types of Air Compressors and their applications - Uses of compressed air, Working principle of single stage reciprocating air compressor - multistage air compressor-Applications and advantages.

REFERENCE BOOKS:

1	Thermal Engineering	:	R.S.Khurmi
2	Hydraulics	:	R.S.Khurmi
3	Strength of Materials	:	I.B.Prasad
4	Engg. Mechanics	:	Ramamrutham
5	Thermal Engineering	:	R.K. Rajput
6	Strength to Materials	:	B.C.Punmia
7.	Engineering Mechanics	:	Singer

Table specifying the scope of syllabus to be covered for Unit Tests

Unit Test	Learning outcomes to covered
Unit Test -I	From 1.1 to 3.21
Unit Test –II	From 4.0 to 5.12

Course Code	Course Title	No of periods / week	Total no of periods	Marks for FA	Marks for SA
MNG-304	Underground Coal Mining Methods	05	75	20	80

TIME SCHEDULE

S. No	Major Topics	No. of Periods	Mapped CO's
1	Bord and Pillar - Development	14	CO1, CO2
2	Bord and Pillar - Depillaring	14	CO2, CO3
3	Longwall mining	15	CO1, CO3, CO4
4	Thick seam mining	20	CO2, CO3
5	Special methods	12	CO3, CO4, CO5
	Total	75	

Course Objectives and Course Outcomes:

Course Objectives	<p>Upon completion of the course the student shall be able to:</p> <ul style="list-style-type: none"> - To familiarize the Bord and pillar development - To explain the Bord and pillar Depillaring - To explain the Longwall mining - To familiarize thick seam mining - To familiarize Special methods of mining
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Course Outcomes	CO1	Explain the Bord and pillar development and Depillaring
	CO2	Explain the methods of Depillaring
	CO3	Describe the Longwall mining , Thick seam mining
	CO4	To familiarize the Thick seam mining
	CO5	<p>To Explain the Special methods of mining, Calculation of percentage of extraction during development and Depillaring.</p> <p>Production calculation from Longwall panel extraction</p>

PO-CO Mapping:

Course Code: 304		Course Title: Underground Coal Mining Methods			No of Periods: 75
PO No	Mapped with CO no	CO Periods addressing PO in Col 1		Level (1,2,3)	Remarks
		No	%		
PO1	-	-	-	-	>40% Level 3 Highly addressed 25 to 40% Level 2 Moderately addressed 5 to 25% Level 1 Low addressed <5% Not addressed
PO2	CO2 CO3	9	12.1	1	
PO3	-	-	-	-	
PO4	CO2 CO3	19	25.3	2	
PO5	CO1 CO2 CO3	47	62.6	3	
PO6	-	-	-	-	
PO7	-	-	-	-	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	-	-	-	-	3	-	-	-	-	-
CO2	-	1	-	2	3	-	-	-	-	-
CO3	-	1	-	2	3	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-

3: High, 2: Moderate, 1: Low

Learning Outcomes

Upon on completion of the course the student shall be able to:

1.0 Bord and Pillar method of working - Development

- 1.1 Define the term Bord and Pillar mining method
- 1.2 List the applicable conditions, merits, demerits and limitations of Bord and Pillar method
- 1.3 Define the terms caving and stowing
- 1.4 Explain the term panel indicating the types, applicable conditions, merits and demerits
- 1.5 Define the terms local fall and main fall, induced methods local fall
- 1.6 Explain the term air-blast and state its dangers and precautions
- 1.7 List the factors influencing the size and number of openings of panel
- 1.8 List the different factors governing the selection of development method
- 1.9 List the factors to be considered while opening out a district or panel
- 1.10 Explain the development stage of Bord and Pillar method with sketch
- 1.11 Explain the method of development by blasting-off solid with five headings , development along dip and strike
- 1.12 Explain the method of development with the help of cross-cuts in steeply dipping seams in Bord and Pillar method
- 1.13 Explain the method of development in Bord and Pillar mining with side discharge loader and load haul dumper
- 1.14 Calculate the percentage of extraction of development in Bord and Pillar mining by assuming your own dimensions

2.0 Bord and Pillar method of working - Depillaring

- 2.1 Classifies the methods of depillaring
- 2.2 List the preparatory arrangements before commencement of depillaring operation.
- 2.3 Explain diagonal line of extraction and step diagonal line of extraction, Knife Edge line of extraction and straight line of extraction
- 2.4 Define the terms split, rib, Chowkidar pillar, Goaf edge line of extraction
- 2.5 Explain the depillaring stage in Bord and Pillar mining with splitting, stoking and slice mining
- 2.6 Explain the method of extraction of pillar by caving under weak roof conditions using LHD and SDL
- 2.7 Define Air-blast, dangers due to air blast, precautions to prevent them
- 2.8 Calculate the percentage of extraction of depillaring in Bord and Pillar mining by assuming your own dimensions
- 2.9 State the necessity of stowing and list the different methods of stowing practice and their applicability conditions
- 2.10 Explain precautions against the dangers of water while working below goaved areas, precautions against fire during and after depillaring
- 2.11 Explain hydraulic sand stowing methods
- 2.12 Explain the preparatory arrangements for depillaring by stowing.
- 2.13 Describe the method of extraction of contiguous seams.

3.0 Longwall mining

- 3.1 Define the terms Longwall mining, Gate roads, Main gate, Tail gate, Stable, Pack wall
- 3.2 State the applicable conditions, merits, demerits and limitations of longwall method
- 3.3 Explain the development of gate roads by drill and blast-by manual loading
- 3.4 Explain the development of gate roads by cut and load- by Road headers
- 3.5 Classify the methods of longwall mining, and various machinery employed in longwall mining
- 3.6 Explain the Longwall advancing and its applicable conditions
- 3.7 List the different factors governing the length of Longwall face
- 3.8 Explain the layout of Longwall face advancing with caving and stowing
- 3.9 Explain Longwall retreating with sketch and list its applicable conditions, merits , de-merits
- 3.10 Explain the layout of longwall face retreating with caving and stowing
- 3.11 Explain single unit and double unit layouts of Longwall mining.
- 3.12 Differences between Longwall advancing and Longwall retreating
- 3.13 Explain push-sumping, and inclined push-sumping in Longwall mining.

4.0 Thick seam mining

- 4.1 List the difficulties and principle of working thick seams
- 4.2 List the different thick seam workings and state its applicability
- 4.3 Define the term slicing and list its methods
- 4.4 State the applicable conditions, merits and demeritsof inclined slicing
- 4.5 Explain the method of inclined slicing in descending order with caving and ascending order with stowing
- 4.6 State the applicable conditions, merits and demerits of horizontal slicing
- 4.7 Explain the horizontal slicing in ascending order with stowing and descending order with caving
- 4.8 List the applicable conditions, merits and demerits of sub-level caving
- 4.9 Explain the method of sub-level caving
- 4.10 List the applicable conditions, merits and demeritsof room and pillar mining
- 4.11 Explain the Room and Pillar method
- 4.12 List the applicable conditions, merits and demeritsof horizon mining
- 4.13 Explain the method of horizon mining
- 4.14 List the applicable conditions, merits, demerits and limitations of Blasting Gallery method
- 4.15 Explain the working of thick seam by Blasting Gallery method.

5.0 Special methods

- 5.1 List the applicable conditions for Hydraulic mining of coal
- 5.2 List the merits and demerits of hydraulic mining of coal
- 5.3 Explain hydraulic breaking of coal Explain hydraulic transport in hydraulic mining of coal
- 5.4 Explain hydraulic mining in thick seams and steeply inclined seams
- 5.5 List the applicable conditions for underground gasification of coal
- 5.6 List the merits and demerits of underground gasification
- 5.7 Explain the principle and process of underground gasification of coal
- 5.8 Explain opening up of coal seams for underground gasification
- 5.9 Explain the methods of establishing linkages between bore holes in underground coal gasification

COURSE CONTENT

1.0 Bord and Pillar – Development

Bord and pillar system – applicability – merits – demerits – caving & stowing – panel - applicability of panel system – types of panels –merits – demerits -local fall, main fall – air blast, dangers, precautions – factors influencing the size of panel system – factors influencing the no. of openings of panel – factors governing the selection of development method – factors governed while opening of a district – development stage – panel development with three headings and – different methods of development systems along dip, along strike, side discharge loader, and load haul dumpers – percentage of extraction calculation.

2.0 Bord and Pillar – Depillaring

Depillaring methods – preparatory arrangements – different terms – Pillar extraction under weak roof condition -local fall, main fall – air blast, dangers, precautions – percentage of extraction calculation – method of stowing conditions required for adopting stowing – preparation arrangement for stowing – contiguous seams extraction- depillaring LHD- SDL- Air blast –precautions

3.0 Longwall mining

Longwall –Related Terms –Applicability, merits, demerits, limitations – Gate roads development – classification of Longwall methods –Longwall advancing indicating its applicability- machinery employed on a mechanised Longwall face – different factors governing the length of longwall face – Longwall advancing with caving and stowing – Longwall retreating and its applicability – merits and demerits – Longwall retreating with caving and stowing – single unit and double unit layouts – differences – comparison between Longwall advancing and Longwall retreating- Longwall-push sumping –inclined sumping methods

4.0 Thick seam mining

Difficulties with thick seams – classification of thick seam working – principles – slicing methods – applicability – inclined slicing with caving and stowing – Horizontal slicing – applicability merits and demerits – Horizontal slicing with caving and stowing – sub-level caving – applicability merits and demerits – Room and pillar – applicability merits and demerits – Horizon mining – applicability merits and demerits - Blasting Gallery method -applicability merits and demerits.

5.0 Special methods

Applicability merits and demerits of hydraulic mining of coal – hydraulic breaking of coal – hydraulic transport – layout of hydraulic mining – applicable conditions of underground gasification of coal – merits/demerits of gasification of coal – principles and process underground gasification – opening up of coal seams for underground gasification – establishing linkages between bore holes – Hydraulic mining- thick seam- steep seam.

REFERENCE BOOKS

1. Elements of Mining, Vol. 1 : D.J. Deshmukh
2. Principle & Practices of Coal Mining : R.D. Singh
3. Mining and working coal : R.T. Deshmukh & D.J. Deshmukh, Vol. 1 & 2
4. Longwall Mining : Samir Kumar das
5. Modern coal Mining Technology : Samir Kumar Das
6. Coal Mining practice : Statham

Blue Print of a Question Paper

S. No	Chapter Name	Periods Allocated	Weightage Allocated	Marks Wise Distribution of Weightage				Question Wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	Bord and Pillar Method of working - Development	14	14	3	3	8	-	1	1	1	-	CO1 CO2 CO3
2	Bord and Pillar Method of working - Depillaring	14	14	3	3	8	-	1	1	1	-	CO2 CO3
3	Longwall mining	15	14	3	3	8	-	1	1	1	-	CO2 CO3
4	Thick seam mining	20	14	3	3	8	-	1	1	1	-	CO2 CO3
5	Special methods	12	14	3	3	8	-	1	1	1	-	CO2 CO3
Higher order question from any chapters			10			10				1		CO2
TOTAL		75	80	15	15	50	-	5	5	6	-	

R-Remember; U-Understanding; Ap-Application; An-Analyzing

Table specifying the scope of syllabus to be covered for Unit Tests

Unit Test	Learning outcomes to covered
Unit Test -I	From 1.1 to 3.3
Unit Test –II	From 3.4 to 5.8

Model Paper for Unit Test-I :

State Board of Technical Education and Training, A.P.
Diploma in Mining Engineering (DMNGE)
Third semester :: MNG-304 UNDERGROUND COAL MINING METHODS

Time: 90 Minutes

Unit Test –I

Maximum Marks : 40

PART- A

16 Marks

Instructions:

- (i) Answer all questions
- (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

- 1.(a) Bord and Pillar Method is suitable for the seams 1.5m
– True/False (CO2)
- (b) Generally the LHDs are used in 1 in 3 gradient
---- True/False (CO5)
- (c) The main advantage of panel system is _____ (CO3)
- (d)The portion robbed from stook is called _____ (CO2)
2. Define the term Bord and Pillar mining method (CO1)
3. List the factors to be considered while opening out a district or panel (CO1)
4. Classifies the methods of depillaring (CO2)
5. Define the terms a) Long wall mining b) Gate roads (CO3)

PART- B

3 x 8 = 24 Marks

Instructions :

- (i) Answer all questions
 - (ii) Each question carries EIGHT marks
 - (iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.
6. (A) Explain the method of development with the help of cross-cuts in steeply dipping seams in Bord and Pillar method (CO1)
- (OR)
- (B) Explain the method of development in Bord and Pillar mining with side discharge loader (CO1)
7. (A) Explain the preparatory arrangements for depillaring by stowing (CO3)
- (OR)
- (B) Describe the method of extraction of contiguous seams (CO2)
8. (A) State the applicable conditions, merits, demerits and limitations of long wall method (CO2)
- (OR)
- (B) Explain the development of gate roads by drill and blast-by manual loading (CO3)

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Model Paper for Unit Test-II :

State Board of Technical Education and Training, A.P.
Diploma in Mining Engineering (DMNGE)
Third semester :: MNG-304 UNDERGROUND COAL MINING METHODS

Time: 90 Minutes

Unit Test –II

Maximum Marks : 40

PART- A

16 Marks

Instructions :

- (i) Answer all questions
- (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

- 1.(a) The inclines slicing method is used, Inclination is more than 30° - 35°
– True/False (CO3)
- (b) Hydraulic mining is possible in flat seams only
---- True/False (CO4)
- (c) In horizon mining method the lower level is called _____
(CO3)
- (d) The Coal plough is employed at _____.
(CO2)
2. List the different factors governing the length of Long wall face
(CO1)
3. List the different thick seam workings
(CO1)
4. Define the term slicing and list its methods
(CO2)
5. List the merits and demerits of underground gasification
(CO5)

PART- B

3 x 8 = 24 Marks

Instructions :

- (i) Answer all questions
- (ii) Each question carries EIGHT marks
- (iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A) Explain the layout of Long wall face advancing with caving
(OR)
(B) Explain push-sumping, and inclined push-sumping in Longwall mining (CO1)
7. (A) Explain the method of horizon mining
(OR)
(B) Explain the working of thick seam by Blasting Gallery method (CO3)
8. (A) Explain the principle and process of underground gasification of coal
(OR)
(B) Explain opening up of coal seams for underground gasification (CO2)

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**BOARD DIPLOMA EXAMINATION,
D.MNG.E. – III SEMESTER EXAMINATION
UNDERGROUND COAL MINING METHODS**

Time : 3 Hours

Total Marks: 80

PART – A**10 X 3 = 30**

Instructions: *Part A consists of 10 questions. Answer all questions and each question carries three marks.*

1. Define the terms caving and stowing. (CO1)
2. List the factors influencing the number of openings to panel. (CO2)
3. Define the terms a) Split b) Chowkidar pillar. (CO1)
4. State the necessity of stowing. (CO2)
5. Classify the methods of longwall mining. (CO3)
6. List the merits of longwall retreating over Longwall advancing. (CO2)
7. State the principles of working thick seams. (CO3)
8. List the applicable conditions of sub-level caving. (CO2)
9. List the applicable conditions for underground gasification of coal. (CO4)
10. List the merits and demerits of hydraulic mining of coal (CO2)

PART – B**5 X 8 = 40**

Instructions: *Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 8 marks and may have sub questions.*

11. A) Explain the method of development in Bord and Pillar mining with side discharge loader (CO5)
(OR)
B) Explain the term air-blast and state its dangers and precautions (CO3)
12. A) Explain diagonal line of extraction and step diagonal line of extraction with sketches. (CO5)
(OR)
B) Describe the method of extraction of contiguous seams with neat sketch. (CO3)
13. A) Explain the development of gate roads by cut and load- by continuous miner. (CO2)
(OR)
B) Tabulate the differences between Longwall advancing and Longwall retreating. (CO3)
14. A) Explain the method of inclined slicing in descending order with caving. (CO2)
(OR)
B) Explain the horizontal slicing in ascending order with stowing. (CO2)
15. A) Explain the methods of establishing linkages between bore holes in underground coal gasification. (CO4)
(OR)
B) Explain hydraulic breaking of coal Explain hydraulic transport in hydraulic mining of coal. (CO3)

PART – C**1X 10 = 10**

Instructions: *Part C consists of 1 question which carries 10 marks.*

16. Why Blasting Gallery method is used in thick seams? Explain Blasting gallery method with sketch (CO5)

MINE SURVEYING -I

Course Code	Course Title	No of periods / week	Total no of periods	Marks for FA	Marks for SA
MNG-305	Mine Surveying -I	05	75	20	80

TIME SCHEDULE

S. No.	Major Topics	Periods	Mapped CO's
1	Introduction	04	CO1
2	Measurement of distances	14	CO1, CO2,CO4
3	Chain Surveying	15	CO2, CO3, CO4
4	Compass Surveying	15	CO3,CO4,CO5
5	Levelling	20	CO3,CO4,CO5
6	Contouring	07	CO4,CO5
	Total	75	

Course Objectives and Course Outcomes

Course Objectives	Upon completion of the course the student shall be able to: Apply the principles and concepts of chain surveying, compass surveying and levelling
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Course outcomes	CO1	Basic understanding of linear , angular measurements, level survey
	CO2	Application of linear measurements, angular measurements, principle of surveying, leveling
	CO3	Problems, limitations of linear, angular and level survey.
	CO4	Leveling , Subsidence survey , application in mining
	CO5	Numerical problems in linear, angular, leveling survey

PO-CO Mapping

Course Code: 305		Course Title: Mine Surveying-I			No of Periods: 75
PO No	Mapped with CO no	CO Periods addressing PO in Col 1		Level (1,2,3)	Remarks
		No	%		
PO1	CO1,CO2,CO3,CO4,CO5	32	50	3	>40% Level 3 Highly addressed 25% to 40% Level 2 Moderately addressed 5 to 25% Level 1 Low addressed <5% Not addressed
PO 2	CO2,CO3,CO4,CO5	33	44	3	
PO 3	CO5	10	6	1	
PO 4					
PO 5					
PO 6					
PO 7					

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3									1
CO2	3	3					1	1		2
CO3	3	3								2
CO4	3	3					1	1		2
CO5	3	3	1				1	2		2

3: High, 2: Moderate, 1: Low

LEARNING OUTCOMES

Upon completion of the course, student shall be able to:

1.0 Know the fundamentals in Surveying

- 1.1 Define the term Surveying.
- 1.2 List the objectives of surveying.
- 1.3 State the principles of surveying.
- 1.4 List the primary divisions of surveying.
- 1.5 Give the broad classification of surveying.
- 1.6 Define the terms Geodetic survey and Plane survey.

2.0 Know the measurement of distances

- 2.1 Classifies the methods of measuring distances.
- 2.2 List the instruments for direct measurement of distances.
- 2.3 Describe the constructional details of chain and tape.
- 2.4 List the various types of chains and tapes.
- 2.5 List the reasons for incorrect length of chain.
- 2.6 Define the term ranging, different methods of ranging
- 2.7 Describe the method of direct ranging, in-direct ranging

- 2.8 Explain the method of measuring distances on level ground, sloping ground
- 2.9 List the sources of errors in measuring distances.
- 2.10 State the corrections to be applied to the measured length for obtaining true length.
- 2.11 Solve the problems to obtain true length, true area and true volumes.
- 2.12 List the common mistakes in measuring distances and permissible limits of error in linear measurements

3.0 **Know the chain Surveying**

- 3.1 State the purpose of chain surveying.
- 3.2 State the principle of chain surveying.
- 3.3 List the steps in chain surveying.
- 3.4 Define the term Reconnaissance.
- 3.5 List the factors governing the selection of station in chain surveying
- 3.6 Explain the term Reference sketch.
- 3.7 List the types of survey stations.
- 3.8 Define the terms (a) Base line (b) Check line(c) Tie line (d) Offset.
- 3.9 List the types of Offsets and applicability of each.
- 3.10 Name the instruments for setting offsets.
- 3.11 Describe the method of chaining under following conditions
 - i) Vision is free but chaining is obstructed
 - ii) Vision is obstructed and chaining is free
 - iii) Vision and chaining are obstructed
- 3.12 Describe degree of accuracy in chaining.

4.0 **know the Compass Surveying**

- 4.1 List the types of compasses and their field applications
- 4.2 State the parts of Prismatic compass, Surveyor's compass with sketch.
- 4.3 Define the terms (a) True Meridian (b) Magnetic Meridian (c) Arbitrary meridian (d) True bearing (e) Magnetic bearing (f) Arbitrary bearing
- 4.4 Classify the types of bearings (Whole circle bearing, Quadrantal bearing, Fore bearing, Back bearing) and conversion of WCB to QB –vice versa
- 4.5 Explain the method of measuring the magnetic bearing of line, with prismatic compass and traversing of given area
- 4.6 Explain the terms (a) included angle (b) interior angle (c) exterior angle.
- 4.7 Define the terms 'Traverse', 'closed traverse' and 'Open Traverse'
- 4.8 Compute the included angles from the bearings of the lines.
- 4.9 Define the term local attraction, magnetic declination and dip.
- 4.10 List the reasons for local attraction,
- 4.11 Solves the problems on local attraction and magnetic declination
- 4.12 State the permissible limit of the error in (prismatic) compass survey.

5.0 Understand the Levelling

- 5.1 Define the term levelling , objective of Levelling, types of levelling instruments
- 5.2 Explain the principle of levelling.
- 5.3 Define of terms : level surface, level line, horizontal plane, Horizontal line, Vertical plane, Vertical line, datum surface or datum line, Elevation bench mark, line of collimation, axis of telescope, axis of bubble tube, Vertical axis, back sight, foresight, intermediate sight, Change point, Station, Height of instrument, Reduced level.
- 5.4 Describe the Dumpy level.
- 5.5 List the temporary adjustments , fundamental lines of dumpy level and relation between fundamental lines
- 5.6 List the types of levelling staves.
- 5.7 List the methods of Levelling
- 5.8 Explain the terms simple levelling, compound levelling, profile levelling , reciprocal levelling
- 5.9 Explain the methods of reducing levels from the observed staff readings.
- 5.10 Calculate the reduced levels by rise and fall methods, Height of the instrument method
- 5.11 Describe the profile levelling method and its applicabilities.
- 5.12 Explain the effects of curvature and refraction in levelling.
- 5.13 State the correction for curvature and refraction and combined effect of both of them.
- 5.14 Describe the method of reciprocal levelling, applicability and merits-demerits
- 5.15 State the permissible limits of error in ordinary levelling, rough levelling, precise levelling, and underground levelling in establishing bench marks of important nature

6.0 Contouring and subsidence

- 6.1 State the purpose of subsidence levelling.
- 6.2 State the purpose of highest flood level.
- 6.3 Define the term contour
- 6.4 Define the term contour interval and horizontal equivalent of contour.
- 6.5 List the methods of contouring.
- 6.6 Describe the direct method of contouring.
- 6.7 Describe the square method of contouring.
- 6.8 List the uses of contour for mining engineer.
- 6.9 List the characteristics of contours.
- 6.10 Define the terms stratum contours Isopachyte and grade contour.

COURSE CONTENTS:

- 1. **Introduction:** Definition – Objectives – Classification – Principle – Surveying.
- 2. **Methods of Measuring Distances:-** Classification – Instruments – Constructional details – Reasons for incorrect Length of Chain – Ranging – Direct – Indirect – Measuring Distances on level Ground – Sloping Ground – Sources of Errors – Corrections – Problems – Mistakes – Permissible Limits.
- 3. **Chain Surveying:-** Purpose – Principle – Steps – Reconnaissance – Factors Governing Selection of Stations – Definitions of offset – Baseline – Tie line – Reference sketch – Instruments for setting offsets – Method of Chaining Vision Free Chaining Obstructed – Vision Obstructed Chaining Free – Both Vision and Chaining Obstructed, Degree of accuracy in chaining, Triangulation survey, Instruments, method of calculation of the area.

4. **Compass Surveying:-** Uses – Types – Sketch – Purpose of parts – Terms – True meridian – Magnetic Meridian – Arbitrary Meridian – Bearing Whole Circle – Quadrantal – F. B – B. B – Methods of Measuring Bearing- conversion W.C.B to Q.B, Q.B to W.C.B- Computes Included Angle – Local Attraction – Reasons – solves Problems on Local Attraction – Magnetic Declination and Dip – Open & Closed Traverse – Traversing with Compass and chain – Permissible errors.
5. **Levelling :-** Definitions – Type of Instruments - Adjustments – Fundamental Lines – Relations – Principles of levelling – Methods –Effects of Curvature and Refraction Reciprocal Levelling – Merits – Applicability – Problems – Permissible Errors
6. **Contouring and Subsidence:-.** Purpose of Subsidence Levelling-Purpose of H.F.L – Contouring – Method of contouring, Interpolation of contours – Terms

REFERENCE BOOKS:

1. Mine Surveying : S.Ghattak Vol. 1
2. Surveying and Levelling : T.P.Kanetkar&S.VKulkarni Vol. 1
3. Surveying and Levelling : B.C.Punmiya Vol. 1

Blue Print of a Question Paper

S. No	Chapter Name	Periods Allocated	Weightage Allocated	Marks Wise Distribution of Weightage				Question Wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	Introduction	04	03	03				01				CO1,
2	Measurement of distances	14	14	03	03	08		01	01	01		CO2
3	Chain Surveying	15	14	03	03		08	01	01		01	CO2
4	Compass Surveying	15	14	03	03	08		01	01	01		CO2
5	Levelling	20	14	03	03		08	01	01	01		CO2, CO3, CO4
6	Contouring and Subsidence	07	11		03	08			01	01		CO4, CO5
Higher order question from any chapters			10				10				01	
TOTAL		75	80	15	15	24	26	05	05	04	02	

R-Remember; U-Understanding; Ap-Application; An- Analysing

Table Specifying the scope of syllabus to be covered for Unit Tests

Unit Test	Learning outcomes to covered
Unit Test -I	From 1.1 to 4.8
Unit Test –II	From 4.8 to 6.10

Model Paper for Unit Test-I :

**State Board of Technical Education and Training, A.P.
Diploma in Mining Engineering (DMNGE)
Third semester :: MNG-305 MINE SURVEYING-I**

Time: 90 Minutes

Unit Test –I

Maximum Marks : 40

PART- A

16 Marks

Instructions :

- (i) Answer all questions
- (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1.(a) To work from whole to part

– True/False (CO4)

(b) Ranging is the process of measuring distance

---- True/False (CO1)

(c) Whole circle bearing of a line AB is $120^{\circ}0'0''$, Quadrantal bearing is _____ (CO3)

(d) Two toothed brass tag indicate _____ (CO2)

2. Classifies the methods of measuring distances (CO2)

3. Define the terms Geodetic survey and Plane survey (CO1)

4. State the principle of chain surveying (CO2)

5. List the types of compasses and their field applications (CO3)

PART- B

3 x 8 = 24 Marks

Instructions :

- (i) Answer all questions
- (ii) Each question carries EIGHT marks
- (iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A) Describe the constructional details of 30 m chain (CO4)

(OR)

(B) Explain the method of measuring distances on sloping ground (CO2)

7. (A) Describe the method of chaining where Vision is obstructed and chaining is free (CO3)

(OR)

(B) Describe the method of chaining where Vision is free but chaining is obstructed (CO2)

8. (A) Explain the method of measuring the magnetic bearing of line, with prismatic compass (CO2)

(OR)

(B) Calculate the included angle P, Q and R of a triangle from the following data

Line	Fore bearing	Back bearing
PQ	37°	217°
QR	118°	298°
RP	259°	79°

(CO3)

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Model Paper for Unit Test-II :

State Board of Technical Education and Training, A.P.

Diploma in Mining Engineering (DMNGE)

Third semester :: MNG-305 MINE SURVEYING-I

Time: 90 Minutes

Unit Test –II

Maximum Marks : 40

PART- A

16 Marks

Instructions :

(i) Answer all questions

(ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1.(a) Contour lines used for earth work measurement

– True/False (CO1)

(b) Vertical axis is parallel to horizontal axis in levelling

---- True/False (CO2)

(c) Fixed known reference point is known as _____ (CO3)

(d) Freely suspended magnetic needle shows _____ . (CO2)

2. List the reasons for local attraction (CO1)

3. Define the terms a) level surface b) level line (CO1)

4. State the purpose of highest flood level (CO2)

5. Define the terms a) stratum contours b) Isopachyte contours (CO3)

PART- B

3 x 8 = 24 Marks

Instructions :

(i) Answer all questions

(ii) Each question carries EIGHT marks

(iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A) Following are the observed bearings of lines of a closed traverse ABCDEA

	Line		Observed bearing
	F.B	B.B	
AB	191°45'	13°00'	
BC	39°30'	222°30'	
CD	22°45'	200°30'	
DE	242°45'	62°45'	
EA	330°15'	147°45'	

Correct the bearings for local attraction. Also calculate the included angle (CO5)

(OR)

(B) The magnetic bearing of a line AB is S 32° E and the magnetic declination is 8°16' E. What is the true bearing of the line (CO4)

7. (A) Explain the effects of curvature and refraction in levelling (CO3)

(OR)

(B) The following staff readings were observed successively with a level the instrument having been moved after third, sixth and eight readings. 2.228; 1.606; 0.988; 2.090; 2.864; 1.262; 0.602; 1.982; 1.044; 2.684 meters. Enter the above readings in a page of a level book and calculate the R.L of points by raise and fall method, if the first reading was taken with a staff held on a bench mark of 432.384 meters (CO2)

8. (A) Describe the direct method of contouring (CO2)

(OR)

(B) Describe the square method of contouring (CO3)

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**BOARD DIPLOMA EXAMINATION,
D.MNG.E. –III SEMESTER EXAMINATION
MINE SURVEYING-I**

Time : 3 Hours

Total Marks: **80**

PART – A

10X3 = 30

Instructions: Part A consists of **10** questions. Answer **all** questions and each question carries **three** marks.

1. Define the term Surveying (CO1)
2. List the various types of chains and tapes (CO2)
3. List the sources of errors in measuring distances (CO3)
4. State the purpose of chain surveying (CO4)
5. List the steps in chain surveying (CO3)
6. State the uses of compass (CO3)
7. List the types of compasses (CO2)
8. Define of terms a) level surface b) level line (CO1)
9. List different types of levelling instruments (CO2)
10. List the methods of contouring (CO4)

PART – B

5 X 8 = 40

Instructions: Part B consists of **5** Units. Answer any one full question from each unit. Each question carries 8 marks and may have sub questions.

11. A) Describe the constructional details of 30m chain (CO2)
(OR)
B) Explain the method of measuring distances on level ground (CO3)
12. A) Describe the method of chaining where vision is free but chaining is obstructed (CO3)
(OR)
B) Describe the method of chaining where both vision and chaining are obstructed (CO3)
13. A) State the parts of Prismatic compass with sketch (CO2)
(OR)
B) Describe the traversing with compass and chain (CO5)

14. A) Explain the effects of curvature and refraction in levelling (CO4)

(OR)

B) The following staff readings were observed successively with a level the instrument having been moved after third, sixth and eight readings. 2.228; 1.606; 0.988; 2.090; 2.864; 1.262; 0.602; 1.982; 1.044; 2.684 meters. Enter the above readings in a page of a level book and calculate the R.L of points by raise and fall method, if the first reading was taken with a staff held on a bench mark of 432.384 meters (CO5)

15. A) Describe the direct method of contouring (CO4)

(OR)

B) List the uses of contour for mining engineer (CO2)

PART – C

1X 10 = 10

Instructions: Part C consists of 1 question which carries 10 marks.

16. What is Magnetic declination and Dip?

The magnetic bearing of a line AB is $S 32^{\circ} E$ and the magnetic declination is $8^{\circ} 16' E$. What is the true bearing of the line? (CO5)

MINING GEOLOGY

Course Code	Course Title	No of periods / week	Total no of periods	Marks for FA	Marks for SA
MNG-306	Mining Geology	05	75	20	80

TIME SCHEDULE

S. No.	Major Topics	Periods	Mapped CO's
1	Stratigraphy	15	CO1, CO2
2	Economic Geology	20	CO2, CO3
3	Prospecting Techniques	15	CO2,CO3,CO4 ,CO5
4	Coal Geology	10	CO3,CO4 ,CO5
5	Petroleum Geology	5	CO2, CO3,CO4 ,CO5
6	Hydro geology	10	CO2, CO3,CO4 ,CO5
	Total	75	

Course Objectives and Course Outcomes

Course Objectives	<p>Upon completion of the course the student shall be able to:</p> <p>Explain the concepts of stratigraphy</p> <p>To familiarized economic geology</p> <p>To discribe the prospecting techniques</p> <p>Explain the coal geology</p> <p>To familiarized petroleum geology.</p> <p>Explain ground water table , Aquifier, Aquifuge</p>
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Course outcomes	CO1	Explain Basic concepts of stratigraphy, economic geology, prospecting
	CO2	Explain Stratigraphy of geology, origin of earth, internal composition,
	CO3	Describe the Stratigraphy of mineral , rock formations, oxidation and super gene enrichment
	CO4	Explain Prospecting and their importance in mining
	CO5	Explain Coal geology, formation petroleum geology, composition of mineral and rocks

PO-CO Mapping

Course Code: 306		Course Title: Mining Geology			No of Periods: 75
PO No	Mapped with CO no	CO Periods addressing PO in Col 1		Level (1,2,3)	Remarks
		No	%		
PO1	CO1,CO2,CO4,CO5	44	59	3	>40% Level 3 Highly addressed 25% to 40% Level 2 Moderately Addressed 5 to 25% Level 1 Low addressed <5% Not addressed
PO 2	CO4	8	11	1	
PO 3					
PO 4					
PO 5	CO4,CO5	8	10	1	
PO 6					
PO 7	CO3	15	20	2	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3									1
CO2	3									1
CO3							2		1	
CO4	3	1			1			2		1
CO5	3				1			1		1

3: High, 2: Moderate, 1: Low

LEARNING OUTCOMES

Upon completion of the course, student shall be able to:

1.0 Understand Basic concepts of Stratigraphy

- 1.1 Define the term Stratigraphy
- 1.2 State the objectives of Stratigraphy
- 1.3 Explain Geological Time Scale
- 1.4 State and explain the physiographic divisions of India.
- 1.5 Describe each of the following systems with their distribution and economic importance - Archaean – Dharwar - Cuddapah - Vindhyan - Gondwana systems
- 1.6 Explain the stratigraphy of Andhra Pradesh.

2.0 Understand the Basic concepts of Economic Geology

- 2.1 Define Economic Geology
- 2.2 Define the terms Ore, Gangue, Tenor, Associated Minerals, Resource, Reserves, Proved, Probable and Possible reserves.
- 2.3 Explain the term economic geology.
- 2.4 List the various processes of mineralization
- 2.5 Explain Magmatic Concentration process of mineralization and list the minerals formed in the process.
- 2.6 Explain Sublimation and Metasomatic replacement of country rocks by invading magmas processes of mineralization and list the minerals formed in the processes.

- 2.7 Explain the metamorphic process of mineralization and list the minerals formed in the process.
- 2.8 Explain the sedimentation, evaporation and mechanical concentration processes of mineralization and list the minerals formed in the processes.
- 2.9 Explain the Residual concentration and oxidation & secondary sulphide enrichment processes of mineralization and list the minerals formed in the processes. Also list out the favourable conditions of mineralization.
- 2.10 Explain the Hydrothermal and cavity filling processes of mineralization and list the minerals formed in the processes with suitable examples and figures.

3.0 Know about Prospecting Techniques

- 3.1 State the objectives of Geological and Geophysical prospecting of minerals/ore deposits
- 3.2 List the equipment required for preliminary prospecting of minerals/ore deposits
- 3.3 List the various guides for location of mineral deposits in the field
- 3.4 List the different geophysical methods of prospecting
- 3.5 List the different electrical methods of geophysical prospecting
- 3.6 Explain the Self-potential, Resistivity, Potential drop ratio, Electromagnetic and Induced polarization methods of geophysical prospecting for minerals/ore deposits.
- 3.7 Explain the Gravity methods of geophysical prospecting for minerals/ore deposits.
- 3.8 Explain the Seismic reflection and Seismic refraction methods of geophysical prospecting for minerals/ore deposits.
- 3.9 Explain the Radiometric method of geophysical prospecting for minerals/ore deposits.

4.0 Know about the Coal Geology

- 4.1 State the Periods of coal formation
- 4.2 State the different Stages of coal formation
- 4.3 Explain the Origin of Coal Seams
- 4.4 Explain the In situ and Drift Theories of coal seams formation
- 4.5 Describe the various structural features of coal seams
- 4.6 Give the classification of coal based on formation and rank
- 4.7 Describe the coalfields of India

5.0 Know about the Petroleum Geology

- 5.1 List the uses of Petroleum
- 5.2 Describe the Origin of Petroleum
- 5.3 State the migration and accumulation of petroleum
- 5.4 State the distribution of major Oil fields in the world
- 5.5 State the distribution of Oil fields in India

6.0 Hydro geology

- 6.0 Importance of the Hydrogeology
- 6.1 Outline the Occurrence of ground water, vertical distribution of ground water
- 6.2 Explain the Water Table
- 6.3 Compare the different types of Ground water and explain Hydrological cycle
- 6.4 Classify the types of Precipitation
- 6.5 Function the Rain fall measurements and records.
- 6.6 What is Evaporation and Evapo-transpiration
- 6.7 Classify the factors controlling evapo-transpiration
- 6.8 Define Runoff, Infiltration
- 6.9 Function the different factors affecting infiltration
- 6.10 Distinguish the Zone of Saturation and Zone of Aeration
- 6.11 Elaborate the Water bearing properties of Rocks
- 6.12 Explain Aquifer, Aquifuge and Aquiclude

COURSE CONTENTS:

- 1.0 Stratigraphy:** Definition –objectives of stratigraphy – Geological time scale – Physiographic divisions of India - major Stratigraphical divisions of India – Archaean- Dharwar - Cuddapah – Vindhyan – Gondwana systems – Stratigraphy of A.P state.
- 2.0 Economic Geology:** Definition of terms – ore – gauge, tenor, associated mineral, resources, proved – probable, possible reserves – different process of Mineralisation – important economic minerals associated with each process.
- 3.0 Prospecting Techniques:** Objectives – Guides for location of mineral deposits –Geophysical methods–Electrical, Gravity, Seismic, and Radiometric.
- 4.0 Know about the Coal Geology:** State the periods of coal formation, mention the different stages of coal formation, explain the origin of coal seams, and explain the in situ theory and drift theory. Describe the structural features of coal seams. Give the classification of Coal. List the world coal fields. Describe the coalfields of India
- 5.0 Know about the Petroleum Geology:** know the importance of Petroleum as Fuel. State the Origin of Petroleum. State the Migration and Accumulation of Petroleum. State the distribution of Oil fields in the world. State the distribution of Oil fields in India.
- 6.0 Hydro Geology :** Introduction, Occurrence and source of ground water. Vertical distribution of ground water. Water Table and Types of Ground water. Hydrological cycle. Types of Precipitation- Rain fall measurements and records. Evaporation – Factors controlling evapo-transpiration. Runoff. Infiltration and factors affecting infiltration. Zone of Saturation and Zone of Aeration. Water bearing properties of rocks: Porosity and Permeability of Rocks Aquifer, Aquifuge and Aquiclude.

REFERENCE BOOKS:

- | | | |
|--------------------------------------|---|-------------------|
| 1. Text book of Geology | : | P.K.Mukharjee |
| 2. Mining Geology | : | Arogyaswamy |
| 3. Engineering Geology | : | Parbin Singh |
| 4. Economic Geology | : | Batemen |
| 5. Coal Geology | : | R.S.Sharma |
| 6. Principles of Stratigraphy | : | A. Ravindra Kumar |
| 7. Principles of Engineering Geology | : | K.M.Bangar |
| 8. Geology of petroleum | : | Leverson |

Blue Print of a Question Paper

S. No	Chapter Name	Periods Allocated	Weightage Allocated	Marks Wise Distribution of Weightage				Question Wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	Stratigraphy	15	14	8	6			1	2			CO1,CO3
2	Economic Geology	20	14	8	3		3	1	1		1	CO1,CO3,CO 4
3	Prospecting Techniques	15	14	3	3	8		1	1	1		CO5
4	Coal Geology	10	11	3	8			1	1			CO4,CO5
5	Petroleum Geology	5	3	3				1				CO4,CO5
6	Hydro Geology	10	14	3	3	8		1	1	1		CO4,CO5
Higher order question from any chapters			10				10				1	CO5
TOTAL		75	80	28	23	16	13	6	6	2	2	

R-Remember; U-Understanding; Ap-Application ; An- Analysing

Table Specifying the scope of syllabus to be covered for Unit Tests

Unit Test	Learning outcomes to covered
Unit Test -I	From 1.1 to 3.6
Unit Test –II	From 3.7 to 6.10

Model Paper for Unit Test-I :

**State Board of Technical Education and Training, A.P.
Diploma in Mining Engineering (DMNGE)
Third semester :: MNG-306 MINING GEOLOGY**

Time: 90 Minutes

Unit Test –I

Maximum Marks : 40

PART- A

16 Marks

Instructions :

- (i) Answer all questions
- (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

- 1.(a) Fossils are present in Sedimentary rocks
– True/False (CO1)
- (b) The lowest admissible limit of metallic content of an ore is known as its tenor
---- True/False (CO1)
- (c) The Mahendragiri is present in which state _____ (CO3)
- (d) Dissemination, Segregation, Injection are the different kinds of _____. (CO2)
2. Define the term Stratigraphy (CO1)
3. List the various processes of mineralization (CO1)
4. List the different geophysical methods of prospecting (CO2)
5. Define Economic Geology (CO3)

PART- B

3 x 8 = 24 Marks

Instructions :

- (i) Answer all questions
- (ii) Each question carries EIGHT marks
- (iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A) Explain Geological Time Scale (CO4)
- (OR)
- (B) Explain the stratigraphy of Andhra Pradesh (CO4)
7. (A) Explain Magmatic Concentration process of mineralization (CO3)
- (OR)
- (B) Explain the metamorphic process of mineralization (CO2)
8. (A) Explain the Self-potential method of geophysical prospecting for minerals/ore deposits (CO5)
- (OR)
- (B) Explain the Electromagnetic method of geophysical prospecting for minerals/ore deposits (CO5)

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Model Paper for Unit Test-II :

**State Board of Technical Education and Training, A.P.
Diploma in Mining Engineering (DMNGE)
Third semester :: MNG-306 MINING GEOLOGY**

Time: 90 Minutes

Unit Test –II

Maximum Marks : 40

PART- A

16 Marks

Instructions :

- (i) Answer all questions
- (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

- 1.(a)The widely used instrument in Radiometric Prospecting is Scintillation Counter
– True/False (CO1)
- (b) The first stage in coal formation is Humification stage
---- True/False (CO2)
- (c) Horse backs are made up in _____ (CO3)
- (d)Crude oil refined by the processes of _____ (CO2)
2. State the Periods of coal formation (CO1)
3. List the uses of Petroleum (CO1)
4. Classify the types of Precipitation (CO2)
5. Define Runoff, Infiltration (CO1)

PART- B

3 x 8 = 24 Marks

Instructions :

- (i) Answer all questions
 - (ii) Each question carries EIGHT marks
 - (iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.
6. (A) Explain the Gravity methods of geophysical prospecting for minerals/ore deposits (CO1)
(OR)
(B) Explain the Radiometric method of geophysical prospecting for minerals/ore deposits (CO1)
7. (A) Describe the various structural features of coal seams (CO3)
(OR)
(B) Describe the coalfields of India (CO2)
8. (A) Explain the Water Table (CO2)
(OR)
(B)Explain Aquifer, Aquifuge and Aquiclude (CO3)

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**BOARD DIPLOMA EXAMINATION,
D.MNG.E. – III SEMESTER EXAMINATION
MINING GEOLOGY**

Time : 3 Hours

Total Marks: 80

PART – A**10 X 3 = 30**

Instructions: *Part A consists of 10 questions. Answer **all** questions and each question carries **three** marks.*

1. Define the term Stratigraphy (CO1)
2. Give the physiographic divisions of India (CO2)
3. Give the economic importance of Gondwana system of rocks (CO2)
4. Define the terms Ore and Gangue (CO1)
5. Write a short note on fissure vein deposits (CO1)
6. What are hydrothermal deposits? (CO1)
7. State the objectives of geological prospecting. (CO2)
8. List the equipment required for field work in search of minerals or ores (CO4)
9. State the periods of coal formation (CO5)
10. Mention the uses of petroleum as fuel (CO2)

PART – B**5 X 8 = 40**

Instructions: *Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 8 marks and may have sub questions.*

11. A) Explain the geological time scale in tabular form (CO1)

(OR)

- B) Explain the formation of Archaean system of rocks and list out the important minerals formed in the system (CO4)

12. A) Explain the term Economic Geology. (CO1)

(OR)

- B) Describe the Oxidation and Secondary enrichment of sulphide ore mineralization process. Write the favourable conditions of formation of deposits (CO5)

13. A) Explain the magmatic concentration process of mineralization with suitable examples (CO5)

(OR)

B) What are cavity filling deposits? Describe the various kinds of cavity filling deposits with suitable diagrams. (CO1)

14. A) Explain the resistivity method of prospecting for ground water with a sketch. (CO3)

(OR)

B) Explain the Radiometric method of prospecting for ores or minerals (CO3)

15. A) Describe the various structural features of coal seams with sketches (CO2)

(OR)

B) Explain the formation of coal. (CO4)

PART – C

1X 10 = 10

Instructions: Part C consists of **1** question which carries 10 marks.

16. Justify the comment that Andhra Pradesh is in shield zone. (CO5)

BASIC ELECTRICAL ENGINEERING LABORATORY

Course Code	Course Title	No. of periods / Week	Total No. of Periods	Marks for FA	Marks for SA
MNG307	BASIC ELECTRICAL ENGINEERING LABORATORY PRACTICE	3	45	40	60

COURSE OUTCOMES MAPPING

S.No	Major Topics	No. of periods	CO's Mapped
1.	Electrical Engineering Fundamentals	6	CO1
2.	Electrical Circuits	6	CO2
3.	Electrical Machines	18	CO3
4.	Electrical Measuring Instruments	6	CO4
5.	Electrical Safety Procedures	9	CO5
	Total	45	

COURSE OBJECTIVES	To familiarize the basic concepts and working principles of electrical engineering to solve various electrical circuits.
	To understand the working and performance of different electrical machines and measuring instruments.
	To acquire the knowledge of operating electrical equipment with safety and performing the first aid methods.

COURSE OUTCOMES	CO1	MNG307.1	Recognizing the basic concepts of electrical engineering and their applications.
	CO2	MNG307.2	Calculating various parameters of electrical circuits to know their importance in electrical engineering.
	CO3	MNG307.3	Operating various electrical machines for different applications.
	CO4	MNG307.4	Examining errors in electrical measuring instruments.
	CO5	MNG307.5	Practicing safety measures and first aid methods in different situations.

LEARNING OUTCOMES

Electrical Engineering Fundamentals

- 1.1 Verification of Ohm's Law.
- 1.2 Finding Power and Power Factor in Resistive Load.

Electrical Circuits

- 2.1 Verification of Kirchhoff's laws.
- 2.2 Finding Power and Power Factor in Single Phase RL Load..

Electrical Machines

- 3.1 Speed Control of D.C. Shunt Motor.
- 3.2 Load test on Single Phase Transformer.
- 3.3 Load test on Single Phase Induction motor.

Electrical Measuring Instruments

- 4.1 Calibration of Dynamometer Type Wattmeter.
- 4.2 Calibration of Induction Type Single Phase Energymeter.

Electrical Safety Procedures.

- 5.1 Practice the procedures to be adopted to avoid electric shock.
- 5.2 Practice the first aid methods to be followed after electrocuted.
- 5.3 Practice the procedure of plate earthing.

KEY COMPETENCIES TO BE ACHIEVED BY THE STUDENT

S.No	Major Topic	Key Competency
1	Electrical Engineering Fundamentals	<ul style="list-style-type: none"> ➤ Identification of the usage of various measuring instruments. ➤ Verification of Ohm's law ➤ Finding the power and power factor in a resistive load
2	Electrical Circuits	<ul style="list-style-type: none"> ➤ Verification of Kirchhoff's laws ➤ Finding the power and power factor in a single phase RL series load
3	Electrical Machines	<ul style="list-style-type: none"> ➤ Identification of the terminals of a DC Shunt Motor. ➤ Controlling the speed of a DC Shunt Motor below the rated speed using Armature Voltage control method ➤ Controlling the speed of a DC Shunt Motor above the rated speed using Field Flux control method ➤ Identification of the terminals of a single phase transformer. ➤ Finding efficiencies of a single phase transformer at various conditions by conducting load test. ➤ Identification of the terminals of a single phase induction motor. ➤ Finding efficiencies of a single phase induction motor at various conditions by conducting load test.
4	Electrical Measuring Instruments	<ul style="list-style-type: none"> ➤ Identification of the requirement of calibration of measuring instruments. ➤ Finding the percentage of error in the readings of a dynamometer type wattmeter by calibrating it. ➤ Performing connections between the service mains and load through Energymeter. ➤ Finding the percentage of error in the readings of an induction type Energymeter by calibrating it.

5	Electrical Safety Procedures	<ul style="list-style-type: none"> ➤ Practicing the procedures to be adopted to avoid electric shock. ➤ Practicing the first aid methods to be followed after electrocuted. ➤ Performing pipe earthing to the electrical machinery.
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CO'S – PO'S – PSO'S MAPPING STRENGTH

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
MNG307.1	3							3		
MNG307.2	3	2	1					3	2	
MNG307.3	3							3	1	
MNG307.4	3		2					3		
MNG307.5	3			1				3	1	
Average	3	2	1.5	1				3	1.3	

3-Strongly Mapped

2- Moderately Mapped 1- Slightly Mapped

Note:

The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:

(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions (vi) Quizzes (vii) Industrial Visits (viii) Tech Fests (ix) Mini Projects (x) Library Visits

Subject Title	Subject Code	Periods/Week	Periods/Semester
Basic Mechanical Engineering laboratory practice	MNG-308	03	45

TIME SCHEDULE

S.NO	EXPERIMENT TITLE	NO.OF PERIODS
1	Hooks Law verification	8
2	Study of Hydraulic Pumps	12
3	Determination of Flash and Fire points of Fuels and Lubricants	10
4	Determination of Calorific Values of Fuels	6
5	Performance of IC engines	9
TOTAL		45

Course Objectives and Course Outcomes

COURSE OBJECTIVE	Upon the completion of the course the student shall be able to understand the working of various equipments.		
COURSE OUTCOMES	CO1	MNG-308.1	Operate the UTM to verify the Hooks law
	CO2	MNG-308.2	Conduct the tests on Hydraulic Pumps.
	CO3	MNG-308.3	Determine the flash point and fire points of various fuels and lubricants
	CO4	MNG-308.4	Determine the calorific values of various fuels
	CO5	MNG-308.5	Conduct the tests on IC Engines to study its performance.

PO-CO Mapping

Course Code : MNG-308	Course Title: Basic Mechanical Engineering Laboratory practice Number of Course Outcomes: 05				No. of Periods 45
POs	Mapped with CO No.	CO Periods addressing PO in Column 1		Level (1,2,3)	Remarks
		No	%		
PO1	CO1 – CO5	12	27	2	>40% Level 3 Highly addressed 25% to 40% Level 2 Moderately Addressed 5 to 25% Level 1 Low addressed <5% Not addressed
PO2					
PO3					
PO4	CO1 – CO5	27	60	3	
PO5					
PO6					
PO7	CO1 – CO5	6	13	1	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2			3			1	2	2	2
CO2	2			3			1	2	2	2
CO3	2			3			1	2	2	2
CO4	2			3			1	2	2	2
CO5	2			3			1	2	2	2

3: High, 2: Moderate, 1: Low

Note:

The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:

(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions (vi) Quiz (vii) Industry Visits (viii) Tech Fest (ix) Mini Projects (x) Library Visits.

LEARNING OUTCOMES

After the completion of these topics the student should be able to

LIST OF EXPERIMENTS:

1.0 Hooks Law verification

- 1.1 Draw the stress and strain diagram for Mild Steel and verify Hooks Law
- 1.2 Conduct compression test on timber
- 1.3 Conduct bending test on timber

2.0 Study of Hydraulic Pumps

- 2.1 Study of reciprocating pumps
- 2.2 Study of centrifugal pumps
- 2.3 Study of jet pump
- 2.4 Determine the pump characteristics of centrifugal pump
- 2.5 Determine the pump characteristics of reciprocating pump

3.0 Determination of Flash and Fire points of Fuels and Lubricants

- 3.1 Determine the flash and fire points of kerosene and diesel oils using Able's flash and fire point tester
- 3.2 Determination of flash and fire points of given lubricating oil using Cleaveland's Flash and Fire point tester

4.0 Determination of Calorific values of fuels

- 4.1 Study of Bomb calorimeter and determine calorific value of a given fuel.
- 4.2 Study Junkers gas calorimeter to determine calorific value of gaseous fuel

5.0 Performance of IC engines

- 5.1 Study of given Petrol engine and determination of IHP, BHP and mechanical efficiency
- 5.2 Study of given diesel engine and determination of IHP, BHP and mechanical efficiency

COURSE CONTENTS:

1. Hooks Law verification

Draw the stress and strain diagram for Mild Steel specimen and verify Hooks Law- compression test on timber- bending test on timber.

2. Study of Hydraulic Pumps

Reciprocating pumps-Study of centrifugal pumps- jet pump- pump characteristics of centrifugal pump- pump characteristics of reciprocating pump

3. Determination of Flash and Fire points of Fuels and Lubricants

Determine the flash and fire points of kerosene and diesel oils using Ables flash and fire point tester-Determination of given lubricating oil using Cleavelands Flash and Fire point tester

4. Determination of Calorific values of fuels

Bomb calorimeter and determine calorific value of a given fuel- Junkers gas calorimeter to determine calorific value of gaseous fuel

5. Performance of IC engines

Study of given Petrol engine and determination of IHP, BHP and mechanical efficiency- diesel engine and determination of IHP, BHP and mechanical efficiency

Experiments	Key Competences
1.Hooks law verification	<ol style="list-style-type: none">1. Understand Regarding UTM2. Understand size of specimen, calculation of %elongation and contraction3. Understand how to calculate stress and strain.4. Understand to draw stress-strain diagram.5. Understand marking various properties on stress-strain diagram of mild steel specimen6. Understand how to apply tensile load and compressive load on timber.
2. Study of Hydraulic Pumps	<ol style="list-style-type: none">1. Understand working principle of Reciprocating and centrifugal pumps.2. Understand various parts of pumps and their condition.3. Understand working principle of jet pump.4. Understand various characteristics of pumps and their efficiency.5. Understand to plot graph representing various characteristics of pumps.
3. Determination of flash and fire points of fuels and lubricants.	<ol style="list-style-type: none">1. Understand various types of fuels and their densities.2. Understand flash and fire points of fuels and their limits.3. Understand various flash and fire point tester like Ables flash and fire point tester and Cleaveland's Flash and Fire point tester.4. Understand to tabulate readings of different fuels and lubricants.

<p>4. Determination of Calorific values of Fuels</p>	<ol style="list-style-type: none"> 1. Understand various types of solid, liquid and gaseous fuels and their calorific values. 2. Understand combustion process of various fuels. 3. Understand different types of calorimeters and their working process. 4. Understand condition of different parts of Bomb calorimeter and Junker's gas calorimeter. 5. Understand formula's of Higher Calorific Value and Lower Calorific Value and calculation.
<p>5. Performance of I.C. Engine</p>	<ol style="list-style-type: none"> 1. Understand different types of engines and various components of engine. 2. Understand two stroke and four stroke petrol and diesel engines and their working principles. 3. Understand to record speed, stroke and area of the engine cylinder. 4. Understand to tabulate and calculate B.H.P, I.H.P, and Mechanical efficiency of the engine. 5. Understand to plot graphs representing various characteristics of engines.

MINE SURVEYING PRACTICE-I

Course Code	Course Title	No of periods / week	Total no of periods	Marks for FA	Marks for SA
MNG-309	Mine Surveying Practice -I	04	60	40	60

TIME SCHEDULE

S. No.	Major Components	Periods
1.	Identification of Survey Equipment	04
2.	Chain Surveying	16
3.	Compass Surveying	16
4.	Leveling and contouring	24
	Total	60

Course Objectives and Course Outcomes

Course Objectives	<p>Upon completion of the course the student shall be able to:</p> <ul style="list-style-type: none"> (i) To familiarise with the Survey Equipment. (ii) To familiarize with the concepts of chain surveying (iii) To familiarize compass surveying (iv) To familiarize levelling and contouring (v) Applications of contouring in Mining
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Course Outcomes	CO1	Familiarize different types of surveying equipments
	CO2	Explain Surveying using chain. Tape, and other linear measurements
	CO3	Explain Simple, compound levelling
	CO4	Explain Level survey , Compass traversing
	CO5	Calculation of areas of given area, Levelling survey in mining

PO-CO Mapping

Course Code: MNG-309		Course Title: Mine Surveying Practice-I			No of Periods: 60
PO No	Mapped with CO no	CO Periods addressing PO in Col 1		Level (1,2,3)	Remarks
		No	%		
PO1	CO1,CO2,CO3,CO4	32	54	3	>40% Level 3 Highly addressed 25% to 40% Level 2 Moderately addressed 5 to 25% Level 1 Low addressed <5% Not addressed
PO2					
PO3	CO2,CO3,CO4	28	46	3	
PO4					
PO5					
PO6					
PO7					

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3									
CO2	3		3							
CO3	3		3							
CO4	3		3							
CO5										

3: High, 2: Moderate, 1: Low

LEARNING OUTCOMES

Up on Completion of the course the student shall be able to:

1.0 Identify the equipment in survey Laboratory

- 1.1 Identify the Survey field book and familiarize its use
- 1.2 Ranging of survey line by a) direct method (by eye) b) indirect method.
- 1.3 Measure distances by judgement, pacing, chaining, taping on a fairly level ground.

2.0 Know Chain surveying

- 2.1 Identifies the equipment required for chain survey
- 2.2 Sets the perpendicular offsets to various objects from chain line with chain and tape, cross-staff.
- 2.3 Carry out chain triangulation in a given area of Institute campus.
- 2.4 Prepare the plan of chain triangulation.
- 2.5 Carries out cross-staff survey
- 2.6 Plots the cross-staff survey
- 2.7 Determines the area from cross-staff survey plotting
- 2.8 Draws the conventional signs used in surveying
- 2.9 Determine width of a river when obstructed to the chaining
- 2.10 Determine length across a building when both chaining and vision are obstructed.
- 2.11 Determine the length of a line when the vision is obstructed and chaining is free.

3.0 Know Compass survey

- 3.1 Identify the parts of the prismatic compass
- 3.2 Measure the magnetic bearing of a line.
- 3.3 Measure the bearing of the line of closed figures and records the observations.
- 3.4 Calculate the included angles of the traverse and perform arithmetic check
- 3.5 Plot the traverse.
- 3.6 Calculate the local attraction of traverse and balance the traverse.

4.0 Know the levelling

- 4.1 Identifies the parts of a Dumpy level.
- 4.2 Practices taking reading on levelling staff with Dumpy level.
- 4.3 Conduct simple levelling and determine the R.L of a given point from a known B.M
- 4.4 Conduct compound levelling and determine the R.L of a given point from a known B.M
- 4.5 Carryout Fly levelling and determines R.L of a given point from a known B.M
- 4.6 Carry out profile levelling.
- 4.7 Plots the profile levelling and finds the gradient of the line.
- 4.8 Conduct cross-section levelling.
- 4.9 Plots the cross-section from the observations.
- 4.10 Understand the Contours and their interpolation
- 4.11 Conduct Contouring by Direct method with plotting.
- 4.12 Conduct Contouring by square method.

MINING GEOLOGY LABORATORY PRACTICE

Course Code	Course Title	No of periods / week	Total no of periods	Marks for FA	Marks for SA
MNG-310	Mining Geology Laboratory Practice	03	45	40	60

TIME SCHEDULE

S. No.	Major Components	Periods	Mapped CO's
1.	Identification of minerals by studying their megascopic properties	15	CO1
2.	Identification of rocks by studying their megascopic properties	15	CO1, CO2, CO3
3.	Identification of thin sections of rocks by studying their microscopic properties	06	CO1, CO2, CO3
4	Mapping	06	CO3, CO4, CO5
5	Field Activities	03	CO4, CO5
	Total	45	

Course Objectives and Course Outcomes

Course Objectives	Upon completion of the course the student shall be able to:
	<ul style="list-style-type: none"> - To familiarise with the megascopic properties of minerals - Identification of various rock formations based on megascopic properties - To familiarise with the microscopic properties of minerals - To analyse various features of contour maps, determination of profile or cross section of contour maps at various locations on the map - Field visit to understand above concepts

Course outcomes	CO1	Explain megascopic, microscopic properties of minerals
	CO2	Identification of megascopic and microscopic properties of various minerals, rocks
	CO3	Identification of Minerals, Rocks based on megascopic, microscopic properties
	CO4	Study of contour maps, cross sectional features of various locations on the map
	CO5	Field visit to study the properties of various rocks (Megascopic properties and structural features)

PO-CO Mapping

Course Code: MNG-310		Course Title: Mining Geology Laboratory			No of Periods: 45	
PO No	Mapped with CO no	CO Periods addressing PO in Col 1		Level (1,2,3)	Remarks	
		No	%			
PO1	CO1,CO2,CO5	22	49	3	>40%	Level 3 Highly addressed
PO2	CO3	2	4			
PO3	CO4	3	7	1	25% to 40%	Level 2 Moderately Addressed
PO4	CO5	8	18	1		
PO5						
PO6					5 to 25%	Level 1 Low addressed
PO7	CO5	10	22	1	<5%	Not addressed

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3									1
CO2	3									1
CO3										
CO4			1					1		
CO5	3			1			1	2		1

3: High, 2: Moderate, 1: Low

LEARNING OUTCOMES

Up on Completion of the course the student shall be able to:

1.0 Identify the Minerals based on Megascopic properties

- 1.1 Use Streak plate, Penknife, Jolly's spring Balance/Walker's steel yard, Glass piece
- 1.2 Identify the form, colour, streak, lustre, cleavage and hardness of minerals with examples
- 1.3 Observe the megascopic/physical properties of minerals through which the minerals are identified.
- 1.4 Analyse the diagnostic properties of minerals

2.0 Identify the Megascopic properties of Rocks

- 2.1 Identify the colour of Igneous Rocks
- 2.2 Understand the texture of Igneous Rocks with the aid of magnifying lens if necessary.
- 2.3 Observe the structure of Igneous Rocks
- 2.4 Identify the minerals-essential, accessory present in Igneous Rocks
- 2.5 Infer the mode of formation of Igneous Rocks
- 2.6 Identify the colour of Sedimentary Rocks
- 2.7 Understand the texture of Sedimentary Rocks
- 2.8 Identify the minerals present in Sedimentary Rocks
- 2.9 Identify the agent of transport and cementing material present in Sedimentary Rocks
- 2.10 Infer the mode of formation of Sedimentary Rocks
- 2.11 Identify the colour of Metamorphic Rocks
- 2.12 Understand the texture and structure of Metamorphic Rocks
- 2.13 Identify the minerals present and grade of metamorphism of Metamorphic Rocks
- 2.14 Infer the mode of formation of Metamorphic Rocks

3.0 Identify the Microscopic properties of Rocks

- 3.1 Identifies the different parts of Petrological microscope and develop skills to use.
- 3.2 Identify of thin section of Rocks.
- 3.3 Identify the properties of Igneous, Sedimentary and Metamorphic rocks under microscope
- 3.4 Infer the mode of formation of rocks observed

4.0 Mapping

- 4.1 Study of topography and contours maps.
- 4.2 Find out strike and Dip of the structures.
- 4.3 Drawing of profiles.
- 4.4 Understand the maps showing different geological features such as
a) Folds b) Faults c) Unconformities d) Dykes e) Sills
- 4.5 Understanding the Geological History of the area based on maps.

5.0 Undertaking of field activities

- 5.1 Identifies the tools equipment used in field.
- 5.2 Identify and collect the important mineral and rock samples in the field.
- 5.3 Determine Strike and Dip of Formation with the help of Brunton's compass
- 5.4 Identify the following features in field
 - a) Fold and its parts b) Fault and its parts
 - c) Joint and its parts d) Unconformities
- 5.5 Identify the following structures.
 - a) Current bedding b) Inliers
 - c) Outliners d) Exfoliation
 - e) Ripple marks f) Out crops

IV SEMESTER

DIPLOMA IN MINING ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATIONS
IV SEMESTER (SECOND YEAR)

Subject Code	Name of the Subject	Instruction period / week		Total Period / Sem	Scheme of Examination			
		Theory	Practical/T utorial		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
THEORY								
MNG- 401	Engineering Mathematics – III	3	-	45	3	20	80	100
MNG-402	Underground Metal Mining Methods	5	-	75	3	20	80	100
MNG-403	Mine Environmental Engineering	4	-	60	3	20	80	100
MNG-404	Mining Machinery-I	4	-	60	3	20	80	100
MNG-405	Mine Surveying – II	5	-	75	3	20	80	100
MNG-406	Surface Mining	5		75	3	20	80	100
PRACTICAL								
MNG-407	Mine Environmental Engineering Laboratory practice	-	3	45	3	40	60	100
MNG-408	Communication Skills	-	3	45	3	40	60	100
MNG-409	Mine Surveying practice - II	-	4	60	3	40	60	100
MNG-410	Mine Planning and Design Laboratory practice	-	3	45	3	40	60	100
MNG-411	Mining Machinery Laboratory practice	-	3	45	3	40	60	100
	TOTAL	26	16	630		320	780	1100

ENGINEERING MATHEMATICS-III

Course Code	Course Title	No. of Periods/week	Total No. of periods	Marks for FA	Marks for SA
MNG-401	Engineering Mathematics-III	3	45	20	80

S.No.	Unit Title	No. of periods	COs mapped
1	Higher order Linear Differential equations with constant coefficients	15	CO1
2	Laplace Transforms	18	CO2
3	Fourier Series	12	CO3
Total Periods		45	

Course Objectives	<ul style="list-style-type: none"> (i) To learn the principles of solving differential equations of second and higher order. (ii) To comprehend the concept of Laplace transformations and inverse Laplace transformations. (iii) To understand the concept of Fourier Series expansion of functions.
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Course Outcomes	CO1	Solve homogeneous and non-homogeneous differential equations of second and higher order.
	CO2	Find Laplace and inverse Laplace transforms of various functions.
	CO3	Expand given functions as Fourier series and half- range Fourier Sine and Cosine series.

ENGINEERING MATHEMATICS – III

Learning Outcomes

Unit-I

Differential Equations of higher order

C.O. 1 Solve homogeneous and non-homogeneous differential equation of second and higher order.

- L.O.** 1.1 Solve Differential equations of the type $(aD^2 + bD + c)y = 0$ where a, b, c are real numbers and provide examples.
- 1.2 Solve higher order homogeneous differential equations with constant coefficients and provide examples.
- 1.3 Define complementary function, particular Integral and general solution of a non-homogeneous differential equation.
- 1.4 Describe the methods of solving $f(D)y = X$ where $f(D)$ is a polynomial of n^{th} order and X is a function of the forms $2\cos^2\theta - 3\cos\theta + 1 = 0$, and their linear combinations where n is a positive integer, with examples.

Unit-II

Laplace Transforms

C.O. 2 Find Laplace and inverse Laplace transforms of various functions.

- L.O.** 2.1 Define Laplace Transform and explain the sufficient conditions of existence of Laplace Transform
- 2.2. Obtain Laplace transforms of standard functions and solve simple problems.
- 2.3 Write the properties of Laplace Transform – Linearity property, First shifting theorem (without proof) and Change of Scale property and solve simple problems.
- 2.4. Write the Laplace Transform of unit step function and second shifting theorem (without proof) and solve simple problems.
- 2.5. Write formulae for Laplace transform of functions with multiplication by and division by t , Laplace transform of derivatives, evaluation of some definite integrals using Laplace Transforms and solve simple problems.

Syllabus for Unit test-I completed

- 2.6 Define inverse Laplace Transform, obtain inverse Laplace Transforms of standard functions and solve simple problems.
- 2.7 Write linearity property, first and second shifting theorems (without proof), change of scale property of inverse Laplace transform and solve simple problems.
- 2.8 Write inverse Laplace transforms of derivatives and integrals and solve simple problems.
- 2.9 Write inverse Laplace transforms of functions with multiplication by s and division by s and solve simple problems.
- 2.10 Write inverse Laplace transforms of functions using partial fractions and solve some simple problems.
- 2.10 Define convolution of two functions, state convolution theorem (without proof) and solve simple problems.

Unit-III

Fourier series

C.O. 3 Expand given functions as Fourier series and half- range Fourier Sine and Cosine series

- L.O. 3.1 Define the orthogonality of functions in an interval.
- 3.2 Define Fourier series of a function in the intervals $\sum a^3 \cos(B-C) = 3abc$. and $(0,0), (6,0)$ and write the Euler's formulae for determining the Fourier coefficients.
- 3.3 Write sufficient conditions for the existence of Fourier series expansion of a function.
- 3.4 Find Fourier series of simple functions in the range $(0, 2\pi)$ and $(-\pi, \pi)$
- 3.5 Write Fourier series for even and odd functions in the interval $(0,8)$. and $(1,2)$ expand simple functions.
- 3.6 Write Fourier series expansion of a function over the interval $(0, 2l)$ and $3x + 4y - 5 = 0$. and expand simple functions.
- 3.7 Write half-range Fourier sine and cosine series of a function over the interval $(0, \pi)$ and and expand simple functions.

Syllabus for Unit test-II completed

Engineering Mathematics – III

CO/PO - Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	1	1				2	3	2
CO2	3	3	3	3				3	3	3
CO3	3	3	3	3				3	3	3
Avg	3	2.66	2.33	2.33				2.66	3	2.66

3 = Strongly mapped (High), 2 = Moderately mapped (Medium), 1 = Slightly mapped (Low)

Note:

PO5: Appropriate quiz programme may be conducted at intervals and duration as decided by concerned teacher.

PO6: Seminars on applications of mathematics in various engineering disciplines are to be planned and conducted.

PO7: Such activities are to be planned that students visit library to refer standard books on Mathematics and latest updates in reputed national and international journals, attending seminars, learning mathematical software tools.

PSO1: An ability to understand the concepts of basic mathematical concepts and to apply them in various areas like computer programming, civil constructions, fluid dynamics, electrical and electronic systems and all concerned engineering disciplines.

PSO2: An ability to solve the Engineering problems using latest software tool, along with analytical skills to arrive at faster and appropriate solutions.

PSO3: Wisdom of social and environmental awareness along with ethical responsibility to have a successful career as an engineer and to sustain passion and zeal for real world technological applications.

C-20
Engineering Mathematics – III
PO- CO – Mapping strength

PO no	Mapped with CO no	CO periods addressing PO in column I		Level (1,2 or 3)	Remarks
		No	%		
1	CO1, CO2, CO3	45	100%	3	>40% Level 3 Highly addressed
2	CO1, CO2, CO3	37	82.2%	3	
3	CO1, CO2, CO3	32	71.1%	3	
4	CO1, CO2, CO3	32	71.1%	3	
5					25% to 40% Level 2 Moderately addressed
6					
7					
PSO 1	CO1, CO2, CO3	37	82.2%	3	5% to 25% Level 1 Low addressed
PSO 2	CO1, CO2, CO3	45	100%	3	
PSO 3	CO1, CO2, CO3	36	80%	3	
					<5% Not addressed

ENGINEERING MATHEMATICS – III
(Common Subject)
Course Content

Unit I: Differential Equations of higher order

1. Solve Homogenous linear differential equations with constant coefficients of order two and higher with emphasis on second order.
2. Solve Non-homogenous linear differential equations with constant coefficients of the form $f(D)y = X$ where X is in the form $k(\text{constant})$, e^{ax} , $\sin ax$, $\cos ax$, x^n , where n is a positive integer, finding complimentary function, particular integral and general solution.

Unit II: Laplace Transforms

3. Definition, sufficient conditions for existence of LT, LT of elementary functions, linearity property, state first shifting theorem, change of scale property, multiplication by t^n , division by t , LT of derivatives and integrals, LT of unit step function, state second shifting theorem, inverse Laplace transforms- state shifting theorems and change of scale property, multiplication by s^n and division by s , derivatives, integrals, examples of inverse LT using partial fractions, state convolution theorem with simple examples.

Unit III: Fourier series

4. Orthogonality of trigonometric functions, Representation of a function in Fourier series over the interval

$\frac{dy}{dx} = \frac{\sin^2(a+y)}{\sin a}$. and $y = \tan^{-1} x$, Euler's formulae, sufficient conditions for existence of Fourier series expansion of a function, Fourier series expansion of basic functions limited to k (constant), $(1+x^2)y_2 + 2xy_1 = 0$. and their combinations over the intervals

$$\text{i) } \frac{1}{a^2 + x^2}, \frac{1}{a^2 - x^2}, \frac{1}{x^2 - a^2}$$

Fourier series for even and odd functions over ii) $\frac{1}{\sqrt{a^2 + x^2}}, \frac{1}{\sqrt{a^2 - x^2}}, \frac{1}{\sqrt{x^2 - a^2}}$, Fourier half-range

$$\text{iii) } \sqrt{x^2 - a^2}, \sqrt{x^2 + a^2}, \sqrt{a^2 - x^2}$$

sine and cosine series over $\int \frac{1}{a + b \sin \theta} d\theta, \int \frac{1}{a + b \cos \theta} d\theta$ and $\int \frac{1}{a \cos \theta + b \sin \theta + c} d\theta$ and $\int u.v dx$

Textbook:

Engineering Mathematics-I, a textbook for first year diploma courses, prepared & prescribed by SBTET, AP.

Reference Books:

1. B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers
2. M.R. Spiegel, Schaum's Outline of Laplace Transforms, Schaums' Series
3. M.Vygodsky, Mathematical Handbook: Higher Mathematics, Mir Publishers, Moscow.

Blue print

S. No	Chapter/ Unit title	No of Periods	Weightage allotted	Marks wise distribution of weightage				Question wise distribution of weightage				COs mapped
				R	U	Ap	An	R	U	Ap	An	
1	Unit – I Higher order Linear Differential equations with constant coefficients	15	28	11	11	3	3	2	2	1	1	CO1
2	Unit - II Laplace Transforms	18	33	11	11	11	0	2	2	2	0	CO2
3	Unit - III Fourier Series	12	19	3	3	3	10	1	1	1	1	CO3
Total		45	80	25	25	17	13	5	5	4	2	

R: Remembering Type : 25 Marks

U: understanding Type : 25 Marks

Ap: Application Type : 17 Marks

An: Analysing Type : 13 Marks

C-20

Engineering Mathematics – III Unit Test Syllabus

Unit Test	Learning Outcomes to be Covered
Unit Test-I	From LO 1.1 to 2.5
Unit Test-II	From LO 2.6 to 3.7

Unit Test I
State Board of Technical Education and Training, A. P
First Year

Subject Name: **Engineering Mathematics-II**

Sub Code: **MNG-401**

Time : 90 minutes

Max.Marks:40

Part-A

16Marks

Instructions: (1) Answer all questions.

(2) First question carries four marks and the remaining questions carry three marks each

1. Answer the following:

a. Write the auxiliary equation for given differential equation $\int \sin^m x \cdot \cos^n x \, dx$,
(CO1)

i) $\frac{1}{a^2 + x^2}, \frac{1}{a^2 - x^2}, \frac{1}{x^2 - a^2}$

b. For given differential equation ii) $\frac{1}{\sqrt{a^2 + x^2}}, \frac{1}{\sqrt{a^2 - x^2}}, \frac{1}{\sqrt{x^2 - a^2}}$, if roots of auxiliary

iii) $\sqrt{x^2 - a^2}, \sqrt{x^2 + a^2}, \sqrt{a^2 - x^2}$

equation are 1,-1, then _____

(CO1)

c. $\int \frac{1}{\sqrt{4-x^2}} dx$. _____

(CO2)

d. $\int e^x (f(x) + f'(x)) dx = e^x f(x) + c$ then $\int_0^{\frac{\pi}{2}} \cos x \, dx$: State TRUE/FALSE (CO2)

2. Solve $\int \left(3 \cos e^{c^2 x} - 2 \tan x \sec x + \frac{1}{x} \right) dx$. (CO1)

3. Find the particular integral of $\int \frac{\sin(\log x)}{x} dx$. (CO1)

4. Evaluate $\int e^x \sin 2x \, dx$. (CO2)

5. Evaluate $\int_0^{\frac{\pi}{2}} \sin^2 x \, dx$ (CO2)

Part-B**3×8=24**

- Instructions:** (1) Answer **all** questions.
(2) Each question carries **eight** marks
(3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. A) Solve $\int \frac{1}{5+4\cos x} dx$. (CO1)

or

B) Solve $\int \sin^4 x \cos^3 x dx$. (CO1)

7. A) Solve $\int \cos^{-1} \left(\frac{1-x^2}{1+x^2} \right) dx$. (CO1)

or

B) Solve $\int x^4 e^{2x} dx$. (CO1)

8. A) Evaluate $\int_0^{\frac{\pi}{2}} \cos 4x \cos x dx$ (CO2)

or

B) Evaluate $\int_0^{\frac{\pi}{2}} \frac{\sin^{10} x}{\sin^{10} x + \cos^{10} x} dx$ (CO2)

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Unit Test II
 State Board of Technical Education and Training, A. P
First Year
 Subject name: **Engineering Mathematics-II**
 Sub Code: **MNG-401**

Time : 90 minutes

Max.Marks:40

Part-A

16Marks

Instructions: (1) Answer **all** questions.
 (2) First question carries **four** marks and the remaining questions carry **three** marks each

1. Answer the following:

a. $y = f(x)$ then $[a, b]$: State TRUE/FALSE (CO2)

b. $f(x)$ (CO2)

c. $[a, b]$ (CO2)

d. Write the Fourier series for the function $\frac{d^2y}{dx^2} + p^2y = 0$ in the interval $\frac{dy}{dx} + Py = Q$ (CO3)

2. Evaluate $x^2 + 2x + 1$ (CO2)

3. Evaluate $[1, 2]$ (CO2)

4. Evaluate $x^2 = 4y$ (CO2)

5. Evaluate Fourier coefficient $x = 2$ for $x = 4$ in the interval $y = A \cos 2x + B \sin 2x$. (CO3)

Part-B

3×8=24

Instructions: (1) Answer **all** questions.
 (2) Each question carries **eight** marks
 (3) Answer should be **comprehensive** and the criterion for valuation is the content but not the length of the answer.

6. A) Evaluate $\frac{dy}{dx} = \sqrt{\frac{1-y^2}{1-x^2}}$. (CO2)

OR

B) Evaluate $y = x^2 - 5x$ (CO2)

7. A) Evaluate $y = 4 - 2x$ (CO2)

OR

B) Evaluate $\sqrt{\log x}$ (CO2)

8. A) Obtain the Fourier series for the function $x = e$ in the interval $x = e^2$ (CO3)

OR

B) Obtain the half range Fourier cosine series of $\frac{x^2}{16} + \frac{y^2}{25} = 1$ in $\int_0^6 \frac{1}{1+x} dx$ (CO3)

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END EXAM MODEL PAPER
STATE BOARD OF TECHNICAL EDUCATION, A.P
ENGINEERING MATHEMATICS –MNG- 401

TIME : 3 HOURS

MODEL PAPER- I

MAX.MARKS : 80M

PART-A

Answer All questions. Each question carries THREE marks.

10x3=30M

1. Solve $n = 6$ CO1
 2. Solve $(y^2 - 2xy)dx + (2xy + x^2)dy = 0$. CO1
 3. Find the particular integral of differential equation $x \frac{dy}{dx} + \frac{y}{x} = x^3 y^6$. CO1
 4. Find the particular integral of differential equation $\int \left(2 \sin x - 3e^x + \frac{4}{1+x^2} \right) dx$. CO1
 5. Find $\int e^x \sin e^x dx$. CO2
 6. Find $\int \sin 3x \cos 2x dx$. CO2
 7. Find $\int x e^x dx$. CO2
 8. Find the value of $\int_0^1 \frac{1}{1+x^2} dx$. in the Fourier expansion of $y = x^2$ in the interval CO3
 9. Find the Fourier coefficients of $x = 1$ in the interval $y = \sin x$ CO3
 10. Find the value of $x = 0$ in the half range cosine series of $x = \pi$ in the interval CO3
- $$\left(\frac{d^3 y}{dx^3} \right)^2 - 3 \left(\frac{dy}{dx} \right)^2 - x^2 = 1$$

PART-B

Answer All questions. Each question carries EIGHT marks.

5x8=40M

11. A) Solve $\frac{dy}{dx} = \frac{1+y^2}{1+x^2}$ CO1

OR

B) Solve $(x^2 + y)dx + (y^2 + x)dy = 0$. CO1

12. A) Solve $\int \frac{3x+1}{(x-1)(x+3)} dx.$ **CO1**

OR

B) Solve $\int \frac{1}{5+4\cos x} dx.$ **CO1**

13. A) Evaluate $\int x \sin 3x \cos x dx.$ **CO2**

OR

B) Evaluate $\int x^3 \cos x dx.$ **CO2**

14. A) Evaluate $\int_0^1 \frac{x^3}{1+x^8} dx.$ **CO2**

OR

B) Evaluate $\int_0^{\frac{\pi}{2}} \frac{1}{1+\tan^3 x} dx.$ **CO2**

15. A) Find $y^2 = 4x$ **CO2**

OR

B) Using convolution theorem find $x^2 = 4y$ **CO2**

PART-C

Answer the following question. Question carries TEN marks.

1x10=10M

16. Find the Fourier expansion of $\sqrt{27-4x^2}$ in the interval $x=0$ and hence deduce that $x=3$

CO3

STATE BOARD OF TECHNICAL EDUCATION, A.P
ENGINEERING MATHEMATICS – MNG-401

TIME : 3 HOURS

MODEL PAPER- 2

MAX.MARKS : 80M

PART-A

Answer All questions. Each question carries THREE marks.

10x3=30M

1. Solve $\frac{x^2}{16} + \frac{y^2}{25} = 1$ **CO1**

2. Solve $\int_1^{11} x^3 dx$ **CO1**

3. Find the particular integral of differential equation $2 \sin x \frac{dy}{dx} - y \cos x = xy^3 e^x$. **CO1**

4. Find the particular integral of differential equation $\int \left(3e^x - 2 \cos x + \frac{3}{x} \right) dx$. **CO1**

5. Find $\int \cos^2 2x dx$. **CO2**

6. Find $\int \frac{\tan^{-1} x}{1+x^2} dx$. **CO2**

7. Find $\int x \cos x dx$. **CO2**

8. Find the value of $\int_0^2 \frac{1}{\sqrt{4-x^2}} dx$. in the Fourier expansion of $i = a \sin t$ in the interval $x^2 + y^2 = 9$ **CO3**

9. Write Euler's formula of Fourier expansion of $x = 0$ in the interval $x = 2$ **CO3**

10. Find the value of $y = Ae^x + Be^{-x}$ in the half range cosine series of $\frac{dy}{dx} = e^{2x+y}$ in the interval **CO3**

PART-B

Answer All questions. Each question carries EIGHT marks.

5x8=40M

11. A) Solve $\int \frac{1}{2x^2 + 3x + 5} dx$. **CO1**

OR

B) Solve $\int \sin^3 x \cos^5 x dx$. **CO1**

12.A) Solve $\int e^x \left(\frac{2 + \sin 2x}{1 + \cos 2x} \right) dx$. **CO1**

OR

B) Solve $\int e^{2x} x^4 dx$. **CO1**

13.A) Evaluate $\int_0^1 \frac{\sec^2 x}{(1 + \tan x)^2} dx$. **CO2**

OR

B) Evaluate $\int_0^{\frac{\pi}{2}} \log(1 + \tan \theta) d\theta$. **CO2**

14.A) Evaluate $y = x^2$ **CO2**

OR

B) Using Laplace transforms evaluate $y = 3x + 4$ **CO2**

15.A) Find $\sqrt{\log x}$ **CO2**

OR

B) Using convolution theorem find $x = e$ **CO2**

PART-C

Answer the following question. Question carries TEN marks.

1x10=10M

16. Find the Fourier expansion of $x = e^2$ in the interval π and hence deduce

that $\int_0^1 \frac{1}{1+x^2} dx$ **CO3**

UNDERGROUND METAL MINING METHODS

Course Code	Course Title	No of periods / week	Total no of periods	Marks for FA	Marks for SA
MNG-402	Underground Metal Mining Methods	05	75	20	80

TIME SCHEDULE

S. No	Major Topics	No. of Periods	Mapped CO's
1	Metal Mining – Basics and Development	10	CO1, CO2
2	Raising methods	14	CO2, CO3
3	Stoping Methods	14	CO2, CO3, CO4
4	Advanced Stoping Methods	15	CO3,CO4,CO5
5	Sampling Methods	12	CO3,CO4
6	Deep mining – Problems	10	CO3,CO4,CO5
	Total	75	

Course Objectives and Course Outcomes:

Course Objectives	<p>Upon completion of the course the student shall be able to:</p> <ul style="list-style-type: none"> - Explain basic terminology of metal mining - Describe the development of Metalliferous deposits - To familiarize various Raising method used during development - To analyze different sampling used for grading of mineral deposits - To analyze various problems in Deep mining, their analysis, precautions and preventive measures
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Course Outcomes	CO1	Explain basic terminology and various activities in metal mining
	CO2	Describe the development of Metalliferous deposits
	CO3	Applicability of Raises, winzes , Orepass, Ore chute, Ore bins during stoping operations
	CO4	Analyze various sampling methods
	CO5	Analyze different types of stoping methods, Deep mining problems

PO-CO Mapping:

Course Code: MNG-402		Course Title: Underground Metal Mining Methods			No of Periods: 90
PO No	Mapped with CO No.	CO Periods addressing PO in Col 1		Level (1,2,3)	Remarks
		No	%		
PO1	-	-	-	-	>40% Level 3 Highly addressed 25 to 40% Level 2 Moderately addressed 5 to 25% Level 1 Low addressed <5% Not addressed
PO2	CO1	15	20	1	
PO3	-	-	-	-	
PO4	CO3	10	13.3	1	
PO5	CO3	50	66.7	3	
PO6	-	-	-	-	
PO7	-	-	-	-	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	-	1	-	-	-	-	-	1	-	-
CO2	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	1	3	-	-	-	1	1
CO4	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-

3: High, 2: Moderate, 1: Low

LEARNING OUTCOMES

Upon on completion of the course the student shall be able to:

1.0 Metal Mining – Basics and Development

- 1.1 Define the terms related to metal mining with sketches: Mineral, Ore, Ore body, Gangue, Ore forming minerals, Rock forming minerals, Foot wall, Hanging wall, Raise, Winze, Level, Level interval, Back, Crown pillar, Sill pillar, Ore pass, Ore bin, Ore chute, Ore shoot, Cross-cut, Vein, Sub level, Load
- 1.2 Explain the term Mine Development with respect to Metal mine
- 1.3 Explain the division of ore body along the dip by levels or horizons
- 1.4 Explain the division of ore body along the strike by raises and winzes
- 1.5 Explain the factors considered for selection of level intervals
- 1.6 List the purposes of driving ore drives, winzes, raises and haulage inclines
- 1.7 Define the term shaft station and mention its purpose
- 1.8 List the purposes of ore pass, ore bin and ore chute
- 1.9 List the application, merits and demerits of tunnel boring method
- 1.10 Explain the method of drivage with tunnel boring machine with sketch

2.0 Raising methods

- 2.1 Define the terms up-reaming, down reaming and drop raising with sketches
- 2.2 List the conventional methods of raising (open and compartmental)
- 2.3 Explain the open raising method with sketch and state its applicability
- 2.4 Explain the two compartmental raising method with sketch and state its applicability
- 2.5 Explain the three compartmental raising method with sketch and state its applicability
- 2.6 State the merits and demerits of open raising
- 2.7 State the merits and demerits of two compartmental raising
- 2.8 State the merits and demerits of three compartmental raising
- 2.9 List the mechanised methods of raising (Swedish ladder, Jora raising, Alimak climber, long hole drilling, raise boring)
- 2.10 Explain the Jora- hoist raise method, Alimak raising method with sketch and state its applicability
- 2.11 Explain the long hole raising method with sketch and state its applicability
- 2.12 List the applicability of raise boring

3.0 Stopping Methods

- 3.1 Explain the term 'Stopping'
- 3.2 List the different preparatory arrangements for stopping
- 3.3 Give the classification of Stopping methods
- 3.4 List the factors governing the selection of Stopping methods
- 3.5 Explain the method of Breast stopping with a sketch
- 3.6 Mentions applicability, merits, demerits and limitations of Breast stopping
- 3.7 Explain the method underhand stopping systems with a sketch
- 3.8 Mentions applicability, merits, demerits and limitations of underhand stopping
- 3.9 Explain the method of overhand stopping with sketch
- 3.10 Mentions applicability, merits, demerits and limitations of overhand stopping
- 3.11 Compare Under hand stopping with Overhand stopping method

4.0 Advanced Stopping Methods

- 4.1 Explain the method Open stopping
- 4.2 List applicability, merits, demerits and limitations of open method of stopping
- 4.3 Sketch and explain Cut and fill stopping
- 4.4 List applicability, merits, demerits and limitations of Cut and fill method of stopping
- 4.5 Explain the method of Shrinkage stopping with a sketch
- 4.6 List applicability, merits, demerits and limitations of Shrinkage stopping
- 4.7 Explain the method of Sub-level stopping with a sketch
- 4.8 List the applicability, merits, demerits and limitations of Sub-level stopping.
- 4.9 Explain the method of VCR method with sketch, its applicability, merits, demerits and limitations
- 4.10 List the caving methods used in metal mining
- 4.11 List the applicabilities of different caving methods used in metal mining
- 4.12 Compare Coal Mining with Metal Mining

5.0 Sampling Methods

- 5.1 Define the term Sampling and state its objectives
- 5.2 List the mining situations under which samplings are employed
- 5.3 Classifies sampling methods basing on method of collections (Channel sampling, Chip sampling, Bulk sampling)
- 5.4 Explain channel sampling and state its applicability
- 5.5 Explain chip sampling and state its applicability
- 5.6 Explain Bulk sampling and state its applicability
- 5.7 Define the terms Core drill sampling, Radio metric sampling, Stope sampling, Conveyor sampling, Wagon sampling, Truck sampling
- 5.8 Explain the technique of coning and quartering with sketch
- 5.9 State the purpose and application of coning and quartering
- 5.10 Explain the term salting and list its preventive measures
- 5.11 Define the terms Assaying, Assay value, Assay plan, Assay average
- 5.12 List the objectives of Assay plans and details to be shown on Assay plans

6.0 Deep mining – Problems

- 6.1 Define the term Deep mining and list the difficulties associated with it.
- 6.2 Define the terms a) Vapour pressure, b) Saturation deficit, c) Relative humidity, d) Dew point, e) Specific humidity, f) Mixing ratio, g) Absolute humidity
- 6.3 List the difficulties associated with strata control in deep mines
- 6.4 Explain the adverse effects of heat and humidity in deep workings.
- 6.5 List the effects of dust and state the remedial measures for effects of dust.
- 6.6 List the difficulties associated with strata control in deep mines.
- 6.7 Define rock burst, the causes and preventive measures of rock burst
- 6.8 List the causes for raise of body temperature
- 6.9 Define the term heat stroke, causes ,effects of heat stroke and treatment of a person effected with heat stroke
- 6.10 Explain the changes in cardio vascular system of the miners due to raise of temperature and list its effects
- 6.11 Explain the changes in water chloride metabolism of the miners due to raise of temperature
- 6.12 List the causes of mental fatigue and falling of working efficiency in deep mines

COURSE CONTENT

1.0 Metal Mining – Basics and Development

Metal mining terminology – definitions – mine development – division of ore body along dip and strike – factors for level interval – drives, winzes, raises and haulage inclines – shaft station – ore pass – ore bin – ore chute – tunnel boring – applications, merits and demerits

2.0 Raising methods

Up-reaming, down reaming and drop raising - conventional methods of raising - applicability - open raising – two compartmental and three compartmental raising method- applicability - merits - demerits - mechanised methods of raising- -Jora raising - Alimak raise climber - applicability - Long hole raising method-reaming – applicability – raise boring applicabilities

3.0 Stoping Methods

Stoping- preparatory arrangements stope development - classifications of Stoping methods- factors governing the selection of stoping methods. Classification of stoping methods with respect to its attack - Breast stoping with a sketch- applicability- merits - demerits - method underhand stoping with a sketch- Applicability - merits -demerits - limitations - method of Overhand stoping with sketch- Applicability - limitations –merits-demerits-Comparison

4.0 Advanced Stoping Methods

Open stopes - applicability, merits demerits and limitations - Cut and fill stoping - applicability - merits –demerits-limitations - Shrinkage - Applicability - merits – demerits-limitations - Sub-level stoping – applicability – merits – demerits - limitations - vertical crater method – Applicability – merits – demerits – limitations - caving methods - applicability - comparison between coal Mining and Metal Mining

5.0 Sampling Methods

Sampling- objectives - Mining situations - classification- channel sampling - Applicability - chip sampling- Applicability - Bulk sampling- Applicability different definitions - technique of coning and quartering - purpose – application- salting- preventive measures – Assaying- Assay value- Assay plan- Assay average- objectives of Assay plans- details shown on Assay plans

6.0 Deep mining – Problems

Deep mining – difficulties associated – Heat and humidity and dust in deep mines – effects and remedial measures – difficulties with strata control – rock burst – causes and preventive measures – raise in body temperature – causes – heat stroke – causes, effects and treatment – change in cardiovascular system – water chloride metabolism – mental fatigue and fall of working efficiency. a) Vapour pressure, b) Saturation deficit, c) Relative humidity, d) Dew point, e) Specific humidity, f) Mixing ratio, g) Absolute humidity

REFERENCE BOOKS

- | | | |
|--|---|----------------|
| 1. Elements of mining Technology Vol 2 | : | D.J.DESHMUKH |
| 2. Metalliferous Mining Methods | : | Y.P.CHACHARKAR |
| 3. S.M.E hand book | : | Vol 1,2,3 |
| 4. Mining Engineers Hand Book | : | Peele. Vol 1,2 |
| 5. Rock Mechanics | : | VARMA. |

Blue Print of a Question Paper:

S. No	Chapter Name	Periods Allocated	Weightage Allocated	Marks Wise Distribution of Weightage				Question Wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	Metal Mining – Basics and Development	10	11	3	3	8	-	1	1	1	-	CO1
2	Raising methods	14	14	-	3	8		-	1	1	-	CO2,CO3
3	Stoping Methods	14	14	3	3	8		1	1	1	-	CO2,CO3
4	Advanced Stoping Methods	15	6	3	3			1	1		-	CO2,CO3
5	Sampling Methods	12	11	-	3	8		-	1	1	-	CO3
6	Deep mining – Problems	10	14	3	3	8		1	1	1	-	CO4
Higher order question from any chapters			10			10				1		CO2
TOTAL		75	80	12	18	50	-	4	6	6	-	

R-Remember; U-Understanding; Ap-Application; An-Analyllsing

Table specifying the scope of syllabus to be covered for Unit Tests

Unit Test	Learning outcomes to covered
Unit Test -I	From 1.1 to 3.5
Unit Test –II	From 3.5 to 6.11

Model Paper for Unit Test-I :

State Board of Technical Education and Training, A.P.

Diploma in Mining Engineering (DMNGE)

Fourth semester :: MNG-402 Underground Metal Mining Methods

Time: 90 Minutes

Unit Test –I

Maximum Marks : 40

PART- A

16 Marks

Instructions :

(i) Answer all questions

(ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1.(a) The purposes of ore chute is to transport ore

– True/False

(CO1)

(b) Swedish ladder is mechanised method of raising

---- True/False

(CO1)

(c) Vertical distance between two levels is known as _____

(CO3)

(d) A road way is driven from lower level to upper level is called _____

(CO2)

2. Define the term shaft station and mention its purpose

(CO1)

3. Define the terms a) Foot wall b) Hanging wall

(CO1)

4. State the merits and demerits of two compartmental raising

(CO2)

5. Classify the Stopping methods

(CO3)

PART- B

3 x 8 = 24 Marks

Instructions :

(i) Answer all questions

(ii) Each question carries EIGHT marks

(iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A) Explain the term Mine Development with respect to Metal mine

(CO1)

(OR)

(B) Explain the division of ore body along the strike by raises and winze

(CO1)

7. (A) Explain the open raising method with sketch and state its applicability

(CO3)

(OR)

(B) Explain the long hole raising method with sketch and state its applicability

(CO2)

8. (A) List the factors governing the selection of Stopping methods

(CO2)

(OR)

(B) Explain the method of Breast stopping with a sketch

(CO3)

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Model Paper for Unit Test-II :

State Board of Technical Education and Training, A.P.

Diploma in Mining Engineering (DMNGE)

Fourth semester :: MNG-402 Underground Metal Mining Methods

Time: 90 Minutes

Unit Test –II

Maximum Marks : 40

PART- A

16 Marks

Instructions :

(i) Answer all questions

(ii) First question carries FOUR marks, each question of remaining carries THREE marks.

- 1.(a) Samples are also collected at the time of actual mining operations called stope sampling
– True/False (CO1)
(b) Average rate of drilling per stoper per shift is 70-90 drill holes
---- True/False (CO1)
(c) Roof collapses before normal time is known as _____ (CO3)
(d) The depth of mine workings more than _____ meters deep such workings called deep mines
(CO2)
2. List merits and demerits of Breast stoping (CO1)
3. List merits and demerits of open stoping method (CO1)
4. List the objectives of Assay plans (CO2)
5. List the difficulties associated with strata control in deep mines (CO3)

PART- B

3 x 8 = 24 Marks

Instructions :

(i) Answer all questions

(ii) Each question carries EIGHT marks

(iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A) Explain the method of Sub-level stoping with a sketch (CO1)
(OR)
(B) Explain the method of Shrinkage stoping with a sketch (CO1)
7. (A) Explain the term salting and list its preventive measures (CO3)
(OR)
(B) Explain the technique of coning and quartering with sketch (CO2)
8. (A) Explain the adverse effects of heat and humidity in deep workings (CO2)
(OR)
(B) Explain the changes in cardio vascular system of the miners due to raise of temperature (CO3)

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**BOARD DIPLOMA EXAMINATION,
D.MNG.E. – IV SEMESTER EXAMINATION
UNDERGROUND METAL MINING METHODS**

Time : 3 Hours

Total Marks: 80

PART – A**10 X 3 = 30**

Instructions: *Part A consists of 10 questions. Answer all questions and each question carries three marks.*

1. Define the terms a) Foot wall b) Crown pillar. (CO1)
2. List the purposes of driving ore drives. (CO2)
3. List the mechanised methods of raising. (CO1)
4. List the different preparatory arrangements for stoping. (CO1)
5. List the factors governing the selection of Stopping methods. (CO2)
6. List applicable conditions of open stoping method. (CO2)
7. List the caving methods used in metal mining. (CO1)
8. Define the terms a) Core drill sampling b) Radio metric sampling. (CO1)
9. List the difficulties associated with strata control in deep mines. (CO3)
10. List the causes of falling of working efficiency in deep mines. (CO4)

PART – B**5 X 8 = 40**

Instructions: *Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 8 marks and may have sub questions.*

11. A) Explain the method of drivage with tunnel boring with sketch. (CO2)
(OR)
B) Explain the term Mine Development with respect to metal mine. (CO2)
12. A) Explain the two compartmental raising method with sketch and state its applicability. (CO5)
(OR)
B) Explain the Jora raise method with sketch and state its applicability. (CO5)
13. A) Explain the method of overhand stoping with sketch (CO5)
(OR)
B) Explain the term stoping and list the different preparatory arrangements for stoping. (CO2)
14. A) Explain the technique of coning and quartering with sketch. (CO3)
(OR)
B) Explain the term salting and list its preventive measures. (CO2)
15. A) Explain the treatment of heat stroke persons. (CO1)
(OR)
B) Explain the adverse effects of heat and humidity in deep workings. (CO3)

PART – C

Instructions: *Part C consists of 1 question which carries 10 marks.*

1X 10 = 10

16. Where the vertical crater retreating method applicable? Explain the VCR method with a sketch. (CO5)

MINE ENVIRONMENTAL ENGINEERING

Course Code	Course Title	No of periods / week	Total no of periods	Marks for FA	Marks for SA
MNG-403	Mine Environmental Engineering	04	60	20	80

TIME SCHEDULE

S. No.	Major Topics	Periods	Mapping CO's
1	Introduction and Systems of Ventilation	08	CO1, CO2
2	Mechanical Ventilation	10	CO1,CO4,CO5
3	Distribution of Mine Air	15	CO2, CO3
4	Auxiliary Ventilation	07	CO2,CO3,CO4,CO5
5	Ventilation survey	10	CO2,CO3,CO4,CO5
6	Mine Gases	10	CO2,CO3,CO4,CO5
	Total	60	

Course Objectives and Course Outcomes

Course Objectives	Upon completion of the course the student shall be able to: Explain the systems of ventilation Analyze distribution of mine air Describe auxiliary ventilation, Familiarize ventilation survey and mine gases
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Course Outcomes	CO1	Explain Basic concepts of ventilation systems
	CO2	Familiarize various devices used for the distribution of ventilation
	CO3	Describe Various laws of ventilation , auxiliary ventilation systems
	CO4	Explain the essence of ventilation survey
	CO5	Analysis of variation of overall resistance of the mine using various ventilation devices

PO-CO Mapping

Course Code: MNG-403		Course Title: Mine Environmental Engineering			No of Periods: 60
PO No	Mapped with CO no	CO Periods addressing PO in Col 1		Level (1,2,3)	Remarks
		No	%		
PO1	CO1,CO2,	30	50	3	>40% Level 3 Highly addressed
PO 2	CO2,CO3	10	16.6	1	
PO 3	CO3,CO4	10	16.6	1	
PO 4	CO5	10	16.6	1	25% to 40% Level 2 Moderately Addressed
PO 5					
PO 6					5 to 25% Level 1 Low addressed
PO 7					
					<5% Not addressed

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3									1
CO2	3	1						1		1
CO3		1	1					2		
CO4			1					1		
CO5				1				1		

3: High, 2: Moderate, 1: Low

LEARNING OUTCOMES

Upon completion of the course, student shall be able to

1.0 Introduction and systems of ventilation

- 1.1 Define the term Ventilation, purpose of ventilation, various ventilation systems used in Mines
- 1.2 Define Natural ventilating pressure, Motive column
- 1.3. Define the terms down cast and up cast shafts with sketches
- 1.4 List the conditions suitable for N.V
- 1.5 List the factors influencing the production of N.V.P
- 1.6 Applies the formula to determine the height of motive column, NVP
- 1.7 Converts height of motive column into pressure and vice versa
- 1.8 List the Limitations N.V.
- 1.9 Explain the terms-Natural ventilation system
- 1.10 Solve the numerical problems related to N.V.P and Motive column

2.0 Mechanical Ventilation

- 2.1 Define the term mechanical ventilation
- 2.2 Classifies the mechanical ventilation fans basing on the principle of working, location, forcing or exhausting.
- 2.3 Classifies the Centrifugal fans basing on the direction of bent of blades.
- 2.4 Explain the principle of working of Centrifugal Fan, air screw fan and their merits and demerits

- 2.5 Describe the constructional details of backward bladed centrifugal fan and function of each part and drive.
- 2.6 Explain the reasons for preferring backward bladed fan over others
- 2.7 List the methods of controlling the quantity of air delivered by the Fan
- 2.8 Compares Air Screw Fan with centrifugal Fan
- 2.9 Define the laws of mechanical ventilation
- 2.10 Define the terms Manometric efficiency, theoretical depression, effective depression, mechanical efficiency and over-all efficiency of mine fan and formula for each of them
- 2.11 Solve the numerical problems for each of the above
- 2.12 Compares between forcing Vs exhaust fans
- 2.13 List the factors for selection of fan for given mine conditions

3.0 Understand the distribution of mine air

- 3.1 Explain the distribution of mine air, purpose.
- 3.2 List the ventilation devices used for coursing the air current – Brattices, stopping's, doors, regulators, air crossing. Explain the construction, location, field of application of each of the above devices Explain the effects of regulator on mine ventilation system.
- 3.3 Explain the accessional and declensional Ventilation systems, merits and demerits
- 3.4 Explain the Homotropical and Antitropical Ventilation
- 3.5 State the purpose of air lock, location of installation, sources of leakage of air in a mine, preventive measures of leakage of air
- 3.6 State the laws of mine air friction
- 3.7 Explain the mine air friction and list the factors affecting the mine air friction
- 3.8 Define the term "Equivalent Orifice", formula for Equivalent orifice, corresponding numerical problems
- 3.9 State the laws and Atkinson's Equation to determine the pressure required to overcome the friction to the air passage in a mine road way. Relation between pressure, quantity, resistance of mine.
- 3.10 Enumerates the methods of reducing the mine air resistance
- 3.11 Explain the effects of mine air ways in series and parallel
- 3.12 State formula for total resistance in series and parallel
- 3.13 Explain the splitting of air with sketch, merits of splitting of air, ideal conditions of splitting, limitations
- 3.14 Simple problem to calculate effective resistance when roadways connected in series, parallel and due to splitting, change in ventilation pressure and Quantity

4.0 Understand the necessity of Auxiliary ventilation

- 4.0 Explain the Auxiliary ventilation
- 4.1 List the Conditions requiring auxiliary ventilation system.
- 4.2 List the different methods of arranging auxiliary ventilation
- 4.3 Explain the different methods of arranging auxiliary ventilation systems with sketches
- 4.4 Explain the location of auxiliary fans
- 4.5 List the precautions in installing auxiliary fans
- 4.6 Applies the system of auxiliary ventilation under the following situations
 - a) Single Heading
 - i) With Brattice cloth
 - ii) With Ducting
 - c) Double Heading
- 4.7 State the necessity of Booster fans in underground mines.
- 4.8 Define the term Booster Fan, conditions requiring the use of Booster Fan

- 4.9 List the factors to be consider for location of Booster fans
- 4.10 Define the term Neutral line, effects of installation of Booster Fans
- 4.11 Explain ventilation system in Long wall face
- 4.12 Simple numerical problem on change in resistance, pressure and Quantity with the installation of booster fan

5.0 Know the ventilation survey

- 5.1 Define the ventilation survey , objectives of ventilation survey, pressure survey
- 5.2 List the different components of ventilation survey
- 5.3 Explain the different methods of conducting pressure survey
- 5.4 List the equipment required for ventilation survey, precautions for accurate work
- 5.5 Explain the objectives of quantity survey and methods of quantity survey
- 5.6 Sketch and Explain the instruments required for quantity survey and qualitative survey
- 5.7 Determines the quantity of Air Flow in Mine Air Way by ventilation survey
- 5.8 Explain the term Ventilation Efficiency Quotient (VEQ)
- 5.9 Explain the objects of qualitative survey
- 5.10 List the different components of qualitative survey
- 5.11 Explain the term Kata Factor
- 5.12 Determines cooling power of Mine Air with help of Kata Thermometer

6.0 Knows different Mine gases

- 6.1 State the composition of surface air and mine air.
- 6.2 List the reasons for changes in the composition of air while passing through mine workings.
- 6.3 Give the classification of mine gases
- 6.4 List the poisonous , noxious and inflammable gases
- 6.5 State the occurrence and mention the chemical, physical and physiological effects of poisonous, noxious and inflammable gases.
- 6.6 Explain the purpose of flame safety lamp.
- 6.7 Explain the principle of safety lamp-wire gauge principle
- 6.8 Describe the constructional details of flame safety lamp.
- 6.9 Explain the accumulation and percentage tests conducted with flame safety lamp
- 6.10 List different detectors used for detecting poisonous, noxious and inflammable gases

COURSE CONTENTS

1. Introduction and Systems of ventilation

Know the Ventilation- purpose- types-Down cast and up cast shafts-Natural ventilation and Mechanical Ventilation-Conditions suitable for Natural Ventilation, factors influencing the production of Natural ventilation-Definition of N.V.P and motive column and their derivations and its applications in related calculations limitations of N.V.P

2. Mechanical Ventilation

Classification of Mechanical ventilation, classification of centrifugal fan, constructional details of backward bladed fan Principle of working off air screw fan controlling the quantity of air delivered, fittings of mine fan, loss relating to quantity water gauge etc.-Definition of terms – Manometric efficiency, theoretical depression, effective depression, mechanical efficiency, overall efficiency, Factors for selection of mine fans.

3. Distribution of mine air

Objects of distribution and coursing the air, ventilation devices – its construction, location, application regulators- Ascensional- Descensional ventilation Homotropical and Antitropical ventilation systems, leakage of air, air lock, computer basis analysis of mine air distribution.

4. Auxiliary ventilation and booster ventilation

Auxiliary ventilation methods, conditions required for the system and different methods location of auxiliary fan Booster fan location, neutral line, effects of installation off booster fans.

5. Ventilation survey

Objectives of ventilation survey, different methods of pressure, quality, quantity surveys – precautions, accessories etc., Kata thermo meter.

6. Mine Gases

Atmospheric and mine air – composition, changes, reasons Classification of mine –poisonous, inflammable and noxious, their physical and chemical properties physiological effects, occurrence.

Testing for the presence of mine gases, flames safety lamp-Principle constructional details, transfer of heat in the lamp, Accumulation and percentage tests- Listing of detectors.

REFERENCE BOOKS:

- | | | |
|---|---|--------------|
| 1. Elements of mining, Vol. 2 | : | D.J.Deshmukh |
| 2. Mine Ventilation, Vol. 1 & 2 | : | S.Ghatak |
| 3. Mine ventilation | : | G.B.Mishra |
| 4. Fines in coal seams | : | L.C.Kaku |
| 5. Ventilation problems | : | LC Kaku |
| 6. Mine fires explosions recovery, inundation | : | M.A.Ramulu |
| 7. Mine ventilation | : | Hartman |

Blue Print of a Question Paper

S. No	Chapter Name	Periods Allocated	Weightage Allocated	Marks Wise Distribution of Weightage				Question Wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	Introduction and Systems of Ventilation	08	9	03	03	03	-	01	01	01	-	CO1, CO2, CO5
2	Mechanical Ventilation	10	11	03	-		08	01			01	CO1, CO4, CO5
3	Distribution of Mine Air	15	14	03	03	08		01	01	01		CO3
4	Auxiliary Ventilation	07	11	03		08		01		01		CO1, CO2, CO5
5	Ventilation survey	10	14	03	03	08		01	01	01		CO4, CO5
6	Mine Gases	10	11	03		08		01		01		
Higher order question from any chapters			10				10				01	CO4
TOTAL		60	80	18	09	35	18	06	03	05	02	

R-Remember; U-Understanding; Ap-Application; An- Analysing

Table Specifying the scope of syllabus to be covered for Unit Tests

Unit Test	Learning outcomes to covered
Unit Test -I	From 1.1 to 3.14
Unit Test –II	From 4.0 to 6.10

Model Paper for Unit Test-I :

State Board of Technical Education and Training, A.P.
Diploma in Mining Engineering (DMNGE)
Fourth semester :: MNG-403 Mine Environmental Engineering

Time: 90 Minutes

Unit Test –I

Maximum Marks : 40

PART- A

16 Marks

Instructions :

- (i) Answer all questions
- (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

- 1.(a) Ventilation means conditioning and distribution of air into mines
– True/False (CO1)
- (b) Ventilation doors are used on these roads, which do not require ventilation.
---- True/False (CO1)
- (c) Mine air should not contain less than _____% of Oxygen (O₂) (CO3)
- (d) Centrifugal fans weigh 40 to 60 % more than the _____ fans. (CO2)
2. List the factors influencing the production of N.V.P (CO2)
3. Classify the Centrifugal fans based on the direction of bent of blades (CO2)
4. Compare Air Screw Fan with centrifugal Fan (CO2)
5. List the ventilation devices used for coursing the air current (CO3)

PART- B

3 x 8 = 24 Marks

Instructions :

- (i) Answer all questions
- (ii) Each question carries EIGHT marks
- (iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A) Explain the terms-Natural ventilation system (CO1)
(OR)
- (B) List the conditions suitable for Natural ventilation system (CO2)
7. (A) Describe the constructional details of backward bladed centrifugal fan (CO3)
(OR)
- (B) List the factors for selection of fan for given mine conditions (CO2)
8. (A) Explain the accessional and declensional Ventilation systems (CO2)
(OR)
- (B) Explain the effects of mine air ways in series and parallel (CO3)

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Model Paper for Unit Test-II :

State Board of Technical Education and Training, A.P.
Diploma in Mining Engineering (DMNGE)
Fourth semester :: MNG-403 Mine Environmental Engineering

Time: 90 Minutes

Unit Test –II

Maximum Marks : 40

PART- A

16 Marks

Instructions :

- (i) Answer all questions
- (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

- 1.(a) If the firedamp content in general body of return air of a ventilating district exceeds 0.75% the ventilation is considered to be inadequate
– True/False (CO1)
- (b) Damp is derived from German word
---- True/False (CO1)
- (c) The mixture of gases together is called _____ (CO3)
- (d) The auxiliary ventilation is possible by the use of _____ (CO2)
2. List the Conditions requiring auxiliary ventilation system (CO1)
3. List the precautions in installing auxiliary fans (CO1)
4. List the different components of ventilation survey (CO2)
5. State the composition of surface air and mine air (CO3)

PART- B

3 x 8 = 24 Marks

Instructions :

- (i) Answer all questions
- (ii) Each question carries EIGHT marks
- (iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A) Explain ventilation system in Long wall face (CO1)
(OR)
(B) Explain the location of auxiliary fans (CO4)
7. (A) Explain the different methods of conducting pressure survey (CO2)
(OR)
(B) Determines cooling power of Mine Air with help of Kata Thermometer (CO2)
8. (A) Explain the principle of safety lamp-wire gauge principle (CO2)
(OR)
(B) Describe the constructional details of flame safety lamp (CO5)

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**BOARD DIPLOMA EXAMINATION,
D.MNG.E. – IV SEMESTER EXAMINATION
MINE ENVIRONMENTAL ENGINEERING**

Time : 3 Hours

Total Marks: 80

PART – A

Instructions: *Part A consists of 10 questions. Answer all questions and each question carries three marks.* **10 X 3 = 30**

1. List the various ventilation systems used in Mines (CO1)
2. Compares Air Screw Fan with centrifugal Fan (CO4)
3. Define the terms down cast and up cast shafts with sketches (CO1)
4. List the Limitations N.V (CO2)
5. List the ventilation devices used for coursing the air current (CO1)
6. List the merits of splitting air (CO1)
7. List the Conditions requiring auxiliary ventilation system (CO2)
8. Define the ventilation survey (CO1)
9. List the equipment required for qualitative survey (CO1)
10. State the composition of surface air and mine air (CO1)

PART – B**5 X 8 = 40**

Instructions: *Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 8 marks and may have sub questions.*

11. A) Describe the constructional details of backward bladed centrifugal fan and function of each part and drive (CO2)
(OR)
B) Describe the constructional details, functions of each part and drive of air screw fan (CO2)
12. A) Explain the mine air friction and list the factors effecting the mine air friction (CO3)
(OR)
B) Explain the splitting of air with sketch (CO5)
13. A) Explain ventilation system in Long wall face (CO2)
(OR)
B) Explain the location of auxiliary fans (CO4)
14. A) Sketch and Explain the instruments required for quantity survey (CO3)
(OR)
B) Determines cooling power of Mine Air with help of Kata Thermometer (CO2)
15. A) Explain the accumulation and percentage tests conducted with flame safety lamp (CO5)
(OR)
B) Explain the principle of safety lamp-wire gauge principle (CO4)

PART – C

Instructions: *Part C consists of 1 question which carries 10 marks.*

1X 10 = 10

16. State the Atkinson's Equation to determine the pressure required to overcome the friction to the air passage in a mine road way. (CO3)

MINING MACHINERY – I

Course Code	Course Title	No of periods / week	Total no of periods	Marks for FA	Marks for SA
MNG-404	Mining Machinery - I	04	60	20	80

TIME SCHEDULE

S. No.	Major Topics	Periods	Mapped CO's
1	Wire ropes	10	CO1,CO2
2	Rope Capping	10	CO2,CO3, CO4
3	Transportation in Mines - Rope Haulages	15	CO2,CO3, CO4
4	Transportation in Mines - Conveyors , Locomotives and aerial rope ways	10	CO3, CO4
5	Mine Pumps	15	CO2,CO3, CO4
	Total	60	

Course Objectives and Course Outcomes

Course Objectives	<p>Upon completion of the course the student shall be able to:</p> <ul style="list-style-type: none"> - Explain the wire ropes, construction, method of manufacture of wire ropes. - Familiarize the methods of capping, re- capping, splicing. Field application of different types rope capel used in mining - Familiarize the transportation systems used in underground mines, Types of haulage systems, Conveyors, Locomotives, Aerial rope ways - Describe different types of pumps used in underground mines, Constructional details and principle of working of Centrifugal pumps, Turbine pumps,
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Course Outcomes	CO1	Basic understanding of different types machinery used in mines, such as underground transportation, wire ropes.
	CO2	Explain Constructional details of wire ropes, methods of manufacture of wire ropes, types of transportation systems used in mines, Mine pumps
	CO3	Explain Applicability of different types of wire ropes, capping, re-capping, haulage systems
	CO4	Explain Field application of different types of rope capel, Haulages, Transportation systems, mine pumps
	CO5	Simple numerical problems in determination of Factor of safety of ropes, Power required for different haulage systems, Conveyors, Tractive effort of locomotive, Safety devices used in Haulages, Conveyors.

PO-CO Mapping

Course Code: 404		Course Title: Mining Machinery-I			No of Periods: 60
PO No	Mapped with CO no	CO Periods addressing PO in Col 1		Level (1,2,3)	Remarks
		No	%		
PO1					>40% Level 3 Highly addressed 25% to 40% Level 2 Moderately Addressed 5 to 25% Level 1 Low addressed <5% Not addressed
PO 2	CO2,CO3	30	50	3	
PO 3	CO2	08	13.3	1	
PO 4	CO2,CO3	16	26.6	2	
PO 5	CO2	06	10	1	
PO 6					
PO 7					

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1										
CO2		3	1	2	1			2	1	1
CO3		3		2					1	1
CO4										
CO5										

3: High, 2: Moderate, 1: Low

LEARNING OUTCOMES

Upon completion of the course, student shall be able to

1.0 Understand the manufacture of mine ropes used in mines

- 1.1 State the uses of wire ropes in mines
- 1.2 Classifies wire ropes basing on place of application and construction.
- 1.3 State the composition of material of wire ropes.
- 1.4 Explain the field tests to be conducted on wires in rope
- 1.5 Explain the stages of manufacturing of wires of ropes
- 1.6 Describe the constructional details of different types of ropes.
- 1.7 Explain space factor, factor of safety, capacity factor bending factor
- 1.8 State the applicability of different types of wire ropes in Mining.
- 1.9 List the causes of deterioration of wire ropes
- 1.10 List the preventive measures against deterioration of ropes
- 1.11 State the formulate for finding the size, weight and strength wire ropes
- 1.12 Solves numerical problems related to the above formulae.

2.0 Know Rope Capping

- 2.1 Define the terms capping and recapping
- 2.2 List the different methods of capping the wire ropes
- 2.3 State the applicability of different capping types.
- 2.4 Sate the composition of White metal used for capping
- 2.5 State the temperature and other conditions in which white metal is poured into the capel
- 2.6 Explain the method of coned socket capping.
- 2.7 Describe method of interlocking wedge type capping

- 2.8 State the purpose of splicing of wire ropes
- 2.9 Describe the methods of splicing of wire ropes.
- 2.10 Mention the care and maintenance of wire ropes.

3.0 Understand methods of rope haulage in underground mines

- 3.1 State the purpose of transportation in mines and factors governing the selection of various haulages systems
- 3.2 Give comprehensive classification of transportation systems in mines
- 3.3 Explain different methods of transportation by rope haulage in underground
- 3.4 List the types of rope haulage and applicability of each type of rope haulage
- 3.5 Describe the direct rope haulage system, advantages , dis-advantages and safety devices used
- 3.6 Describe the endless rope haulage system including safety devices used, advantages and disadvantages.
- 3.7 Explain over-rope and under-rope endless system including the applicability
- 3.8 Describe rope clips commonly used for under rope haulage and over rope haulage
- 3.9 State the necessity of tensioning arrangements; describe tensioning arrangement for endless rope haulage
- 3.10 Describe the main and tail rope haulage system including safety devices used and advantages, disadvantages
- 3.11 Explain Gravity rope haulage/Self-acting incline rope haulage, and advantages , disadvantages
- 3.12 Simple numerical problems in determination of capacity of tubs, HP of motor, number of tubs.

4.0 Understand transportation in mines by conveyors, Locomotives & Aerial ropeways

- 4.1 Give the comprehensive classification of conveyors based on their applicability
- 4.2 Explain the belt conveyors with their tensioning arrangements
- 4.3 State limitations, merits and demerits of belt conveyor system
- 4.4 Explain scraper chain conveyor system, merits, de-merits of scraper chain conveyor
- 4.5 Simple problems to calculate the capacity of belt conveyor
- 4.6 Classify locomotive haulage systems
- 4.7 State merits, demerits, applicability and limitations of diesel locomotives system
- 4.8 Explain exhaust conditioner and flame trap fitted to diesel locomotive
- 4.9 State merits, demerits, applicability and limitations of battery locomotives system
- 4.10 Explain trolley wire locomotive, merits, demerits and limitations of trolley wire locomotives system
- 4.11 Simple numerical problems in calculation of tractive effort of locomotive
- 4.12 Classify aerial rope ways, applicability of mono cable, Bi-cable aerial rope way

5.0 Understand various Pumps used in Mines

- 5.1 Define various terms with regards to pumps a) Pump b) Head c) Static suction head d) Static discharge head e) Total static head f) Friction head g) Manometric head h) Effective head i) Internal head j) Hydraulic head k) Water hammer l) End thrust
- 5.2 Give the comprehensive classification of mine pumps with their applicability
- 5.3 Explain the principle of working, constructional details of reciprocating pump and purpose of Air vessel
- 5.4 Describe the principle of working and constructional details of centrifugal pumps
- 5.5 Describe the methods of starting and stopping of centrifugal pump
- 5.6 Explain the constructional details and principle of working of turbine pump

- 5.7 Describe the method of starting and stopping of turbines pump, method of balancing end thrust using – hydraulic balance disc
- 5.8 Explain the constructional details/fittings of submersible pump.
- 5.9 Explain the principle of working and constructional details of mono pump.
- 5.10 List out the considerations for the selection of pumps.
- 5.11 List differences between reciprocating pump and centrifugal pump
- 5.12 Simple numerical problems on calculation of head, capacity and H.P of mine pumps

COURSE CONTENTS:

1.0 Wire Ropes

Usage, classification of wire ropes, applicability of different ropes - selection parameters - computation of numerical problems on size - Weight and strength of wire ropes

2.0 Rope Capping

Capping and recapping of wire ropes, classification - description of capping methods - splicing methods, description of splicing

3.0 Transportation in Mines -Rope Haulages

Purpose of transportation, comprehensive classification of transportation - ROPE HAULAGE - direct Rope Haulage System, merits, demerits and applications - safety

Devices in Direct Rope Haulage system-Endless Rope Haulage System, merits, demerits and applicability's safety devices - Laying and maintenance of track- constructional details of mine tub/car -factors of selection for rope haulage serial rope ways- computation problems for determination of H.P. rope size breaking strength, Tub capacity, number of tubs.

4.0 Transportation in Mines -Conveyors, Locomotives & Areal Rope ways

Conveyor usage, classification - belt conveyor system, different types of belt constructions, safety devices merits, demerits and limitations of conveying system - Scraper chain convey or system, protective devices-merits, demerits and limitation, computation of numerical problems on size of the conveyor for a given output and computation of motor HP.Classify loco haulage systems, merits, demerits, applicability of different system – classify aerial ropeway, the applicable conditions of aerial ropeways.

5.0 Mine Pumps

Pumping - Various terms of pumping, classification of pumps - centrifugal pump fittings - Turbine pump, fittings – End thrust - submersible pump –fittings merits limitation - Mono Pump-Selection of pumps - computation of numerical problems on Head, Quantity, H.P. Frictional losses.

REFERENCE BOOKS

- | | |
|---------------------------------------|----------------------|
| 1. Elements of Mining | : D.J.Deshmukh Vol.3 |
| 2. Mine pumps | : Rakesh and Lee |
| 3. Mine pumps | : S.Ghattak |
| 4. U.M.S.Volumes | : UMS Series |
| 5. Statham series VOL II | : Statham |
| 6. Mine transportation | : Kerlin |
| 7. Introduction to mining engineering | : Hartman |
| 8. Mine winding and Transport | : S.C Walker |

Blue Print of a Question Paper

S. No	Chapter Name	Periods Allocated	Weightage Allocated	Marks Wise Distribution of Weightage				Question Wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	Wire ropes	10	14	03	03	08		01	01	01		CO3
2	Rope Capping	10	11	03		08		01		01		CO2
3	Transportation in Mines -Rope Haulages	15	17	03	06	08		01	02	01		CO2
4	Transportation in Mines -Conveyors , Locomotives and aerial rope ways	10	14	03	03	08		01	01	01		CO3
5	Mine Pumps	15	14	03	03	08		01	01	01		CO3
Higher order question from any chapters			10				10				01	CO4
TOTAL		60	80	15	15	40	10	05	05	05	01	

R-Remember; U-Understanding; Ap-Application ;An- Analysing

Table specifying the scope of syllabus to be covered for Unit Tests

Unit Test	Learning outcomes to covered
Unit Test -I	From 1.1 to 3.7
Unit Test –II	From 3.8 to 5.12

Model Paper for Unit Test-I :

State Board of Technical Education and Training, A.P.

Diploma in Mining Engineering (DMNGE)

Fourth semester :: MNG-404 Mining Machinery-I

Time: 90 Minutes

Unit Test –I

Maximum Marks : 40

PART- A

16 Marks

Instructions :

(i) Answer all questions

(ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1.(a) Splicing is the process of fixing the wire rope to capple

– True/False

(CO1)

(b) Simple round strand rope is used for winding

---- True/False

(CO1)

(c) Back stay is a safety device used in _____

(CO2)

(d) Wire drawing is _____ process.

(CO2)

2. State the uses of wire ropes in mines

(CO1)

3. Classifies wire ropes basing on place of application and construction

(CO1)

4. List the different methods of capping the wire ropes

(CO2)

5. Classification of transportation systems in mines

(CO3)

PART- B

3 x 8 = 24 Marks

Instructions :

(i) Answer all questions

(ii) Each question carries EIGHT marks

(iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A) Explain the field tests to be conducted on wires in rope

(CO4)

(OR)

(B) Explain the stages of manufacturing of wires of ropes

(CO2)

7. (A) Explain the method of coned socket capping

(CO2)

(OR)

(B) Describe method of interlocking wedge type capping

(CO2)

8. (A) Explain different methods of transportation by rope haulage in underground

(CO4)

(OR)

(B) Describe the endless rope haulage system

(CO5)

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Model Paper for Unit Test-II :

**State Board of Technical Education and Training, A.P.
Diploma in Mining Engineering (DMNGE)
Fourth semester :: MNG-404 Mining Machinery-I**

Time: 90 Minutes

Unit Test –II

Maximum Marks : 40

PART- A

16 Marks

Instructions :

- (i) Answer all questions
- (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

- 1.(a) Loop take up arrangement is used in chain conveyors
– True/False (CO1)
- (b) Snub pulley is used to increase angle of contact in belt conveyor
---- True/False (CO2)
- (c) The limiting gradient of Locomotive Haulage is _____ (CO3)
- (d) Water colliding with the retreating piston or ram causing violent shock is called _____ (CO4)
2. State the necessity of tensioning arrangements (CO5)
3. Classify locomotive haulage systems (CO2)
4. Define the terms a) Pump b) Head (CO1)
5. write the method of starting and stopping of centrifugal pump (CO5)

PART- B

3 x 8 = 24 Marks

Instructions :

- (i) Answer all questions
- (ii) Each question carries EIGHT marks
- (iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A) Describe the main and tail rope haulage system (CO5)
(OR)
(B) Explain Gravity rope haulage/Self-acting incline rope haulage (CO4)
7. (A) Explain the belt conveyors with their tensioning arrangements (CO3)
(OR)
(B) Explain exhaust conditioner and flame trap fitted to diesel locomotive (CO2)
8. (A) Describe the principle of working and constructional details of centrifugal pumps (CO3)
(OR)
(B) Explain the constructional details/fittings of submersible pump (CO2)

**BOARD DIPLOMA EXAMINATION,
D.MNG.E. – IV SEMESTER EXAMINATION
MINING MACHINERY-I**

Time : 3 Hours

Total Marks: 80

PART – A**10X3 = 30**

Instructions: *Part A consists of 10 questions. Answer **all** questions and each question carries **three** marks.*

1. State the uses of wire ropes in mines (CO1)
2. List the causes of deterioration of wire ropes (CO2)
3. Define the terms capping and recapping (CO1)
4. List the types of rope haulage (CO1)
5. List advantages and disadvantages of Direct rope haulage (CO1)
6. List various safety devices required in direct rope haulage (CO2)
7. State limitations of belt conveyor system (CO3)
8. Classify aerial rope ways (CO2)
9. Define the terms a) Pump b) Head (CO1)
10. List out the considerations for the selection of pumps (CO2)

PART – B**5 X 8 = 40**

Instructions: *Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 8 marks and may have sub questions.*

11. A) Explain the stages of manufacturing of wires of ropes (CO2)
(OR)
B) Describe the constructional details of Simple round strand rope. (CO4)
12. A) Describe method of interlocking wedge capping (CO5)
(OR)
B) Describe the methods of splicing of wire ropes (CO2)

13. A) Describe the endless rope haulage system including safety devices used (CO4)

(OR)

B) Explain Gravity rope haulage/Self-acting incline rope haulage (CO3)

14. A) Explain scraper chain conveyor system (CO2)

(OR)

B) State merits, demerits, applicability and limitations of battery locomotives system (CO4)

15. A) Explain the constructional details and fittings of centrifugal pumps (CO2)

(OR)

B) Explain the constructional details/fittings of submersible pump (CO2)

PART – C

1X 10 = 10

Instructions: *Part C consists of 1 question which carries 10 marks.*

16. What is water hammering and end thrust? Describe the method of balancing end thrust-hydraulic balance disc (CO2)

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MINE SURVEYING - II

Course Code	Course Title	No of periods / week	Total no of periods	Marks for FA	Marks for SA
MNG-405	Mine Surveying - II	05	75	20	80

TIME SCHEDULE

S. No.	Major Topics	Periods	Mapping of CO's
1	Theodolite surveying	20	CO1, CO2, CO5
2	Setting out curves	12	CO2, CO3, CO4, CO5
3	Correlation Survey and Triangulation Survey	15	CO2, CO3, CO4
4	Tacheometry	08	CO3, CO4, CO5
5	Dip, strike and Fault problems	10	CO2, CO3, CO4, CO5
6	Fundamentals of Advanced survey	10	CO2, CO3, CO4, CO5
	Total	75	

Course Objectives and Course Outcomes

Course Objectives	<p>Upon completion of the course the student shall be able to:</p> <ul style="list-style-type: none"> - Describe the theodolite survey, traversing of an area by Theodolite - Familiarize setting out curves, application of different types of curves in underground mines. - Familiarize correlation survey, applicability in underground mines - Explain the Methods of triangulation survey - Familiarize tachometry survey - Computation of dip, strike, fault problems - Familiarize the basic operations of Total station
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Course Outcomes	CO1	Explain the basic principle of operation of theodolite, setting out curves, correlation survey, Total station
	CO2	Explain the methods of Traversing of given area by Theodolite. Setting out curves both on surface and in underground, Triangulation survey
	CO3	Describe the correlation survey in Mines, Important components of Theodolite, Total station
	CO4	Describe the total station surveying
	CO5	Solving various numerical problems in Theodolite, Tachemetry, Correlation. Dip strike and length of cross measure drift problems

PO-CO Mapping

Course Code: 405		Course Title: Mine Surveying-II			No of Periods: 75
PO No	Mapped with CO no	CO Periods addressing PO in Col 1		Level (1,2,3)	Remarks
		No	%		
PO1	CO2,CO3	27	36	2	>40% Level 3 Highly addressed 25% to 40% Level 2 Moderately Addressed 5 to 25% Level 1 Low addressed <5% Not addressed
PO 2					
PO 3	CO2,CO3	32	43	3	
PO 4					
PO 5	CO2,CO3	16	21	1	
PO 6					
PO 7					

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1										
CO2	2		3		1			1	1	1
CO3	2		3		1			1	1	1
CO4										
CO5										

3: High, 2: Moderate, 1: Low

LEARNING OUTCOMES

Upon completion of the course, student shall be able to

1.0 Understand the theodolite survey.

- 1.1 Describe transit Vernier theodolite., fundamental lines of transit theodolite and relation between them
- 1.2 List the Essentials (parts) of a transit theodolite, permanent adjustments of a transit theodolite
- 1.3 Define the terms, transiting, swinging face left, face right and changing face as used in theodolite, index error, centring, telescope normal , telescope vertical
- 1.4 List methods of measurement of horizontal angles, Describe the repetition and reiteration methods of measurement of horizontal angle, magnetic bearing of line their applicability
- 1.5 State the applicability of repetition and reiteration methods the method of measuring vertical angle.
- 1.6 List the method of traversing with theodolite and explain continuous Azimuth method, double foresight method of traverse
- 1.7 Computes the bearing of the lines of traverse in double foresight method.
- 1.8 State the checks on the accuracy of angular measurements in closed figures
- 1.9 Explain the term 'Permissible error of Closure' and permissible errors in a) Surface traverse
b) Underground traverse
- 1.10 Explain the term rectangular co-ordinates and compute latitude, departure from the traverse.

- 1.11 Solves the problems related with rectangular co-ordinates, calculating the length and bearing of the closing line of the traverse. Determination of area of closed traverse .
- 1.12 State the rules for distribution of error of closure. Different methods of distribution of error of closure, Bowditch rule of balancing the traverse

2.0 **Setting Out Curves**

- 2.1 Classifies the curves
- 2.2 Define simple curve, reverse curve, compound curve, transition curve and vertical curve, super elevation
- 2.3 State the elements of simple curve
- 2.4 List the methods of setting out curve,
- 2.5 Explain the method of setting out curve by chord and offset method on surface and underground
- 2.6 Explain the method of setting out curve by chord and angle Method on surface and underground
- 2.7 Explain the method of setting out road way in underground from a main road at a given bearing (direction)and gradient

3.0 **Correlation Survey and Triangulation survey**

- 3.1 Define the term correlation, triangulation survey
- 3.2 State the purpose of correlation.
- 3.3 List the different methods of correlation.
- 3.4 Describe the method of correlation by Direct traversing
- 3.5 Describe the method of correlation by Co-Planning or Exact alignment method
- 3.6 Describe the methods of correlation by Weissbach triangle or approximate alignment method
- 3.7 State the principle of triangulation survey
- 3.8 Explain different triangulation schemes
- 3.9 Explain the method of measuring base line in centenary
- 3.10 Explain the method of extension of base line
- 3.11 List the (checks) adjustments for measured angles of a triangle

4.0 **Tacheometry**

- 4.1 State the principle of tacheometric Surveying
- 4.2 List merits and demerits of tacheometric survey
- 4.3 List the systems of tacheometric survey
- 4.4 Explain the tacheometric constants
- 4.5 Explain the stadia method of tacheometric survey
- 4.6 List the errors in stadia method
- 4.7 Derives the relation (formula) among stadia reading, horizontal distance and vertical distances when the line of sight is inclined and the staff is held vertical
- 4.8 Solve problems for horizontal distances and vertical heights.

5.0 **Dip, Strike, Fault problems**

- 5.1 Define the terms (a) Dip (b) True dip (c) Apparent dip (d) Strike (e) Fault.
- 5.2 State the inter relation between true dip, apparent dip and strike of a mineral bed
- 5.3 Derives a formula relating them
- 5.4 Solves the problems relating to them – determines the rate and direction of true dip or strike of a mineral bed

- 5.5 Solves problems related to strike and fault – calculate the length of drift, passing through the fault.
- 5.6 Solves problems basing on bore hole data- Calculates the rate and direction of true dip of the seam.
- 5.7 Solves problems connected to cross – measure drift driven between two parallel seams with given data.

6.0 Knows the fundamentals of advanced surveying

- 6.1 State the basics of Surveying with Electronic instruments
- 6.2 State the basic principles of surveying with Electronic instruments
- 6.3 List the types of EDM instruments.
- 6.4 Explain the working principle of Electromagnetic distance measuring system.
- 6.5 State the various applications of remote sensing.
- 6.6 State the fundamentals of GPS.
- 6.7 List the applications of GPS in Mining
- 6.8 List the uses of total station
- 6.9 List the parts of total station
- 6.10 State the function of each part of total station
- 6.11 Explain the procedure for measurement of distance and angle between the given points using Total station
- 6.12 Explain the procedure for measurement of area between the given points using Total station

COURSE CONTENTS:

1. **Theodolite:** Magnetic bearing of lines. Traversing – continuous Azimuth, double fore sight methods – computation of bearings of traverses check of accuracy in angular measurements – permissible error – distribution – calculation of latitude and departure – problems on rectangular coordinates – calculation of areas – Bowditch Rule
2. **Setting Curves:** Classification – Definitions – elements of simple curve – Method of setting out curves – by chord and offset, chord and angle.
3. **Correlation survey and Triangulation surveying** - Purpose – methods of correlation – Direct Traversing – Co – planning – weisbach Triangle-Definition – Principles – Different triangulation schemes – Base line measurement – Adjustments – Extension of base line
4. **Tacheometry:** Principles – systems – Constants Methods – Stadia method, substance method, Tangential method – merits and demerits of Tachometry – relation between stadia reading, Horizontal distance, vertical distance, solves problems.
5. **Dip, Strike, Fault problems:** Definitions of Dip, Strike, Fault, True Dip, Apparent Dip-Relation among them- Solving the problems relating to them – determines the rate and direction of true dip or strike of a mineral bed- Solving the problems related to strike and fault – calculate the length of drift, passing through the fault-Bore whole problems- cross measure drift problems.
6. **Fundamentals of advanced survey:** basics of Surveying with Electronic instruments- principles of surveying with Electronic instruments- Essentials- Applications of remote sensing- Fundamentals and applications of GPS in Mining- Uses and parts of Total station- measurement of angle between the given points using Total station

REFERENCE BOOKS:

1. Surveying : S.Ghatak Vol-1,2,3
2. Surveying : Kanetkar&KulkarniVol -1 and Vol-2
3. Surveying : B.C.PunmiaVol- 1,2,3
4. U.M.S. Volumes

Blue Print of a Question Paper

S. No	Chapter Name	Periods Allocated	Weightage Allocated	Marks Wise Distribution of Weightage				Question Wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	Theodolite surveying	20	14	03	03	08		01	01	01		CO2, CO3
2	Setting out curves	12	14	03	03	08		01	01	01		CO2, CO3
3	Correlation Survey and Triangulation Survey	15	14	03	03		08	01	01	01		CO2, CO3
4	Tacheometry	08	03		03				01			CO2, CO3
5	Dip, strike and Fault problems	10	11	03		08		01		01		CO2, CO3
6	Fundamentals of Advanced survey	10	14	03	03	08		01	01	01		CO2, CO3
Higher order question from any chapters			10				10				01	CO5
TOTAL		75	80	15	15	32	18	05	05	05	01	

R-Remember; U-Understanding; Ap-Application; An- Analysing

Table Specifying the scope of syllabus to be covered for Unit Tests

Unit Test	Learning outcomes to covered
Unit Test -I	From 1.1 to 3.7
Unit Test –II	From 3.8 to 6.12

Model Paper for Unit Test-I :

**State Board of Technical Education and Training, A.P.
Diploma in Mining Engineering (DMNGE)
Fourth semester :: MNG-405 MINE SURVEYING-II**

Time: 90 Minutes

Unit Test –I

Maximum Marks : 40

PART- A

16 Marks

Instructions :

- (i) Answer all questions
- (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

- 1.(a) Is it necessary to know all the coordinates of the stations to calculate the area of given traverse
– True/False (CO1)
- (b) Two shafts are required in co-planing method of correlation survey
-- True/False (CO1)
- (c) Transition curve is introduced between _____ (CO3)
- (d) The magnetic bearing of the lines can be measured by attaching ____ to the theodolite. (CO2)
2. Define the terms a) transiting b) swinging (CO1)
3. State the applicability of repetition method (CO1)
4. Classifies the curves (CO2)
5. List the different methods of correlation (CO3)

PART- B

3 x 8 = 24 Marks

Instructions :

- (i) Answer all questions
- (ii) Each question carries EIGHT marks
- (iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A) Explain continuous Azimuth method (CO5)

(OR)

- (B) The following are the notes of an underground traverse:

Line	Quadrant bearing	Hor. Distance
AB	N36°14'E	320m
BC	N6°18'W	420m
CD	S81°44'E	115m

The coordinates of A are 443.7m south and 186.1m west based on a local origin. Calculate the coordinates of the station B,C and D and determine the length and bearing of closing line DA

(CO5)

7. (A) Explain the method of setting out curve by chord and offset method on surface (CO4)

(OR)

- (B) Explain the method of setting out curve by chord and angle method on surface (CO4)

8. (A) Describe the method of correlation by Direct traversing (CO2)

(OR)

- (B) Describe the method of correlation by Co-Planning or Exact alignment method (CO3)

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Model Paper for Unit Test-II :

**State Board of Technical Education and Training, A.P.
Diploma in Mining Engineering (DMNGE)
Fourth semester :: MNG-405 MINE SURVEYING-II**

Time: 90 Minutes

Unit Test –II

Maximum Marks : 40

PART- A

16 Marks

Instructions :

- (i) Answer all questions
- (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1.(a) EDM means Electronic distance measuring

– True/False (CO1)

(b) UK Defense was developed the GPS

---- True/False (CO1)

(c) In Tangential Method The Horizontal Distance= _____ (CO3)

(d) The ratio of the perpendicular to the base is constant in similar isosceles is the principle of ____ (CO2)

2. List merits and demerits of tacheometric survey (CO4)

3. Define the terms (a) Dip (b) True dip (CO1)

4. List the types of EDM instruments (CO2)

5. List the applications of GPS in Mining (CO3)

PART- B

3 x 8 = 24 Marks

Instructions :

- (i) Answer all questions
- (ii) Each question carries EIGHT marks
- (iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A) Explain the method of measuring base line in centenary (CO4)

(OR)

(B) Explain the tacheometric constants (CO3)

7. (A) A The apparent dip of a lode, when measured in the direction $S35^{\circ}W$ is 35° , and when measured in the direction $S35^{\circ}E$, is 47° . Calculate the amount and direction of dip of the lode

(CO5)

(OR)

(B) Three boreholes A,B and C supplied the following information of a coal seam

Line	Bearing	Gradient
AB	$S40^{\circ}W$	1 in 5
AC	$S35^{\circ}E$	1 in 3

Calculate the direction and gradient of the true dip of the coal seam (CO4)

8. (A) Explain the working principle of Electromagnetic distance measuring system (CO2)

(OR)

(B) Explain the procedure for measurement of area between the given points using Total station (CO3)

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**BOARD DIPLOMA EXAMINATION,
D.MNG.E. – IV SEMESTER EXAMINATION
MINE SURVEYING-II**

Time : 3 Hours

Total Marks: 80

PART – A**10 X3 = 30 Marks**

Instructions: *Part A consists of 10 questions. Answer **all** questions and each question carries **three** marks.*

1. List the fundamental lines of a transit theodolite (CO2)
2. State the applicability of repetition and reiteration methods (CO2)
3. Define simple curve, reverse curve (CO1)
4. Classifies the curves (CO4)
5. State the principle of triangulation survey (CO1)
6. Define the term correlation, triangulation survey (CO1)
7. List the systems of tacheometric survey (CO2)
8. Define the terms (a) Dip (b) True dip (CO1)
9. List the types of EDM instruments (CO4)
10. List the parts of total station (CO1)

PART – B**5 X 8 = 40**

Instructions: *Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 8 marks and may have sub questions.*

11. A) Describe the continuous Azimuth, method of traverse (CO2)
(OR)
B) Describe the method of measuring vertical angle (CO1)
12. A) Explain the method of setting out curve by chord and angle Method on surface (CO1)
(OR)
B) Explain the method of setting out curve by chord and offset method in underground (CO1)
13. A) Describe the method of correlation by Direct traversing (CO1)
(OR)
B) Explain the method of measuring base line in centenary (CO1)

14. A) The apparent dip of a lode, when measured in the direction $S35^{\circ}W$ is 35° , and when measured in the direction $S35^{\circ}E$, is 47° . Calculate the amount and direction of dip of the lode (CO1)

(OR)

- B) Three boreholes A,B and C supplied the following information of a coal seam

Line	Bearing	Gradient
AB	$S40^{\circ}W$	1 in 5
AC	$S35^{\circ}E$	1 in 3

Calculate the direction and gradient of the true dip of the coal seam (CO1)

15. A) Explain the working principle of Electromagnetic distance measuring system (CO1)

(OR)

- B) Explain the procedure for measurement of angle between the given points using Total station (CO1)

PART – C

1X 10 = 10

Instructions: *Part C consists of 1 question which carries 10 marks.*

16. A tachemeter is set up at B and observations are made to station A and C. The multiplying constant is 100 and the additive constant is 0.42. The following readings are taken:

	Staff Intercept	Middle Cross-hair	Vertical Angle
To A	0.828	0.963	$+24^{\circ}12'$
To C	1.077	1.068	$+12^{\circ}12'$

The instrument height is 1.203 m. The reduced level of A is 118.410 m A.O.D. Determine the R.L.s of B and C and the horizontal distances AB and BC. (CO1)

SURFACE MINING

Course Code	Course Title	No of periods / week	Total no of periods	Marks for FA	Marks for SA
MNG-406	Surface Mining	05	75	20	80

TIME SCHEDULE

S. No	Major Topics	No. of Periods	Mapped CO's
1	Surface mining - Basics	15	CO1,CO2,CO4
2	Surface mining - Machinery	20	CO4,CO5
3	Surface mining – Drilling and Blasting	15	CO2,CO3,CO4,CO5
4	Slope stability	15	CO3,CO4,CO5
5	Environment and Ecology	10	CO1,CO4,CO5
	Total	75	

Course Objectives and Course Outcomes:

Course Objectives	<p>Upon completion of the course the student shall be able to:</p> <ul style="list-style-type: none"> - Explain the basic operations involved in Surface Mining - Familiarize the methods of opening the deposits for Surface Mining - Explain various machinery used in opencast mines and their applicability in Surface Mining - Familiarize the Drilling and Blasting operations in Surface Mining - Analysis of stability of slopes in Overburden dumps as well as pit slope stability
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Course Outcomes	CO1	Explain Basic terminology involved Surface Mining, machinery used.
	CO2	Explain Various operations involved in Surface Mining, Machinery used , Drilling and blasting operation
	CO3	Describe the Operation of various machinery used in Surface Mining
	CO4	Explain drilling and Blasting operation involved in Surface mining and Production calculations. Factors influencing the stability of slope. Study of salient features of EMP, EIA
	CO5	Determination of production from Surface Mining, Slope stability analysis, Importance of EMP.EIA

PO-CO Mapping:

Course Code: 406		Course Title: Surface Mining			No of Periods: 75
PO No	Mapped with CO no	CO Periods addressing PO in Col 1		Level (1,2,3)	Remarks
		No	%		
PO1	CO1	20	29	2	>40% Level 3 Highly addressed 25 to 40% Level 2 Moderately addressed 5 to 25% Level 1 Low addressed <5% Not addressed
PO2				-	
PO3	CO2,CO3,CO4	31	42	3	
PO4	CO4	4	1.0	-	
PO5	CO2,CO3	20	28	2	
PO6	-	-	-	-	
PO7	-	-	-	-	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	-	-	-	1	-
CO2	-	-	3	-	2	-	-	-	1	1
CO3	-	-	3	-	2	-	-	-	1	1
CO4	-	-	3	-	-	-	-	-	-	1
CO5	-	-	-	-	-	-	-	-	-	-

3: High, 2: Moderate, 1: Low

LEARNING OUTCOMES

Upon on completion of the course the student shall be able to:

1.0 Surface mining - Basics

- 1.1 Define the term surface mining and classify its types.
- 1.2 Define the following terms related to open cast mining with sketches, outcrop, overburden, face, bench, floor of bench, toe, crust, angle of repose, stripping ratio, Break even stripping ratio, placer mining, alluvial Mining, strip mining, , slope stability, back filling, box cut, trench cut.
- 1.3 List the major surface coal and metal mines in India.
- 1.4 List the different Geo – mining situations under which surface mining is adopted.
- 1.5 List the different merits, demerits and limitations of surface mining.
- 1.6 List and explain the different stages of surface mining (vegetation clearance, levelling, formation of approach roads, formation of benches on OB and coal or mineral, drilling, blasting, loading & transportation, dumping and back filling operations).
- 1.7 Explain haul roads and write about the location and design of haul roads.
- 1.8 Describe curves, super elevation, dividers, berms, drainage system, escape lanes, lighting on haul roads.
- 1.9 Define dumps in surface mines and mention the types.
- 1.10 Explain internal and external dumps.
- 1.11 Explain safety berms on dumps.

2.0 Surface mining - Machinery

- 2.1 List the different machinery for preparing the ground (dozer, scraper, Ripper, road grader, compacting equipment like road rollers etc.).
- 2.2 Classify dozers, scrapers, rippers, road graders and list its applicable conditions.
- 2.3 Classify and list the applications of HEMM deployed in surface mines (Drills, Excavators, Transport equipment, Road making equipment etc)
- 2.4 Classify the types of shovels and list their general components with functions.
- 2.5 Explain the operation and place of application of Shovels with sketch.
- 2.6 List and define the operating parameters of shovel (dumping height, cutting height, and dumping radius, maximum digging radius, bucket fill factor, Swell factor, bucket factor, swing factor, cycle time, loading time)
- 2.7 Classify the types of draglines and list their general components with functions
- 2.8 Explain the operation and place of application of Draglines with sketch.
- 2.9 Compare shovels with draglines
- 2.10 List the main components, their functions and place of application of Bucket Wheel Excavator with a neat sketch
- 2.11 List the types of Transport system (dumpers, belt conveyors, rails, pipeline transport, high angle sand witch conveyors and aerial rope ways).
- 2.12 Explain the general construction of dumper with neat sketch.
- 2.13 List the applicable conditions, merits and demerits of surface continuous miner, In-pit crusher technology and spreaders

3.0 Surface mining – Drilling and Blasting

- 3.1 List and explain different parameters connected to drilling of blast holes.
- 3.2 List and explain the different pattern of drill holes, based on depth, diameter, spacing and burden of drill holes.
- 3.3 List the applications, merits and demerits of vertical, inclined and sub-grade drilling.
- 3.4 List the blasting tools and accessories used in surface mine blasting.
- 3.5 Explain the use of nonels, raydets, electric detonators, boosters, detonating cords.
- 3.6 Explain method of giving connections and firing procedure in surface mines.
- 3.7 Explain the deck charging /deck loading and its applicability.
- 3.8 Estimate the charges required for blasting a round.
- 3.9 Explain the controlled blasting techniques to control fly rocks (muffled blasting), vibrations (cushion blasting), and sound (chamber blasting).
- 3.10 Define the term sleeping holes and list the situation for their existence.
- 3.11 Define the term secondary blasting., methods of secondary blasting
- 3.12 List the dangers due to blasting practice in surface mines and preventive measures

4.0 Slope stability

- 4.1 Define slope stability and list the factors influencing the slope stability of a bench.
- 4.2 Define the terms slope angle, angle of repose, overall slope of bench.
- 4.3 List and explain types of slope failures.
- 4.4 List and explain parameters required for slope design.
- 4.5 List and explain the methods of preventing slope failures.
- 4.6 State the formula to calculate the factor of safety of bench slope
- 4.7 Simple numerical problems to calculate the factor of safety of bench slope (Planer failure)
- 4.8 State the effect of water in bench slope stability

5.0 Environment and Ecology

- 5.1 Define the term Environment
- 5.2 State the impact on environment due to opencast mining operations
- 5.3 State and explain the various environmental pollutions (Water, Air, Land Pollutions) due to mining operations
- 5.4 Explain the prevention and control of various pollutions (Water, Air, Land pollutions) due to mining
- 5.5 Define the term Ecology and impact on ecology due to Surface Mining operations
- 5.6 Explain the relation between Environment and Ecology
- 5.7 State the purpose of EIA (Environmental Impact Assessment)
- 5.8 Explain the salient features of EIA
- 5.9 State the necessity of EMP (Environmental Management Plan)
- 5.10 Explain the salient features of EMP
- 5.11 Define the term "Reclamation".
- 5.12 Explain land reclamation operations in Surface Mines

COURSE CONTENTS:

1.0 Surface mining - Basics

Define Surface Mining, different terms used in surface mining - forms of Surface mining – Geo mining situation under which surface mining adopted - major coal and metal opencasts – Limitations – merits and demerits – preparation of ground, de-vegetation – clearance – formation of OB benches – coal benches – drilling – blasting – loading – transportation – back filling- box cut, trench cut, haul roads dumps- internal and external dumps, safety berms on dumps - dividers, berms, drainage system, escape lanes on haul roads.

2.0 Surface mining - Machinery

Different machinery for preparing the ground for mining operation, dozer, scraper, ripper, road grader, classification of dozers - application of dozer in mines.-classification of rippers-- road graders-application of road grader - classification of road rollers (compacting equipment) - classification of excavators - types of shovels - components and their functions of shovels - operating parameters of shovel - define dumping height, cutting height, dumping radius, maximum digging radius, bucket fill factor, swell factor, bucket factor, swing factor, cycle time, loading time - operation and place of application of shovels - list types of draglines - Main components and their functions, of dragline - operation and place of application of dragline - comparison of shovel vs dragline - main components and their functions, of bucket wheel excavator - operation and place of application of bucket wheel excavator- applicable conditions, merits and demerits of surface miner

3.0 Surface mining – Drilling and Blasting

Classify drill holes – vertical inclined drilling – merits – demerits – various parameters for drill blast holes – drill patterns – application estimation of charges for blasting round of holes – blasting tools for shot firing procedure - patterns - transportation, storage, charging of bulk explosives - use of accessories such are nonels, electronic detonators, boosters, detonating cords-- methods of giving connection and firing procedure -deck charging and its applicability - controlled blasting

techniques to control of fly rocks, vibrations sound, dust generation - muffled blasting, cushion blasting - chamber blasting and deck blasting and their applicability - Secondary Blasting-Pop shooting, plaster blasting -Dangers due to blasting practice in open cast mines--preventive measures due to blasting practice in open cast mines.

4.0 Slope stability

Slope stability and Factors influencing the slope stability of a bench - Define the terms: Slope angle, Angle of Repose, Over all slope of bench - Simple numerical problems to calculate the overall slope of the bench -Types of slope failures - Parameters required for slope design - Methods of preventing slope failures - Formula to calculate the factor of safety of bench slope - Simple numerical problems to calculate the factor of safety of bench slope

5.0 Environment and Ecology :

Definition- Impact on environment due to opencast mining operations - Various environment pollutions (water, air, land pollutions) due to mining operations - Prevention and control of various environment pollutions (water, air, land pollutions) due to mining operations –Ecology and impact on ecology due to OC Mining operations - Relationship between Environment & Ecology- EIA (Environmental Impact Assessment) - EMP land Reclamation operations in opencast mines

REFERENCE BOOKS:

- | | | |
|--|---|-----------------|
| 1. Surfacing Mining | : | G.B.Mishra |
| 2. Blasting in Mines | : | Samir Kumar Das |
| 3. Surfacing Mining | : | Samir Kumar Das |
| 4. Mine Management | : | S. Ghattak |
| 5. Heavy earth mining Machinery | : | Amitosh de |
| 6. Principles & practices of coal mining | : | R.D.Singh |

Blue Print of a Question Paper:

S. No	Chapter Name	Periods Allocated	Weightage Allocated	Marks Wise Distribution of Weightage				Question Wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	Surface mining - Basics	15	14	3	3	-	8	1	1	-	1	CO1,CO3
2	Surface mining - Machinery	20	14	3	3	-	8	1	1	-	1	CO3
3	Surface mining – Drilling & Blasting	15	14	3	3		8	1	1		1	CO2
4	Slope stability	15	14	3	3	8	-	1	1	1	-	CO3,CO4
5	Environment and Ecology	10	14	3	3	8		1	1	1		CO1,CO4,C O5
Higher order question from any chapters			10				10				1	CO3
TOTAL		75	80	15	15	16	34	5	5	2	4	

R-Remember; U-Understanding; Ap-Application; An-Analysing

Table Specifying the scope of syllabus to be covered for Unit Tests

Unit Test	Learning outcomes to covered
Unit Test -I	From 1.1 to 3.5
Unit Test –II	From 3.6 to 6.12

Model Paper for Unit Test-I :

**State Board of Technical Education and Training, A.P.
Diploma in Mining Engineering (DMNGE)
Fourth semester :: MNG-406 Surface Mining**

Time: 90 Minutes

Unit Test –I

Maximum Marks : 40

PART- A

16 Marks

Instructions :

- (i) Answer all questions
- (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1.(a)Leaching is the chemical extraction of metals

– True/False (CO1)

(b) What is the extension of a box cut known as Trench Cut

---- True/False (CO1)

(c) Maximum height of the mineral bench is _____ (CO3)

(d)Usually in the soft strata the blast hole length can be taken _____. (CO2)

2.Define the terms a) face b) bench (CO1)

3. List the different machinery for preparing the ground (CO1)

4. List the applications, merits and demerits of sub-grade drilling (CO2)

5. Classify the types of shovels (CO3)

PART- B

3 x 8 = 24 Marks

Instructions :

- (i) Answer all questions
- (ii) Each question carries EIGHT marks
- (iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A) List the major surface coal and metal mines in India (CO1)

(OR)

(B) List the different Geo – mining situations under which surface mining is adopted (CO1)

7. (A) Explain the operation and place of application of Draglines with sketch (CO3)

(OR)

(B) Explain the general construction of dumper with neat sketch (CO2)

8. (A) Explain different parameters connected to drilling of blast holes (CO2)

(OR)

(B)Explain the use of nonels, raydets, electric detonators (CO3)

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Model Paper for Unit Test-II :

**State Board of Technical Education and Training, A.P.
Diploma in Mining Engineering (DMNGE)
Fourth semester :: MNG-406 Surface Mining**

Time: 90 Minutes

Unit Test –II

Maximum Marks : 40

PART- A

16 Marks

Instructions :

- (i) Answer all questions
- (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

- 1.(a) Rope shovel machine is rugged and used in hard ore
– True/False (CO1)
- (b) EMP means Environment Management Project
---- True/False (CO1)
- (c) Place of application of dozer is _____ (CO3)
- (d) Bucket Wheel Excavator boom can be moved up and down by _____ about the horizontal axis
(CO2)
2. Define the term secondary blasting (CO1)
3. Define the terms slope angle, angle of repose (CO1)
4. Define the term Environment (CO2)
5. State the purpose of EIA (CO3)

PART- B

3 x 8 = 24 Marks

Instructions :

- (i) Answer all questions
- (ii) Each question carries EIGHT marks
- (iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A) Explain method of giving connections and firing procedure in surface mines (CO1)
(OR)
- (B) Explain the deck charging /deck loading and its applicability (CO1)
7. (A) Explain parameters required for slope design (CO3)
(OR)
- (B) Explain the methods of preventing slope failures (CO2)
8. (A) Explain the prevention and control of various pollutions (Water, Air, Land pollutions) due to mining (CO2)
(OR)
- (B) Explain land reclamation operations in Surface Mines (CO3)

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**BOARD DIPLOMA EXAMINATION,
D.MNG.E. – IV SEMESTER EXAMINATION
SURFACE MINING**

Time : 3 Hours

Total Marks: 80

PART – A**10 X 3 = 30**

Instructions: *Part A consists of 10 questions. Answer **all** questions and each question carries **three** marks.*

1. Define the term surface mining and classify its types. (CO1)
2. Describe curves, super elevation. (CO1)
3. List the different merits of surface mining. (CO1)
4. List the different machinery for preparing the ground. (CO1)
5. Classify the types of draglines. (CO1)
6. List the types of transport systems used in surface mining. (CO1)
7. Define the term sleeping holes and list the situation for their existence. (CO1)
8. List the blasting tools and accessories used in surface mine blasting. (CO1)
9. List the factors influencing the slope stability of a bench. (CO1)
10. Define the terms a) slope angle b) angle of repose. (CO1)

PART – B**5 X 8 = 40**

Instructions: *Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 8 marks and may have sub questions.*

11. A) Explain haul roads and write about the location and design of haul roads. (CO1)
(OR)
B) Explain internal and external dumps. (CO1)
12. A) Explain the operation and place of application of Shovels with sketch. (CO1)
(OR)
B) Classify and list the applications of HEMM deployed in surface mines. (CO1)
13. A) List and explain different parameters connected to drilling of blast holes (CO1) .
(OR)
B) Explain the methods of secondary blasting. (CO1)
14. A) Explain method of giving connections and firing procedure in surface mines. (CO1)
(OR)
B) Estimate the charges required for blasting a round. (CO1)
15. A) List and explain parameters required for slope design. (CO1)
(OR)
B) List and explain types of slope failures. (CO1)

PART – C**1X 10 = 10**

Instructions: *Part C consists of 1 question which carries 10 marks.*

16. Explain the operation and place of application of Bucket wheel Excavator with sketch. (CO1)

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MINE ENVIRONMENTAL ENGINEERING LABORATORY PRACTICE

Course Code	Course Title	No of periods / week	Total no of periods	Marks for FA	Marks for SA
MNG-407	Mine Environmental Engineering Laboratory Practice	03	45	40	60

TIME SCHEDULE

S. No.	Major Components	Periods	Mapped CO's
1.	Flame Safety Lamp and Gas Detectors	15	CO1,CO2,CO4,CO5
2.	Coursing of air with ventilation devices	15	CO1,CO2,CO3, CO4,CO5
3.	Rescue and Reviving apparatus	15	CO1,CO2, CO3, CO4,CO5
	Total	45	

Course Objectives and Course Outcomes

Course Objectives	<p>Upon completion of the course the student shall be able to:</p> <ul style="list-style-type: none"> - To familiarise various components of Flame safety lamp - Explain various detectors used in underground mines and their applicability - Familiarise various devices used in Ventilation - Explain principle of operation various Rescue apparatus used in mines - Familiarise various Rescue and Reviving apparatus
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Course Outcomes	CO1	Describe Flame safety lamp, gas detectors and rescue apparatus
	CO2	Explain precise operations with flame safety lamp, gas detectors and rescue operation
	CO3	Observe various parameters, their variations and graphically represent the same
	CO4	Explain coursing of the air with various ventilation devices
	CO5	Determine the percentage of different gases

PO-CO Mapping

Course Code: MNG-407		Course Title: Mine Environmental Engineering Laboratory Practice			No of Periods: 45
PO No	Mapped with CO no	CO Periods addressing PO in Col 1		Level (1,2,3)	Remarks
		No	%		
PO1	CO1,CO2,CO3	15	33.3	2	>40% Level 3 Highly addressed
PO2	CO1,CO3,CO4	10	22.2	1	
PO3	CO2	10	22.2	1	
PO4	CO2	10	22.2	1	
PO5	-	-	-	-	25% to 40% Level 2 Moderately Addressed
PO6	-	-	-	-	
PO7	-	-	-	-	5 to 25% Level 1 Low addressed
					<5% Not addressed

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	1	-	-	-	-	-	1	1	-
CO2	2	-	1	1	-	-	-	2	1	-
CO3	2	1	-	-	-	-	-	1	1	-
CO4	-	1	-	-	-	-	-	1	-	-
CO5	-	-	-	-	-	-	-	-	-	-

3: High, 2: Moderate, 1: Low

Learning Outcomes

Up on Completion of the course the student shall be able to:

1.0 Flame Safety Lamp and Gas Detectors

- 1.1 Identifies and sketches the parts of flame safety lamp
- 1.2 Disassembles and assembles the flame safety lamp
- 1.3 Tests for the presence of inflammable gas accumulation and percentage of tests.
- 1.4 Sketches the size and shape of the gas caps with varying percentages of inflammable gas
- 1.5 Determines the percentage of methane using Methanometer
- 1.7 Determines the percentage of CO using CO Detectors (chemicals)
- 1.8 Determines the percentage of other gases using multi-gas detectors

2.0 Coursing of air with ventilation devices

- 2.1 Sketches the ventilation devices
- 2.3 Conducts the ventilation survey for quantity of air using Anemometer, Velometer, Smoke test, Pitot tube
- 2.4 Conducts the ventilation survey for pressure using inclined manometer
- 2.5 Determines the ventilation efficiency quotient (VEQ)
- 2.6 Conducts the qualitative survey for determining the temperature, relative humidity and cooling power of air.
- 2.7 Draws the ventilation plan

3.0 Studies various Rescue and Reviving apparatus used in mines

- 3.1 Identify various rescue and reviving apparatus
- 3.2 Sketch and study self-contained breathing apparatus
- 3.3 Sketch and study gas mark
- 3.4 Sketch and study the self-rescuer used in mines
- 3.5 Sketch and study the dragger Pulmotor reviving apparatus.

Communication Skills

Course Code	Course Title	No. of Periods/Week	Total No. of Periods	Marks for FA	Marks for SA
MNG-408	Communication Skills	3	45	40	60

S. No.	Unit Title	No of Periods	COs Mapped
1	Listening Skills	6	CO1
2	Introducing Oneself	3	CO1, CO2, CO3
3	Short Presentation (JAM)	6	CO1, CO2, CO3
4	Group Discussion	6	CO1, CO2, CO3
5	Preparing Resume with Cover Letter	3	CO3
6	Interview Skills	9	CO1, CO2, CO3
7	Presentation Skills	9	CO1, CO2
8	Work place Etiquette	3	CO1, CO2
Total Periods		45	

Course Objectives	To comprehend the features of communication needed for professional success and display the use of these competently
	To present ideas, opinions in group discussions and presentations on topics of general and technical interest
	To prepare for job selection processes

CO No.	Course Outcomes
CO1	Interacts in academic and social situations by comprehending what is listened to when others speak.
CO2	Demonstrates effective English communication skills while presenting ideas, opinions in group discussions and presentations on topics of general and technical interest.
CO3	Exhibits workplace etiquette relevant in classroom situations for easy adaptation in professional setting in the future.

CO-PO Matrix

Course Code MNG-408	Course Title: English Number of Course Outcomes: 4				No. of Periods: 45
POs	Mapped with CO No.	CO Periods Addressing PO in Column 1		Level of Mapping (1,2,3)	Remarks
		Number	Percentage %		
PO1		Not directly applicable for Communication Skills Course however interactive activities that use content from science and technology relevant to the Programme taken up by the student shall be exploited for communication in the Course.			
PO2					
PO3					
PO4					
PO5	CO1, CO2, CO3	11	25%		>60%: Level 3
PO6	CO1, CO2, CO3	27	60%		16 -59%: Level 2
PO7	CO1, CO2, CO3	7	15%		Up to 15%: Level 1

Level 3 – Strongly Mapped

Level 2- Moderately Mapped

Level 1- Slightly Mapped

Mapping Course Outcomes with Program Outcomes:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1					✓	✓	✓
CO 2					✓	✓	✓
CO3					✓	✓	✓

Blue Print for evaluation based on Course Outcomes for SA:

Note: Every Question based on CO has to be given marks for the following parameters of communication in the rubric.

- Fluency and Coherence
- Lexical Resource (Vocabulary)
- Grammatical Range and Accuracy

***Rubric Descriptors 'Good/ Competent / Fair /Poor' for Communication**

LEVEL OF COMPETENCE	Fluency and Coherence	Lexical Resource (Vocabulary)	Grammatical Range and Accuracy
GOOD (9-10*)	Speaks at length without noticeable effort or loss of coherence. May demonstrate language-related hesitation at times, or some repetition and/or self-correction.	Uses vocabulary resources flexibly during discussion. Uses paraphrase effectively.	Uses a range of complex structures with some flexibility.
	Uses a range of connectives and discourse markers with some flexibility. Articulates and adapts to near naturalization.	Uses some less common vocabulary and shows some awareness of style and collocation	Mostly produces error-free sentences.
COMPETENT (6-8)	Is willing to speak at length, though may lose coherence at times due to occasional repetition, self-correction or hesitation.	Has enough vocabulary to discuss topics and make meaning clear in spite of inappropriacies.	Uses a mix of simple and complex structures, but with limited flexibility.
	Uses a range of connectives and discourse markers but not always appropriately.	Generally paraphrases successfully	May make mistakes with complex structures though these rarely cause comprehension problems.
FAIR (3-5)	Tries to maintain a flow of speech but t uses repetition, self correction and/or slow speech to keep going.	Manages to talk about familiar and unfamiliar topics but uses vocabulary with limited flexibility.	Produces only basic sentence forms, however, errors persist.
	Produces simple speech fluently, but more complex communication causes fluency problems.	Attempts to use paraphrase but with mixed success.	Uses a limited range of more complex structures, but these usually contain errors and may cause some comprehension problems
POOR (0 *-2)	Speaks with long pauses. Pauses lengthy before most words. Merely imitates	Uses simple vocabulary to convey personal information	Attempts basic sentence forms but with limited success, or relies on apparently memorized utterances
	Has limited ability to link simple sentences	Has insufficient vocabulary for less familiar topics	Makes numerous errors except in memorized expressions
	Gives only simple responses and is frequently unable to convey basic message	Only produces isolated words or memorized utterances	Struggles to produce basic sentence forms

s*10 marks to be awarded only if competence level shows flawless expertise in English.

***0 marks to be awarded when student shows incoherence and gives irrelevant responses.**

Blue Print for evaluation based on Course Outcomes for SA of each student:

Note: Marks are awarded for each student as per the Rubric descriptors.

S. No.	Questions based on Course Outcomes	Periods Allocated for practical work	Marks Wise Distribution of Weightage	Marks allotment for each Student in the Rubric*				Mapping of COs
				Poor 0-2	Fair 3-5	Competent 6-8	Good 9-10	
1	Describe the given object in a minute	6	10					CO 2
2	Exchange ideas/ views in a group discussion on _____ issue (academic, technical or social)	6	10					CO1, CO 2
3	Present your ideas /opinions on the given issue/ topic (individual to an audience)	9	10					CO1, CO2, CO 3
4	Role play an imaginary work-place situation	6	10					CO1, CO2, CO 3
5	Individual interaction with the Examiner duly submitting Resume (Facing the Interview) – Introducing oneself and answering questions	12	10					CO1, CO2, CO 3
6	*Listen to and comprehend any audio communication/ content	6	10					CO1, CO2, CO 3
TOTAL		45	60					

***Listen to and comprehend the given audio content:** Giving the Students time to read the questions (Fill in the Blanks, Select from Alternatives, True or False, Table fill, etc.) in chunks before listening to audio inputs also played in chunks.

Blue Print for evaluation based on Course Outcomes for Formative Assessment:

Note: Every Question based on CO has to be given marks for the following parameters in the rubric.

- Fluency and Coherence
- Lexical Resource
- Grammatical Range and Accuracy

S. No.	Questions based on Course Outcomes	Periods Allocated for practical work	Marks Wise Distribution of Weightage	Marks allotment for each Student in the Rubric*				Mapping of COs
				Poor 0-2	Fair 3-5	Competent 6-8	Good 9-10	
Formative Assessment - 1								
1	Describe the given object in a minute	3	10					CO 2
2	Exchange ideas/ views in a group discussion on _____ issue (academic, technical or social)	6	10					CO1, CO 2
3	Present your ideas /opinions on the given issue/ topic (individual to an audience)	6	10					CO1, CO2, CO 3
4	*Listen to and comprehend any audio communication/ content	3	10					CO1, CO2, CO 3
Total		18	40					
Formative Assessment -2								
1	Present your ideas /opinions on the given issue/ topic (individual to an audience)	3	10					
2	Role play an imaginary work-place situation	6	10					CO1, CO2, CO 3
3	Individual interaction with the Examiner duly submitting Resume (Facing the Interview) – Introducing oneself and answering questions	15	10					CO1, CO2, CO 3
4	*Listen to and comprehend any audio communication/ content	3	10					CO1, CO2, CO 3
TOTAL		27	40					

Learning Outcomes

1. Listening Skills:

- 1.1 Listen to audio content (dialogues, interactions, speeches, short presentations) and answer questions based on them
- 1.2 Infer meanings of words / phrases / sentences / after listening to audio content as mentioned above

2. Introducing Oneself:

- 2.1 Prepare a grid different aspects for presentation about a person / oneself
- 2.2 Present a 1 or 2 minute introduction of oneself for an audience

3. Short Presentation:

- 3.1 Define an object
- 3.2 Describe an object, phenomenon, event, people
- 3.3 Speak on a topic randomly chosen

4. Group Discussion:

- 4.1 Practice Group Discussion. Techniques
- 4.2 Participate in group discussions

5. Resume Writing and Cover Letter:

- 5.1 Prepare resumes of different sorts – one's own and others.
- 5.2 Write an effective cover letter that goes with a resume

6. Interview Skills:

- 6.1 Prepare a good Curriculum Vitae
- 6.2 Exhibit acceptable (Greeting, Thanking, Answering questions with confidence)

7. Presentation Skills:

- 7.1 Prepare Posters, Charts, PPT's on issue of general and technical interest
- 7.2 Present one's ideas before an audience with confidence using audio visual aids and answer questions that are raised.

8. Workplace Etiquette:

- 8.1 Show positive attitude & adaptability / appropriate body language to suit the work place.

Display basic of etiquette like politeness, good manners

MINE SURVEYING PRACTICE - II

Course Code	Course Title	No of periods / week	Total no of periods	Marks for FA	Marks for SA
MNG-409	Mine Surveying Practice -II	04	60	40	60

TIME SCHEDULE

S. No.	Major Components	Periods	Mapped CO's
1.	Theodolite Traversing	36	CO1,CO2,CO5
2.	Triangulation	04	CO5
3.	Curve setting	08	CO2,CO5
4.	Tacheometry	12	CO4,CO5
	Total	60	

Course Objectives and Course Outcomes

Course Objectives	<p>Upon completion of the course the student shall be able to:</p> <ul style="list-style-type: none"> -To familiarise with the Theodolite, various operation of theodolite -To familiarize with the concepts of triangulation -To familiarize the methods of curve setting both surface as well as underground mines -To familiarize computation of distance using tacheometry -Hands on experience of various surveying instruments
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Course Outcomes	CO1	Demonstrate various operations of theodolite
	CO2	Compute horizontal and vertical angles
	CO3	Compute the distance and elevation for different conditions
	CO4	Explain Setting out curves by different methods
	CO5	Explain Concept of triangulation

PO-CO Mapping

Course Code: MNG-409		Course Title: Mine Surveying Practice-II			No of Periods: 60
PO No	Mapped with CO no	CO Periods addressing PO in Col 1		Level (1,2,3)	Remarks
		No	%		
PO1	-	-	-	-	>40% Level 3 Highly addressed 25% to 40% Level 2 Moderately addressed 5 to 25% Level 1 Low addressed <5% Not addressed
PO2	-	-	-	-	
PO3	CO2,CO3,CO4	10	17	1	
PO4	CO1,CO2,CO3,CO4	40	66	3	
PO5	-	-	-	-	
PO6	-	-	-	-	
PO7	CO2	10	17	1	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1				3						1
CO2			1	3			1	2		1
CO3			1	3						
CO4			1	3				1		1
CO5										

3: High, 2: Moderate, 1: Low

LEARNING OUTCOMES

Up on Completion of the course the student shall be able to:

1.0 Know the parts, functions and uses of Transit theodolite.

- 1.1 Practices the centering, leveling the theodolite over a station and reads the Vernier.
- 1.2 Practices the measurement of horizontal angle over a station and reads the Vernier.
- 1.3 Practices the prolongation of straight line with theodolite.
- 1.4 Measures the horizontal angle by repetition.
- 1.5 Measures the horizontal angle by reiteration.
- 1.6 Practices the measurement of vertical angle.
- 1.7 Determines the height of pole when its base is inaccessible.
- 1.8 Conducts traverse survey by direct bearing method.
- 1.9 Conducts traverse survey by double foresight method
- 1.10 Plot the traverse by meridian method and rectangular co- ordinate

2.0 Know the Triangulation

- 2.1 Carries out Extension of the given base line.

3.0 Know the Curve Setting

- 3.1 Sets out curve by chord and offset.
- 3.2 Sets out curve by Chord and Angle.

4.0 Know the Tacheometry survey

- 4.1 Determines the tacheometric constants.
- 4.2 Determines the R.L of points by fixed hair method.
- 4.3 Determines the R.L.s of points by tangential method.

MINE PLANNING AND DESIGN LABORATORY PRACTICE

Course Code	Course Title	No of periods / week	Total no of periods	Marks for FA	Marks for SA
MNG-410	Mine Planning and Design Laboratory Practice	03	45	40	60

TIME SCHEDULE

Sl. No	Major topics	Periods	Mapped CO's
1	Drawing of layouts of underground mine	15	CO1
2	Drawing of layouts of open cast mine and blasting design	15	CO2,CO4
3	Calculation of output for surface mine	8	CO2,CO5
4	Design of mine transport for surface mine	7	CO4,CO5
	Total	45	

Course Objectives and Course Outcomes

Course Objectives	<p>Upon completion of the course the student shall be able to:</p> <ul style="list-style-type: none"> - To familiarise with the Underground mine layout - To familiarise with Surface mine layouts - Explain various cross sectional plans of a mine - Output calculation - To familiarize various systems of mine transportations
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Course Outcomes	CO1	Salient features of various plans and sections used in mines
	CO2	Familiarise Various features of Mine plans
	CO3	Explain the systems of transportation of a mine , Estimation of reserves, life of the mine
	CO4	Analyse the features of cross sectional plans
	CO5	Determination of production of mine based on the given data

PO-CO Mapping

Course Code: MNG-410		Course Title: Mine Planning and Design Laboratory Practice			No of Periods: 45
PO No	Mapped with CO no	CO Periods addressing PO in Col 1		Level (1,2,3)	Remarks
		No	%		
PO1	CO1,CO3	13	28.8	2	>40% Level 3 Highly addressed 25% to 40% Level 2 Moderately addressed 5 to 25% Level 1 Low addressed <5% Not addressed
PO2					
PO3	CO1,CO3	20	44.4	3	
PO4					
PO5					
PO6	CO1,CO3	12	26.6	2	
PO7					

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2		3			2			2	1
CO2										
CO3	2		3			2			2	1
CO4										
CO5										

3: High, 2: Moderate, 1: Low

LEARNING OUTCOMES

Up on Completion of the course the student shall be able to:

1.0 Draw the layouts of underground mine

- 1.1 Draw a pit-top & pit Bottom layouts of shaft
- 1.2 Draw a layout of Development of Bord and Pillar mining using LHD
- 1.3 Draw a layout of Depillaring by Bord and Pillar by using SDL
- 1.4 Draw a layout of mechanised long wall advancing by caving/stowing
- 1.5 Draw a layout of mechanised long wall retreatting by caving/stowing
- 1.6 Draw a layout of mechanised Blasting Gallery method
- 1.7 Draw a layout of incline slicing by caving/stowing

2.0 Draw the layouts of surface mine and blasting design

- 2.1 Draw a layout for a surface mine with an output 10,000 tonne/day in a flat deposit. Shovel dumper combination .Assume required data.
- 2.2 Explain and draw the Layout of Dragline mining combinations in opencast mines
- 2.3 Draw the Layout of Bucket wheel excavator combinations in opencast mines
- 2.4 Draw a layout for a surface coal mine with an output of 1000 tonne /day in a deposit having a gradient of 4 degree. Assume your own conditions.
- 2.5 Design of blasting sequence in surface mine.

3.0 Knows Calculate output for surface mine

- 3.1 Calculation of No. of shovels, dumpers, drills require for given output.
- 3.2 Calculation of bucket capacity of the shovel, dragline capacity, Bucket wheel excavator capacity, capacity of the dumper for the above problem.

4.0 Design of Mine transport for surface mine

- 4.1 Draw the transport layout of haul roads in a mechanised surface mine
- 4.2 Draw the sketches of the following machinery
 - a) Shovel b) Bucket wheel excavator c) Surface miner d) Dragline

MINING MACHINERY LABORATORY PRACTICE

Course Code	Course Title	No of periods / week	Total no of periods	Marks for FA	Marks for SA
MNG-411	Mining Machinery Laboratory Practice	03	45	40	60

TIME SCHEDULE

S. No.	Major Components	Periods	Mapped CO's
1.	Rope haulage systems - Equipments	20	CO1,CO2,CO5
2.	Mine pumps	15	CO3,CO4,CO5
3.	Drilling machines and accessories	10	CO2,CO3,CO4,CO5
	Total	45	

Course Objectives and Course Outcomes

Course Objectives	<p>Upon completion of the course the student shall be able to:</p> <ul style="list-style-type: none"> - To familiarise with the rope haulage system used in mines - To familiarise mine pumps - To familiarise various parts of drilling machine - Describe various operations of drilling machines
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Course Outcomes	CO1	Explain constructional details of different wire ropes
	CO2	Describe different haulage system used in underground mines
	CO3	Describe the different safety devices used in haulage system
	CO4	Explain different drilling machinery used in underground mines
	CO5	Explain different types of pumps used in mines

PO-CO Mapping

Course Code: MNG-411		Course Title: Mining Machinery Laboratory Practice			No of Periods: 45
PO No	Mapped with CO no	CO Periods addressing PO in Col 1		Level (1,2,3)	Remarks
		No	%		
PO1	CO1	5	11	1	>40% Level 3 Highly addressed 25% to 40% Level 2 Moderately addressed 5 to 25% Level 1 Low addressed <5% Not addressed
PO2	CO1,CO2,CO3	18	40	3	
PO3	CO1,CO2,CO3	17	38	2	
PO4	CO1	5	11	1	
PO5	-	-	-	-	
PO6	-	-	-	-	
PO7	-	-	-	-	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	1	3	2	1	-	-	-	2	1	1
CO2	-	3	2	-	-	-	-	-	1	1
CO3	-	3	2	-	-	-	-	-	1	1
CO4	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-

3: High, 2: Moderate, 1: Low

LEARNING OUTCOMES

Up on Completion of the course the student shall be able to:

1.0 Rope haulage systems - Equipments

- 1.1 Sketch the direct rope haulage system used in mines and observe the types of motor used, braking system present in it.
- 1.2 Sketch the endless rope haulage system used in mines and also sketch various attaching devices like small man clip
- 1.3 Sketch the various safety devices used in haulage system.
- 1.4 Draw the circuit diagram of signalling system used in Haulages

2.0 Mine pumps

- 2.1 Sketch the reciprocating pump and know about the method of starting and stopping of reciprocating pump
- 2.2 Sketch the centrifugal and turbine pump and observe the functioning of balancing disk

3.0 Drilling machines and accessories

- 3.1 Sketch the electrical coal drill used in mine
- 3.2 Sketch and know the working of sun and planet gear used in coal drill
- 3.3 Sketch the different types of drill rods used in mining.

V SEMESTER

**DIPLOMA IN MINING ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATIONS
V SEMESTER (THIRD YEAR)**

Subject Code	Name of the Subject	Instruction period / week		Total Period / Sem	Scheme of Examination			
		Theory	Practical/Tutorial		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
THEORY								
MNG-501	Mine Management and Entrepreneurship	5	-	75	3	20	80	100
MNG-502	Mine Legislation and Safety	6	-	90	3	20	80	100
MNG-503	Mine Hazards and Rescue	5	-	75	3	20	80	100
MNG-504	Mining machinery-II	6	-	90	3	20	80	100
MNG-505	Rock Mechanics and Strata Control	5	-	75	3	20	80	100
PRACTICAL								
MNG-506 *	Practical Training and Assessment	-	1	7	3	20	30	50
MNG-507	Rock Mechanics Laboratory Practice	-	3	45	3	40	60	100
MNG-508	Life Skills	-	3	45	3	40	60	100
MNG-509	CAD Practice	-	3	45	3	40	60	100
MNG-510	Total station Survey Practice	-	3	45	3	40	60	100
MNG-511	Project Work	-	2	38	3	20	30	50
	TOTAL	27	15	630		300	700	1000

*MNG 506 shall be scheduled for one single day for entire semester while framing the time table for class work

MINE MANAGEMENT AND ENTREPRENEURSHIP

Course Code	Course Title	No of periods / week	Total no of periods	Marks for FA	Marks for SA
MNG-501	Mine Management and Entrepreneurship	05	75	20	80

TIME SCHEDULE

S. No.	Major Topics	Periods	Mapped CO's
1	Mine Management	10	CO1, CO2
2	Entrepreneurship	20	CO2,CO3,CO4,CO5
3	Total Quality Management, Recruitments and Training	20	CO2,CO3,CO4,CO5
4	Network analysis	15	CO3,CO4,CO5
5	Smart Technologies	10	CO4, CO5
	Total	75	

Course Objectives and Course Outcomes

Course Objectives	<p>Upon completion of the course the student shall be able to:</p> <ul style="list-style-type: none"> - Familiarise the concepts of management, ownership styles and organisation structures - Exposure to organisational behavioural concepts, basics of project and operational management - Familiarize the fundamentals of Total Quality Management (TQM). - Familiarize recruitment and training - Explain network analysis and its usage in salvage operation of Mining machinery - Describe the necessity and functioning of smart technologies.
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Course Outcomes	CO1	Explain Basic terminology management, entrepreneurship, network analysis
	CO2	Explain total quality management, recruitment and training
	CO3	Explain network analysis
	CO4	Explain mining operations and transportation
	CO5	Describe the necessity and functioning of smart technologies

PO-CO Mapping

Course Code: MNG-501		Course Title: Mine Management and Entrepreneurship			No of Periods: 75
PO No	Mapped with CO no	CO Periods addressing PO in Col 1		Level (1,2,3)	Remarks
		No	%		
PO1	CO2,CO4	5	6.6	1	>40% Level 3 Highly addressed 25% to 40% Level 2 Moderately Addressed 5 to 25% Level 1 Low addressed <5% Not addressed
PO 2	CO4	5	6.6	1	
PO 3	CO1,CO2,CO3	23	30.6	2	
PO 4	CO2,CO5	10	13.3	1	
PO 5	CO1,CO3	16	21.3	1	
PO 6	CO1	16	21.3	1	
PO 7					

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1			2		1	1		2	1	
CO2	1		2	1				2	1	
CO3			2		1			1	1	
CO4	1	1						2		
CO5				1				1		

3: High, 2: Moderate, 1: Low

Learning Outcomes

Upon completion of the course, student shall be able to:

1.0 Know Principle of Management applied to mining Industry.

- 1.1 State the role of Mining Industry in economic development of our country.
- 1.2 State the Applicability of different types of ownership of Industries with reference to mining.
- 1.3 Define the term Management
- 1.4 Explain the different functions of Management
- 1.5 State the Principle of Scientific Management
- 1.6 List its characteristics of Scientific Management.
- 1.7 Define the term organisation
- 1.8 List the different departments in Mining Industry.
- 1.9 Draw the organisation chart of a conventional Underground mine
- 1.10 Draw the organisation chart of a mechanised Long wall mine
- 1.11 Draw the organisation chart of a mechanised Opencast mine.

2.0 Understand Entrepreneurship and organisational structure

- 2.1 Define the term Entrepreneurship and Explain the concepts of Entrepreneurship
- 2.2 List the factors that motivate entrepreneur
- 2.3 State the risks and rewards encountered by an entrepreneur in respect of finance, career, personality and requirements of an entrepreneur
- 2.4 Explain the Maslow's theory of motivation
- 2.5 Explain Traits theory of leadership and Behavioural theory of leadership
- 2.6 Explain the method of product and site selection
- 2.7 Explain decision making and communication process
- 2.8 List the financial assistance programs
- 2.9 Explain the role of banks in the development of entrepreneur
- 2.10 State the statutory requirement in setting up a mining industry
- 2.11 Conduct demand and market surveys
- 2.12 Explain the Break even Analysis , terminology used in Break even analysis and numerical problems on Break even analysis

3.0 Total Quality Management, Recruitments and Training

- 3.1 Define the total quality management, concept of quality
- 3.2 List the quality systems and elements of quality systems
- 3.3 State the principles of quality assurance
- 3.4 Understand the basic concepts of TQM, pillars of TQM and Indian standards on quality systems
- 3.5 List the evolution of ISO standards
- 3.6 Discuss ISO standards along with constituents of ISO 9000 series of quality systems, outstanding features and drawbacks of ISO 9000 series of standards.
- 3.7 List the beneficiaries of ISO 9000.
- 3.8 Explain the concept of ISO 14000
- 3.9 Define the term recruitment and training
- 3.10 State various methods of recruitment process.
- 3.11 State Essential Qualification of persons recruited in mines under various category.
- 3.12 Explain different category training as per VTC Rules and various training programmes

4.0 Network analysis

- 4.1 Define network analysis
- 4.2 State the objectives of network analysis
- 4.3 Define the various terms CPM, Activity, Predecessor event, Merge and burst event, dummy activity
- 4.4 List the guide lines for construction of network diagrams
- 4.5 List the merits and demerits of CPM
- 4.6 Solve simple problems on CPM
- 4.7 Define the term PERT
- 4.8 List the time estimate in PERT
- 4.9 State the methodology of PERT
- 4.10 List the merits and demerits of PERT
- 4.11 Compare PERT Vs CPM
- 4.12 Solve the simple problems on PERT

5.0 Knows the Smart Technologies

- 5.1 Understand the overview of Internet of Things(IoT)
- 5.2 Define the term IoT, principle of working of IoT and key features of IoT
- 5.3 List the components of IoT (hardware, software, technology and protocols)

- 5.4 List the advantages and disadvantages of IoT, applications of IoT in various fields of engineering
- 5.5 Mention the application of IoT in Smart Cities
- 5.6 State the application of IoT in Smart Energy and the Smart Grid
- 5.7 Mention the application of IoT in Smart Transportation and Mobility
- 5.8 State the application of IoT in Smart Home, Smart Buildings and Infrastructure
- 5.9 Mention the application of IoT in Smart Factory and Smart Manufacturing
- 5.10 Mention the application of IoT in Smart Health
- 5.11 Mention the application of IoT in Food and Water Tracking and Security
- 5.12 Mention the application of IoT in Social Networks and IoT

COURSE CONTENTS:

1. **Mine management**
Role of mining Industry in country's economic development, ownerships of Industries, Management, organisation, in the context of mining Industry.
2. **Entrepreneurship and organisational structure**
Motivating factors, Risks and Rewards, requirements of entrepreneur, products selection. site solution, , setting of a Mine-Theory of motivation-Leader ship-Decision making process-communication process- Market survey., Demand survey techno-economic-Break even analysis.
3. **Total Quality Management, Recruitments and training**
Definition of TQM-concept of quality- quality systems and elements of quality systems- principles of quality assurance- constituents of ISO 9000 series-Merits and drawbacks of ISO-Indian standards of Quality system - Recruitment and training, Methods of recruitment - Essential Quality of person different category training as per VTC Rules - Training programmes
4. **Network analysis**
Definition and Objectives of network analysis-construction of network diagrams-Definitions of various terms-Merits and demerits of CPM-Simple problems on CPM-PERT-Definition, methodology, time estimates –Simple problems on PERT-Compression CPM Vs PERT
5. **Knows the Smart Technologies**
Overview of Internet of Things (IoT)-working principle - key features -- components - advantages and disadvantages of IoT-applications of IoT in various fields of engineering

REFERENCE BOOKS:

- | | | |
|---|---|------------|
| 1. Mine Management, Legislation and Ground safety | : | S.Ghattak. |
| 2. Mine Management | : | V.N.Singh |
| 3. Industrial Management | : | O.P.Khanna |

Blue Print of a Question Paper

S. No	Chapter Name	Periods Allocated	Weightage Allocated	Marks Wise Distribution of Weightage				Question Wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	Mine Management	10	14	03	03	08		01	01	01		CO1
2	Entrepreneurship	20	14	03	03	08		01	01	01		CO1
3	Total Quality Management, Recruitments and Training	20	14	03	03		08	01	01		01	CO3
4	Network analysis	15	14	03	03	08		01	01	01		CO2,CO4
5	Smart Technologies	10	14	03	03	08		01	01	01		CO1,CO2,CO3
Higher order question from any chapters			10				10				01	CO3
TOTAL		75	80	15	15	32	18	05	05	04	02	

R-Remember; U-Understanding; Ap -Application ; An- Analyzing

Table Specifying the scope of syllabus to be covered for Unit Tests

Unit Test	Learning outcomes to covered
Unit Test -I	From 1.1 to 3.5
Unit Test –II	From 3.6 to 5.12

Model Paper for Unit Test-I :

State Board of Technical Education and Training, A.P.

Diploma in Mining Engineering (DMNGE)

Fifth semester :: MNG-501 Mine Management and Entrepreneurship

Time: 90 Minutes

Unit Test –I

Maximum Marks : 40

PART- A

16 Marks

Instructions :

(i) Answer all questions

(ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1. (a) Organisation is a tool of Management

– True/False (CO1)

(b) Demand survey is the process of knowing the demand of a particular product which is intended to manufacture

---- True/False (CO1)

(c) Industry plays a vital role in the development of _____ of any country (CO3)

(d) The details gathered from various Feasibility Studies are presented in the form of a report called _____ . (CO2)

2. Define the term Management (CO1)

3. List the different departments in Mining Industry (CO1)

4. List the factors that motivate entrepreneur (CO2)

5. Define the total quality management, concept of quality (CO3)

PART- B

3 x 8 = 24 Marks

Instructions :

(i) Answer all questions

(ii) Each question carries EIGHT marks

(iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A) Explain the different functions of Management (CO1)

(OR)

(B) Draw the organisation chart of a mechanised Opencast mine (CO1)

7. (A) Explain the Maslow's theory of motivation (CO3)

(OR)

(B) Explain Traits theory of leadership and Behavioural theory of leadership (CO2)

8. (A) Explain the method of product and site selection (CO2)

(OR)

(B) Explain decision making and communication process (CO3)

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Model Paper for Unit Test-II :

State Board of Technical Education and Training, A.P.

Diploma in Mining Engineering (DMNGE)

Fifth semester :: MNG-501 Mine Management and Entrepreneurship

Time: 90 Minutes

Unit Test –II

Maximum Marks : 40

PART- A

16 Marks

Instructions :

(i) Answer all questions

(ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1.(a) IoT means Internet of Things

– True/False (CO1)

(b) It is the process of selecting the different category of persons to the different posts by adopting some procedure

---- True/False (CO1)

(c) 5 S principles are developed in _____ (CO3)

(d) The vocabulary on quality system is defined in ____ . (CO2)

2. State various methods of recruitment process (CO1)

3. Define the various terms a) Activity b) Predecessor event (CO1)

4. List the time estimate in PERT (CO2)

5. Define the terms a) IoT b) principle of working of IoT (CO3)

PART- B

3 x 8 = 24 Marks

Instructions :

(i) Answer all questions

(ii) Each question carries EIGHT marks

(iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A) Explain the concept of ISO 14000 (CO1)

(OR)

(B) Explain different category training as per VTC Rules and various training programmes (CO1)

7. (A) List the merits and demerits of PERT (CO3)

(OR)

(B) Compare PERT Vs CPM (CO2)

8. (A) State the application of IoT in Smart Factory and Smart Manufacturing (CO2)

(OR)

(B) State the application of IoT in Smart Home, Smart Buildings and Infrastructure (CO3)

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**BOARD DIPLOMA EXAMINATION,
D.MNG.E. – V SEMESTER EXAMINATION
MINE MANAGEMENT AND ENTREPRENEURSHIP**

Time : 3 Hours

Total Marks: 80

PART – A**10 X 3 = 30**

Instructions: *Part A consists of 10 questions. Answer all questions and each question carries three marks.*

1. Define the terms a) Management b) organisation (CO1)
2. List its characteristics of Scientific Management (CO2)
3. List the factors that motivate entrepreneur (CO2)
4. List the financial assistance programs (CO2)
5. Define the total quality management (CO1)
6. Define the term recruitment and training (CO1)
7. Define network analysis (CO1)
8. List the time estimate in PERT (CO4)
9. Define the term IoT (CO1)
10. List the key features of IoT (CO1)

PART – B**5 X 8 = 40**

Instructions: *Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 8 marks and may have sub questions.*

11. A) Explain the different functions of Management. (CO2)
(OR)
B) Draw the organisation chart of a mechanised Opencast mine (CO3)
12. A) Explain the role of banks in the development of entrepreneur. (CO2)
(OR)
B) Explain the terminology used in Break-even Analysis (CO3)
13. A) Discuss ISO standards and list the constituents of ISO 9000 series of quality systems (CO2)
(OR)
B) Explain different category training as per VTC Rules (CO1)
14. A) List the merits and demerits of CPM (CO2)
(OR)
B) List the merits and demerits of PERT (CO2)
15. A) List the advantages and disadvantages of IoT. (CO1)
(OR)
B) State the application of IoT in Smart Home, Smart Buildings and Infrastructure (CO5)

PART – C

Instructions: *Part C consists of 1 question which carries 10 marks.*

1X 10 = 10

16. Construct the network diagram and find

a) Critical path(b) Expected time to build the plant. By using the given data (CO4)

Activity	1-2	2-3	3-6	2-4	1-5	5-6	4-6	5-7	7-8	6-8
Duration (days)	6	4	5	8	4	7	11	9	12	3

MINE LEGISLATION AND SAFETY

Course Code	Course Title	No of periods / week	Total no of periods	Marks for FA	Marks for SA
MNG-502	Mine Legislation and Safety	06	90	20	80

TIME SCHEDULE

S. No.	Major Topics	Periods	Mapping CO's
1	Mines Act 1952, and Mines Rules 1955	14	CO1
2	Coal Mines Regulations, 2017 and Metalliferous Mines Regulations, 1960- I	20	CO2, CO5
3	Coal Mines Regulations, 2017 and Metalliferous Mines Regulations, 1960- II	20	CO2, CO5
4	The Mines and Minerals (Development and Regulation) Act, 1957 Mineral Concession Rules, 1960	20	CO4
5	Industrial Dispute Act-1947 and Mine safety	16	CO2
	Total	90	

Course Objectives and Course Outcomes

Course Objectives	<p>Upon completion of the course the student shall be able to:</p> <ul style="list-style-type: none"> - Explain the acts and rules used in mines and provisions related to them - Explain the importance of Coal mines regulations -2017 and various provisions - Explain the importance of Metalliferous Mines Regulations - Describe the scope and importance of Mines and Minerals Development act 1957, and Mineral concession rules 1960 - Explain Industrial Dispute Act 1947
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Course Outcomes	CO1	Explain mines act and mine rules
	CO2	Explain application of coal mines regulations
	CO3	Explain application of metalliferous mines regulations
	CO4	Explain application of Mines and Mineral concession rules
	CO5	Explain Industrial Dispute Act 1947

PO-CO Mapping

Course Code: 502		Course Title: Mine Legislation and safety			No of Periods: 90	
PO No	Mapped with CO no	CO Periods addressing PO in Col 1		Level (1,2,3)	Remarks	
		No	%			
PO1	-	-	-	-	>40% Level 3 Highly addressed	Level 3 Highly addressed
PO 2	CO1,CO3,CO5	40	44.4	3		
PO 3	CO1,CO3,CO5	24	26.6	2		
PO 4	CO1,CO3,CO5	24	26.6	2		
PO 5	-	-	-	-	5 to 25% Level 1 Low addressed	Level 1 Low addressed
PO 6	CO5	2	2.4	-		
PO 7	-				<5%	Not addressed

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1		3	2	2					2	1
CO2										
CO3		3	2	2					2	1
CO4										
CO5		3	2	2					2	1

3: High, 2: Moderate, 1: Low

LEARNING OUTCOMES

Upon completion of the course, student shall be able to

1.0 Mine Act 1952 and Mine Rules 1955

- 1.1
 - a) State the necessity of Mine Legislation
 - b) List the different laws applicable to mines-(Mines Act 1952, Mines Rules 1955, Coal Mines Regulations 2017 and Metalliferous Mines Regulations 1961, Mines Vocational Training Rules, 1966, Mines Crush Rules, 1966, Oil Mines Regulations 1984, Mineral Concession Rules 1960, Mines and Minerals (Reg. & Dev.) Act 1957, Granite Conservation and Development Rules 1999, Indian Electricity Rules 1956)
- 1.2 State the areas of application and date of commencement short title and extent of mines Act, important terms of Mines Act
- 1.3 Define the term Adult, Agent, Chief Inspector, Employer, Inspector, Relay and Shift, Serious bodily injury, reportable injury
- 1.4 List the situations exempted from application of the Mines Act
- 1.5 List the provisions related to the drinking water.
- 1.6 List the provisions of Act in respect of notice to be given about accidents
- 1.7 List the provisions related to hours and limitations of employment above ground
- 1.8 List the provisions related to hours of work below ground and above ground

- 1.9 List the provisions of limitations of daily hours of work including overtime
- 1.10 Enumerates the provisions of Act, related to leave wages, related to drinking water
- 1.11 Define the terms, leave, calendar year, certifying surgeon, court of enquiry
- 1.12 List the rules related to First Aid, Medical appliances

2.0 Know the provisions of CMR -2017/MMR -1961 – Part I

- 2.1 Define the terms; approved safety lamp, Banks man, competent person, machinery, Ventilating District, Working place
- 2.2 Know the other terms limited to CMR only.
Define the terms shot firer, over man, assistant or under manager, on setter, fiery seam flame proof apparatus, gassy seam of first, second and third degree, General body of air
- 2.3 Know the other terms limited to M.M.R. only.
Define the terms Assistant Manager, Underground Manager, Blasters, Bell man, Single Man, Metalliferous Mine, Mine foremen, Mine mate.
- 2.4 List the duties and responsibilities of manager, Safety officer, Oven-man under CMR/MMR
- 2.5 List the provisions related to Haulage roads, travelling road ways under CMR/MMR
- 2.6 List the provisions related to open cast working under CMR/MMR
- 2.7 List the provisions related to workings near mine boundaries, setting of supports under CMR/MMR
- 2.8 List the provisions related to steep workings, development, depillaring under CMR
- 2.9 List the provisions related to extractions of coal by method other than the bord and pillar system, Multi sections and contiguous seams under CMR
- 2.10 List the provisions related to workings under railways roads, systematic timbering rules under CMR/MMR
- 2.11 List the provisions related to precautions after a fire has broken out, general precautions against fire, surface precautions against fire under CMR/MMR
- 2.12 List the provisions related to precaution against dust , eruption of gas , dangers from surface water under CMR/MMR
- 2.13 List the provisions related to dangers from underground inundation, intentional flooding under CMR/MMR

3.0 Know the provisions of CMR -2017/MMR -1961 - Part II

- 3.1 List the provisions related to underground precautions against fire under CMR/MMR
- 3.2 List the provisions related to further precautions against spontaneous heating, precautions after a fire has broken out under CMR/MMR
- 3.3 List the provisions related to equipment, precautions for fire fighting under CMR/MMR
- 3.4 Know the provisions related to standards of ventilation under CMR/MMR
- 3.5 List the precautions against gas during dewatering and reopening under CMR/MMR
- 3.6 List the precautions against inflammable gases and noxious gases under CMR
- 3.7 Determination of percentage of inflammable gas and of, environment conditions, general precautions in gassy, Mines, Management etc., of gassy mines under CMR/MMR
- 3.8 List the provisions related to storage of explosives, magazines and transport of explosives under CMR/MMR
- 3.9 List the provisions reserve station, drilling, charging stemming. Shot holes electrical shot firing under CMR/MMR
- 3.10 List the provisions related to inspections before shot firing , after shot firing and misfires under CMR/MMR

- 3.11 List the provisions related to additional precautions in gassy mines, stone drifts under CMR/MMR
- 3.12 List the provisions to use, and maintenance of protective footwear, supply of helmets under CMR/MMR
- 3.13 List the provisions related to use and supply of other protective equipment. under CMR/MMR

4.0 Knows about the Mines and Minerals (Development and Regulation) Act-1957 and Mineral Concession Rules-1960

- 4.1 Define the terms- Mining Lease, Minor minerals, Prospecting license and reconnaissance permit as per MMDR Act, 1957.
- 4.2 List the provisions related to Prospecting or mining operations to be under licence or lease as per MMDR Act, 1957.
- 4.3 List the provisions related to Restrictions on the grant of prospecting licences or mining leases as per MMDR Act, 1957.
- 4.4 List the provisions related to application of prospecting licences or mining leases as per MMDR Act, 1957.
- 4.5 List the provisions related to Application for reconnaissance permit as per Mineral Concession Rules, 1960
- 4.6 List the provisions related to Application for prospecting licence and its renewal as per Mineral Concession Rules, 1960
- 4.7 List the provisions related to Applications for grant of mining leases as per Mineral Concession Rules, 1960
- 4.8 List the provisions related to Renewal of mining lease as per Mineral Concession Rules, 1960

5.0 Know the Industrial Dispute Act-1947 and importance of safety in mines

- 5.1 Define the term Industrial Dispute act-1947
- 5.2 State various causes and adverse effects of Industrial Dispute, various provisions of ID act
- 5.3 List the provisions related to Strike, lockout
- 5.4 Define the terms-safety, unsafe act, unsafe conditions, safety campaign, safety awareness.
- 5.5 Define the term 'Accidents', 'Injury', serious bodily injury, Accidents rate.
- 5.6 List direct losses (costs) and indirect losses (costs) due to accidents in mines.
- 5.7 Classify accidents in mines basing on causes, responsibility, and place wise, degree of severity, category wise, age wise, shift wise and time wise.
- 5.8 Explain the importance of safety in mines, factors influencing safety in mines
- 5.9 Explain the need of vocational training to promote safety.
- 5.10 Describe pit safety committee.
- 5.11 State the term of office, scope and functions of pit safety committee.
- 5.12 Explain safety organization at pit level.

COURSE CONTENTS:

1.0 Mines Act 1952 and Mines Rules 1955

Meaning of the terms, Mine Act, Regulations, Rules, Bye-laws, standing orders, and situations under which act does not apply. Provisions of Mines Act in respect of Drinking water health and hygiene conservancy, Medical Appliances, Hour and limitations of Employment - Leave with wages.

Mine Rules related to drinking water, lavatories, urinals with on surface and in underground first aid, - Ambulance, Hours, and limitations of Employment - leave with wages - with wages and over time.

2.0 Coal Mines and Metalliferous Mines Regulations Part -I

Important definitions, regulations related to notice of accidents duties of managers, Asst/under Managers, Overman, foreman and surveyor, Mine plans and sections. Means of Access and egress ladder and Ladder ways under M.M.R. Transport of men and material by Haulage mine

3.0 Coal Mines and Metalliferous Mines Regulations Part -II

Working precautions against dangers from gas and water Mine ventilation, mine lighting and safety equipment and types of fences(Miscellaneous)

4.0 Knows about The Mines and Minerals (Development and Regulation) Act, 1957 and Mineral Concession Rules, 1960

Define the terms- Mining Lease, Minor minerals, Prospecting license and reconnaissance permit as per MMDR Act, 1957-Lit the provisions related to Prospecting or mining operations to be under licence or lease , Restrictions on the grant of prospecting licences or mining leases , application of prospecting licences or mining leases as per MMDR Act, 1957. - List the provisions related to Application for reconnaissance permit --Application for prospecting licence and its renewal - Applications for grant of mining leases as per Mineral Concession Rules, 1960-Renewal of mining lease as per Mineral Concession Rules, 1960.

5.0 Industrial Dispute Act-1947 and Importance of Safety in mines

Industrial Dispute act-1947, causes f or Industrial Dispute adverse effects for Industrial Dispute various provisions of ID act -strike and lockout-Define the terms-safety, unsafe act, unsafe conditions, safety campaign, safety awareness.- importance of safety in mines- factors that influence safety in mines- need of vocational training to promote safety-mine safety week celebrations- pit safety committee- term of office, scope and functions of pit safety committee- safety organization at pit level-Define the term 'Accidents',' Injury', serious bodily injury, Accidents rate- direct losses (costs) and indirect losses (costs) due to accidents- Classify accidents in mines basing on causes, responsibility, place wise, degree of severity, category wise, age wise, shift wise and time wise- Pit safety committee.

REFERENCE BOOKS:

1. Mine Management, Legislation and Ground safety : S.Ghattak.
2. Mines act 1952
3. Mines rules 1955
4. CMR/MMR 1957 / 61
5. Critical Appraisal : Rakesh& Prasad

Blue Print of a Question Paper

S. No	Chapter Name	Periods Allocated	Weightage Allocated	Marks Wise Distribution of Weightage				Question Wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	Mines Act 1952, Mines Rules 1955	14	17	03	06	08		01	02	01		CO1,CO3
2	Coal Mines Regulations, 2017 and Metalliferous Mines Regulations, 1960- Part –I	20	14	03	03	08		01	01	01		CO1,CO3,C O5
3	Coal Mines Regulations, 2017 and Metalliferous Mines Regulations, 1960- Part –II	20	11		03	08			01	01		CO3,CO5
3	The Mines and Minerals (Development and Regulation) Act, 1957 Mineral Concession Rules, 1960	20	14	03	03	08		01	01	01		CO1,CO3
4	Industrial Dispute Act-1947and Mine safety	16	14	03	03	08		01	01	01		CO3
Higher order question from any chapters			10				10				01	CO5
TOTAL		90	80	12	18	40	10	04	06	05	01	

R-Remember; U-Understanding; Ap-Application ;An- Analysing

Table Specifying the scope of syllabus to be covered for Unit Tests

Unit Test	Learning outcomes to covered
Unit Test -I	From 1.1 to 3.5
Unit Test –II	From 3.6 to 5.12

Model Paper for Unit Test-I :

**State Board of Technical Education and Training, A.P.
Diploma in Mining Engineering (DMNGE)
Fifth semester :: MNG-502 Mine Legislation and Safety**

Time: 90 Minutes

Unit Test –I

Maximum Marks : 40

PART- A

16 Marks

Instructions :

- (i) Answer all questions
- (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

- 1.(a) Court of enquiry means a court of inquiry appointed under section 24 of the Act
– True/False (CO1)
- (b) The Competent person means a person who has attained the age of 17 years
---- True/False (CO1)
- (c) The water points shall not be with in washing place _____meters (CO3)
- (d) Indian electricity rules _____. (CO2)
2. State the necessity of Mine Legislation (CO1)
3. Define the terms a) approved safety lamp b) Banks man (CO1)
4. Define the terms a) leave b) calendar year (CO1)
5. Define the terms a) shot firer b) over man (CO1)

PART- B

3 x 8 = 24 Marks

Instructions :

- (i) Answer all questions
- (ii) Each question carries EIGHT marks
- (iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A) List the provisions of Act in respect of notice to be given about accidents (CO2)
(OR)
- (B) List the provisions related to hours and limitations of employment above ground (CO1)
7. (A)List the duties and responsibilities of manager (CO3)
(OR)
- (B) List the provisions related to Haulage roads under CMR (CO2)
8. (A) List the provisions related to open cast working under CMR (CO2)
(OR)
- (B) List the provisions related to underground precautions against fire under CMR/MMR (CO3)

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Model Paper for Unit Test-II :

**State Board of Technical Education and Training, A.P.
Diploma in Mining Engineering (DMNGE)**

Fifth semester :: MNG-502 Mine Legislation and Safety

Time: 90 Minutes

Unit Test –II

Maximum Marks : 40

PART- A

16 Marks

Instructions :

- (i) Answer all questions
- (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1.(a) If any dispute arises as to the life of any protective equipment, it shall be referred to the chief inspector for decision

– True/False (CO1)

(b) Z.A.P means Zero accident power

---- True/False (CO1)

(c) The percentage of inflammable gas does not exceed _____ in the general body of the return air (CO3)

(d) Masonry or other adequate protection against fire, for a distance of not less than ____ metres in every direction from the fan. (CO2)

2. List the provisions to use, and maintenance of protective footwear (CO1)

3. Define the terms- Mining Lease, Minor minerals (CO1)

4. Define the terms-safety, unsafe act (CO1)

5. Define the term Industrial Dispute act-1947 (CO1)

PART- B

3 x 8 = 24 Marks

Instructions :

- (i) Answer all questions
- (ii) Each question carries EIGHT mark
- (iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A) List the precautions against inflammable gases and noxious gases under CMR (CO1)
(OR)

(B) List the provisions related to storage of explosives, magazines and transport of explosives under CMR/MMR (CO2)

7. (A) List the provisions related to Restrictions on the grant of prospecting licences or mining leases as per MMDR Act, 1957 (CO3)

(OR)

(B) List the provisions related to application of prospecting licences or mining leases as per MMDR Act,1957 (CO2)

8. (A) Explain the need of vocational training to promote safety (CO2)

(OR)

(B) Explain the importance of safety in mines (CO5)

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**BOARD DIPLOMA EXAMINATION,
D.MNG.E. –V SEMESTER EXAMINATION
MINE LEGISLATION AND SAFETY**

Time : 3 Hours

Total Marks: **80****PART – A****10 X3 = 30**

Instructions: Part A consists of **10** questions. Answer **all** questions and each question carries **three** marks.

1. Define the terms a) Adult b) Agent (CO1)
2. List the different laws applicable to mines (CO2)
3. List the provisions of limitations of daily hours of work including overtime (CO1)
4. Define the terms a) approved safety lamp b) Banks man (CO1)
5. List the provisions related to workings under railways roads under CMR (CO2)
6. List the provisions related to use and supply of helmets under CMR (CO1)
7. Define the term Industrial Dispute act-1947 (CO1)
8. List the provisions related to Lockout (CO4)
9. Define the terms a) Mining Lease b) Minor minerals (CO1)
10. Define the term a) Accidents b) Injury (CO1)

PART – B**5 X 8 = 40**

Instructions: Part B consists of **5** Units. Answer any one full question from each unit. Each question carries 8 marks and may have sub questions.

11. A) List the situations exempted from application of the Mines Act (CO1)
(OR)
B) List the rules related to Medical appliances (CO2)
12. A) List the duties and responsibilities of manager under CMR/MMR (CO5)
(OR)
B) List the provisions related to open cast working under CMR/MMR (CO4)
13. A) List the precautions against inflammable gases and noxious gases under CMR (CO2)
(OR)
B) List the provisions related to inspections after shot firing misfires under CMR/MMR (CO1)
14. A) List the provisions related to Prospecting or mining operations to be under licence or lease as per MMDR Act, 1957 (CO4)
(OR)
B) List the provisions related to Renewal of mining lease as per Mineral Concession Rules, 1960 (CO4)
15. A) Explain safety organization at pit level (CO1)
(OR)
B) Explain the need of vocational training to promote safety (CO2)

PART – C**1X 10 = 10**

Instructions: Part C consists of **1** question which carries 10 marks.

16. List the provisions reserve station, drilling, charging stemming under CMR/MMR (CO5)

MINE HAZARDS AND RESCUE

Course Code	Course Title	No of periods / week	Total no of periods	Marks for FA	Marks for SA
MNG-503	Mine Hazards and Rescue	05	75	20	80

TIME SCHEDULE

S. No	Major Topics	No. of Periods	Mapped CO's
1	Mine Fires	15	CO1,CO2
2	Mine Explosions and Inundation	20	CO3,CO4
3	Miner's diseases	15	CO2,CO5
4	Rescue and recovery	15	CO5
5	Gas detectors	10	CO3,CO4
	Total	75	

Course Objectives and Course Outcomes:

Course Objectives	<p>Upon completion of the course the student shall be able to:</p> <ul style="list-style-type: none"> - Explain various sources of mine fires, causes, preventive measures - Explain different types of explosions, causes, preventive measures - Describe inundation, safety provisions - Familiarize different types of miners diseases, - Describe the usage of different gas detectors, - Familiarize various rescue apparatus and recovery procedure
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Course Outcomes	CO1	Explain various sources of mine fires, causes, preventive measures
	CO2	Explain different types of explosions, causes, preventive measures
	CO3	Describe inundation, safety provisions
	CO4	Familiarize different types of miners diseases
	CO5	Describe different gas detectors, rescue apparatus and recovery procedure

PO-CO Mapping:

Course Code: MNG-503		Course Title: Mine Hazards and Rescue			No of Periods: 75
PO No	Mapped with CO no	CO Periods addressing PO in Column 1		Level (1,2,3)	Remarks
		No	%		
PO1	CO2	8	10.6	1	>40% Level 3 Highly addressed 25 to 40% Level 2 Moderately addressed 5 to 25% Level 1 Low addressed <5% Not addressed
PO2	CO1,CO2,CO3	41	54.6	3	
PO3	CO2	7	9.3	1	
PO4	CO1,CO2	19	25.3	2	
PO5	-	-	-	-	
PO6	-	-	-	-	
PO7	-	-	-	-	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	-	3	-	2	-	-	-	-	1	1
CO2	1	3	1	2	-	-	-	2	1	1
CO3	-	3	-	-	-	-	-	-	-	1
CO4	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-

3: High, 2: Moderate, 1: Low

LEARNING OUTCOMES

Upon on completion of the course the student shall be able to:

1.0 Mine Fires

- 1.1 Define mine fires and list the types of mine fires.
- 1.2 List the causes and preventive measures of surface and underground mine fires
- 1.3 Explain the term 'Spontaneous heating' and list the signs of spontaneous heating
- 1.4 List the factors for developing spontaneous heating.
- 1.5 List the causes and preventive measures of spontaneous heating
- 1.6 List and explain different methods of dealing with fires and their applicability
- 1.7 Explain the procedure of permanent sealing of fire in I,II, III degree gassy mines.
- 1.8 Explain the method of collecting samples behind the Fire Seals
- 1.9 Calculate the CO/O₂ and CO₂/O₂ deficiency ratio
- 1.10 Describe and interpret the Coward diagram for finding the explosibility of methane air mixture.
- 1.11 List and explain the different methods of re-opening of sealed off areas.
- 1.12 List different fire fighting equipment and describe it in fire fighting organisation

2.0 Mine Explosions and Inundation

- 2.1 Define mine explosion and list the different types of mine explosions.
- 2.2 List the causes and preventive measures of fire damp and coal dust explosions.
- 2.3 Explain the method of treating the coal dust.
- 2.4 Explain the purpose of construction of stone dust barriers and their locations.
- 2.5 State the application and functions of water barriers.
- 2.6 Classify the sources of water in mines.
- 2.7 List the precautions against inundation due to surface and underground water.
- 2.8 List the precautions to be taken while approaching water logged area with sketch.
- 2.9 Explain the function and the use of Burnside safety boring apparatus.
- 2.10 List the different types of dams and state the purpose and applicability of water dams in mines.
- 2.11 Describe the constructional details of sump and barriers.

3.0 Miner's diseases

- 3.1 Explain about various forms of pollution due to mining and explain about control methods.
- 3.2 List various miner's diseases.
- 3.3 List the causes, symptoms and treatment of miner's Jaundice and Ankylostomiasis.
- 3.4 List the causes, symptoms and treatment of Nystagmus.
- 3.5 Define the term pneumoconiosis and list the causes, symptoms and precautions against pneumoconiosis.
- 3.6 List the causes, symptoms and precautions against Asbestosis and Silicosis.
- 3.7 List the causes, symptoms and precautions against Siderosis and manganese poisoning.
- 3.8 List the causes, symptoms and precautions against lead poisoning and chromium poisoning.
- 3.9 List the causes, adverse effects and control of diseases due to radioactive minerals.

4.0 Rescue and recovery

- 4.1 Define the terms rescue and recovery.
- 4.2 List the situations requiring rescue operations.
- 4.3 Classify rescue apparatus.
- 4.4 Explain the constructional details and principle of working of compressed oxygen self-contained breathing apparatus.
- 4.5 Describe the constructional details of smoke helmet and state the purpose of it.
- 4.6 Describe the constructional details of gas mask and state the purpose of it.
- 4.7 Explain the functions of self-rescuer.
- 4.8 Define resuscitation.
- 4.9 State the purpose of resuscitation apparatus and rescue station.
- 4.10 List the equipment required to be kept in mine rescue station.
- 4.11 Describe rescue operations at mine level.

5.0 Gas detectors

- 5.1 Classifies the different methods of gas detection.
- 5.2 Explain the principles on which the detectors are developed or designed.
- 5.3 List the recent techniques of gas detection (remote sensing devices, continuous recorders, remote monitoring, infrared spectrometer and sensors).
- 5.4 List the method of CO detectors.
- 5.5 Explain the method of CO detection by warm blooded creature.
- 5.6 Explain the method of detection CO by chemical detectors.
- 5.7 List and explain the methods of detecting CH₄.
- 5.8 Explain the multi gas detector and its use.

COURSE CONTENT

1.0 Mine fires

Classification, causes, preventive measures, spontaneous heating- causes and preventive measures. Different methods of dealing with fire Permanent sealing of Fire. Collection of samples behind fire seals – Interpretation of samples – Coward's diagram, calculation of CO/O₂ deficiency ratios, reopening of sealed off areas Fire fighting equipment and organisation- Nitrogen infusion

2.0 Mine Explosions and Inundation

Types of mine explosions-Causes and preventive measures, coal dust explosion-causes and preventive measures, Treating coal dust by watering and stone dust barriers – water barriers - Inundation in mines-dangers different sources of water-precautions against surface and underground water-precautions-while approaching water logged area - Burn side safety boring apparatus - purpose of dams. - Design of a dam construction of concrete dam. Accident due to Inundation.

3.0 Miner's diseases

Various forms of environmental pollution due to mining- various forms of pollution due to mining- pollution control methods- various miners' diseases- causes, symptoms and treatment of miner's Jaundice- causes, symptoms and treatment of Ankylostomiasis- causes, symptoms and treatment of Nystagmus-pneumoconiosis- causes, symptoms and precautions against Pneumoconiosis- causes, symptoms and precautions against Asbestosis-causes, symptoms and precautions against Silicosis-causes, symptoms and precautions against Siderosis- causes, symptoms and precautions against Manganese poisoning- causes, symptoms and precautions against Lead poisoning- causes, symptoms and precautions against Chromium poisoning- causes, adverse effects and control of diseases due to radioactive minerals

4.0 Rescue and recovery

Define the terms rescue and recovery- situations requiring rescue operations- rescue apparatus- constructional details of compressed oxygen self-contained breathing apparatus (proto IV apparatus)- principle of function- tests, care and maintenance of compressed O₂ apparatus- purpose of smoke helmet- constructional details –the purpose and constructional details of gas mask functions of self-rescuer- resuscitation- purpose of resuscitation apparatus- purpose of rescue station- equipment required to be kept in mine rescue station- details of rescue stations- rescue organization at mines level.

5.0 Gas Detectors

Gas detectors, Uses,– principle on which designed, determination of percentage of gas with them- Recent techniques of gas detection – remote sensing devices, continuous recorders, monitors, infra-red spectrometers, sensors-Carbon Monoxide detection – Warm blooded birds, chemical detectors, Multi gas detector.

REFERENCE BOOKS

- | | | |
|--|---|-------------|
| 1. Mine fires, Rescue, Recovery and Inundation | : | M A. Ramulu |
| 2. Mine ventilation | : | S. Ghatak |
| 3. Mine environment and its control | : | G B Mishra |
| 4. Mines Rescue rules | | |
| 5. Mine ventilation | : | Hartmen |
| 6. UMS Volumes | | |
| 7. Statham series | | |

Blue Print of a Question Paper:

S. No	Chapter Name	Periods Allocated	Weightage Allocated	Marks Wise Distribution of Weightage				Question Wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	Mine Fires	15	14	3	3	-	8	1	1	-	1	CO1,CO3
2	Mine Explosions and Inundation	20	14	3	3	8		1	1	1		CO1,CO3
3	Miner's diseases	15	14	3	3	-	8	1	1	-	1	CO3
4	Rescue and recovery	15	14	3	3	8	-	1	1	1	-	CO1,CO2
5	Gas detectors	10	14	3	3	8	-	1	1	1	-	CO2
Higher order question from any chapters			10				10				1	
TOTAL		75	80	15	15	24	26	5	5	3	3	

R-Remember; U-Understanding; Ap-Application; An-Analysing

Table specifying the scope of syllabus to be covered for Unit Tests

Unit Test	Learning outcomes to covered
Unit Test -I	From 1.1 to 2.11
Unit Test –II	From 3.1 to 5.8

Model Paper for Unit Test-I :

State Board of Technical Education and Training, A.P.

Diploma in Mining Engineering (DMNGE)

Fifth semester :: MNG-503 Mine Hazards and Rescue

Time: 90 Minutes

Unit Test –I

Maximum Marks : 40

PART- A

16 Marks

Instructions :

(i) Answer all questions

(ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1.(a) Air crossings should be constructed of Fire Proof Material– True/False (CO1)

(b) A mine is not considered to be adequately ventilated if the fire damp percentage exceeds 0.75
----- True/False (CO2)

(c) Incipient fires are also called as _____ (CO3)

(d) In underground coal mines the amount CO produced varies with the _____. (CO2)

2. Define mine fires and list the types of mine fires (CO1)

3. List different fire fighting equipment (CO1)

4. List the different types of mine explosions (CO2)

5. Classify the sources of water in mines (CO3)

PART- B

3 x 8 = 24 Marks

Instructions :

(i) Answer all questions

(ii) Each question carries EIGHT marks

(iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A) List the causes and preventive measures of spontaneous heating (CO2)
(OR)

(B) Explain the procedure of permanent sealing of fire in III degree gassy mines (CO4)

7. (A) List the causes and preventive measures of fire damp explosions (CO3)
(OR)

(B) List the causes and preventive measures of coal dust explosions (CO2)

8. (A) Explain the purpose of construction of stone dust barriers and their locations (CO5)
(OR)

(B) Explain the function and the use of Burnside safety boring apparatus (CO5)

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Model Paper for Unit Test-II :

State Board of Technical Education and Training, A.P.

Diploma in Mining Engineering (DMNGE)

Fifth semester :: MNG-503 Mine Hazards and Rescue

Time: 90 Minutes

Unit Test –II

Maximum Marks : 40

PART- A

16 Marks

Instructions :

- (i) Answer all questions
- (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

- 1.(a) If the liver is affected, then the disease is called Jaundice– True/False (CO1)
- (b) CH₄ is an inflammable gas ---- True/False (CO1)
- (c) Disease caused due to inhalation of iron oxide dust is called _____ (CO3)
- (d) The weights of the gas mask is _____ Kg. (CO2)
- 2. List various miner's diseases (CO2)
- 3. Define the terms rescue and recovery (CO1)
- 4. Classifies the different methods of gas detection (CO2)
- 5. List the methods of detecting CH₄ (CO3)

PART- B

3 x 8 = 24 Marks

Instructions :

- (i) Answer all questions
- (ii) Each question carries EIGHT marks
- (iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

- 6. (A)List the causes, symptoms and treatment of Nystagmus (CO1)
- (OR)
- (B) List the causes, symptoms and precautions against Asbestosis and Silicosis (CO1)
- 7. (A) Describe the constructional details of gas mask and state the purpose of it (CO3)
- (OR)
- (B) Describe rescue operations at mine level (CO2)
- 8. (A) Explain the principles on which the detectors are developed or designed (CO2)
- (OR)
- (B) Explain the multi gas detector and its use (CO5)

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BOARD DIPLOMA EXAMINATION
D.MNG.E. – V SEMESTER EXAMINATION
MINE HAZARDS AND RESCUE

Time : 3 Hours

Total Marks: **80****PART – A****10 X 3 = 30**

Instructions: Part A consists of **10** questions. Answer **all** questions and each question carries **three** marks.

1. Define mine fires and list the types of mine fires. (CO1)
2. List the factors for developing spontaneous heating. (CO2)
3. List the causes of fire damp explosions. (CO2)
4. Classify the sources of water in mines. (CO3)
5. List various miner's diseases. (CO2)
6. List the causes of diseases due to radioactive minerals. (CO1)
7. Define the terms rescue and recovery. (CO1)
8. List the equipment required to be kept in mine rescue station. (CO2)
9. Classifies the different methods of gas detection. (CO1)
10. List the method of CO detections. (CO4)

PART – B**5 X 8 = 40**

Instructions: *Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 8 marks and may have sub questions.*

11. A) List different fire fighting equipment and describe it in fire fighting organisation. (CO1)
 (OR)
 B) Explain the procedure of permanent sealing of fire in III degree gassy mines. (CO1)
12. A) Describe the constructional details of sump and barriers. (CO4)
 (OR)
 B) Explain the purpose of construction of stone dust barriers and their locations. (CO5)
13. A) Explain about various forms of pollution due to mining and explain about control methods (CO2)
 (OR)
 B) List the causes, symptoms and precautions against Asbestosis. (CO2)
14. A) Explain the functions of self-rescuer. (CO4)
 (OR)
 B) Explain the constructional details and principle of working of compressed oxygen self-contained breathing apparatus. (CO4)
15. A) Explain the principles on which the detectors are developed or designed. (CO1)
 (OR)
 B) Explain the method of CO detection by warm blooded creature. (CO4)

PART – C**1X 10 = 10**

Instructions: Part C consists of **1** question which carries 10 marks.

16. Why Burnside safety boring operator used in underground mines? Explain the function and the use of Burnside safety boring apparatus with sketch. (CO5)

MINING MACHINERY-II

Course Code	Course Title	No of periods / week	Total no of periods	Marks for FA	Marks for SA
MNG-504	Mining Machinery - II	06	90	20	80

TIME SCHEDULE

S. No	Major Topics	No. of Periods	Mapped CO's
1	Conventional Face machinery	18	CO1,CO2
2	Longwall Face machinery	17	CO2,CO4
3	Flame proofing, intrinsic safety, Signalling and Cables in mines	15	CO2,CO3
4	Winding system- Part-I	20	CO2,CO5
5	Winding system Part-II	20	CO4,CO5
	Total	90	

Course Objectives and Course Outcomes:

Course Objectives	<p>Upon completion of the course the student shall be able to:</p> <ul style="list-style-type: none"> - Familiarize different machinery, principle of operation - Familiarize the scope and importance of flame proofing, constructional details - Explain various intrinsic safety apparatus used in mines and their constructional details. Methods of making circuit intrinsically safe - Familiarize various types of signaling systems used in mines, their construction and mode of operation - Familiarize different types of cables used in mines, their construction , field usage, - Describe the winding system used in mines, various components, principle of working, safety precautions
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Course Outcomes	CO1	Explain different drilling machinery
	CO2	Describe different cables used in mines, their construction and mode of operation.
	CO3	Explain various intrinsic safety apparatus used in mines and their construction
	CO4	Describe the winding system used in mines, various components, principle of working, and safety precautions.
	CO5	Explain various types of signaling systems used in mines, their construction and mode of operation

PO-CO Mapping:

Course Code: MNG-504		Course Title: Mining Machinery-II			No of Periods: 90
PO No	Mapped with CO no	CO Periods addressing PO in Column 1		Level (1,2,3)	Remarks
		No	%		
PO1	-	-	-	-	>40% Level 3 Highly addressed
PO2	CO1,CO2	20	22.2	2	
PO3	CO1,CO2	25	27.7	2	25 to 40% Level 2 Moderately addressed
PO4	CO1,CO2	25	27.7	2	
PO5	CO2,CO3	20	22.2	2	5 to 25% Level 1 Low addressed
PO6	-	-	-	-	
PO7	-	-	-	-	<5% Not addressed

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	-	2	2	2	-	-	-	-	3	-
CO2	-	2	2	2	2	-	-	-	4	-
CO3	-	-	-	-	2	-	-	-	1	-
CO4	-	-	-	-	-	-	-	-		-
CO5	-	-	-	-	-	-	-	-		-

3: High, 2: Moderate, 1: Low

LEARNING OUTCOMES

Upon on completion of the course the student shall be able to:

1.0 Conventional face machinery

- 1.1 List the different drills used in mines and mention the field of use of each.
- 1.2 Explain the working of electric rotary drill with neat sketch.
- 1.3 Explain the working of hammer rock drill with sketch.
- 1.4 Write down the function of each part of hammer rock drill.
- 1.5 State the purposes of air-leg and coal cutting machines.
- 1.6 List the types of power loaders used mines and mention the field use of each.
- 1.7 Explain the principle of working of Side Discharge Loaders used in mines
- 1.8 Explain the principles of working of Load Haul Dumpers used in mines
- 1.9 Explain the principles of working of Rocker shovel used in metal mines
- 1.10 Explain the principles of working of Road headers used in underground mines.

2.0 Long wall face machinery

- 2.1 Explain the working of Single Ended Ranging Drum Shearer (SERDS) with sketch.
- 2.2 Explain the working of Double Ended Ranging Drum Shearer (DERDS) with sketch
- 2.3 Write down the applications of SERDS and DERDS.
- 2.4 Explain the principle of working of Armoured Face Conveyor (AFC)
- 2.5 State the principle of lump breaker
- 2.6 State purpose of power pack.
- 2.7 List the factors governing the selection of power supports.

- 2.8 Draw and state the purpose of the following in power supports
a) Canopy b) Caving Shield c) Double acting Advancing Ram
d) Face Guard e) Extension Canopy f) Lemniscates Links
- 2.9 Explain various components of AFC
- 2.10 State the purpose of Bottom opened and Bottom closed AFC and their applicability
- 2.11 State the applicable conditions of Twin-In-Bord and Twin-Out-Bord AFC and their advantages, disadvantages.

3.0 Flame proofing, Intrinsic safety, Signalling and Cables in mines

- 3.1 Define the terms flame proof apparatus and intrinsically safe apparatus.
- 3.2 State the necessity of flame proofing and intrinsic safety to apparatus used in mines.
- 3.3 List the field use of flame proof apparatus and intrinsically safe apparatus,
- 3.4 Describe the constructional features of flame proofing.
- 3.5 Explain the methods of intrinsic safety
- 3.6 Describe the gate-end switch gear (box) used for coal drills.
- 3.7 Classify the methods of signalling in mines.
- 3.8 Explain the electrical signalling system used in underground haulage roadway with sketch.
- 3.9 Explain the signalling system in winding shafts.
- 3.10 Classify the types of cables used in mines.
- 3.11 Explain the constructional details of mine cables with cross sectional sketch
- 3.12 Explain cable jointing methods in vertical shaft.
- 3.13 Write down the care and maintenance steps to be taken for protection of mine cables.

4.0 Winding system – Part -I

- 4.1 Define the term winding and state the purpose of winding in shafts.
- 4.2 List the equipments required in a winding system and state the purpose of each.
- 4.3 Explain the types of head gear frames and state the purpose of head gears
- 4.4 Explain the arrangement for loading and unloading of skip at pit-top and pit-bottom respectively.
- 4.5 State the necessity of guides for cage or skip
- 4.6 Explain the erection of flexible and rigid guides to cage or skip.
- 4.7 List the applicable conditions, merits and demerits of rigid and flexible guides
- 4.8 Explain the working of keps and safety catches with sketch.
- 4.9 List the types of safety hooks
- 4.10 Explain the working of kings-safety hook (detaching hook) with sketch.
- 4.11 Explain the constructional details of cage suspension gear
- 4.12 Explain the purpose of each component of cage suspension gear
- 4.13 Explain the constructional details of sheave or pulley

5.0 Winding system – Part -II

- 5.1 Compare cage winding with skip winding.
- 5.2 List the types of winding systems (drum and koepe)
- 5.3 Explain the drum winding with drum construction and list the types of drums.
- 5.4 List the safety devices used on winding system.
- 5.5 Explain the koepe or friction winding.
- 5.6 Describe the single rope and multi-rope friction winding with sketch.
- 5.7 List the merits and demerits of koepe or friction winding.
- 5.8 Compare drum winding with friction winding.
- 5.9 State the principle of braking in winding.
- 5.10 Explain the suspended calliper brake and anchored post brake
- 5.11 Explain the dynamic electrical breaking , Regenerative breaking
- 5.12 Explain the method of speed control by Lilly controller and other automatic contrivances

COURSE CONTENTS:

1. **Conventional Face machinery**
Handheld drills – electronic rotary drills - hammer rock drills - power loader – field of applications, working operation – air leg – coal cutters
2. **Longwall face machinery**
Principle, design and application of long wall face machinery shearer, AFC, Lump breaker – stage loader, power pack self-advancing chock shield supports- SERDS and DERDS- their applications- principle of working of AFC (Armoured Face conveyor)- principle of lump breaker- purpose of power pack.
3. **Fame proofing, Intrinsic safety, Signalling and Cables in mines**
Necessity of flame proofing- intrinsic safety apparatus - field of application – constructional features - methods of intrinsic safety - field or application - methods of signalling in mines – electrical signalling - classification – types – constructional details – cable jointing – care and maintenance.
4. **Winding systems- Part-I**
Winding in shafts – purpose, equipment - types of had gear frames – shaft fittings – guides in the shafts – pit – top arrangement – keps and suspension gear – Types of drums - head gear pulley, care skip winging-pit-top and pit-bottom arrangements – cage suspension gear- sheave -pulley
5. **Winding systems – Part –II**
Drum winding and skip winding, multi-deck winding and friction winding – drum and friction winding – winding engine – depth - methods of speed control – breaking in winding – types of breaks- automatic contrivances – dynamic –regenerative breaking

REFERENCE BOOKS:

- | | |
|-------------------------------------|----------------|
| 1. Elements of Mining Vol.3 | : D.J.Deshmukh |
| 2. Mine Pumps, Haulages and Winding | : S.Ghatak |
| 3. Mining Machinery | : S.Ghatak |
| 4. Statham series VOL III | |
| 5. U.M.S.Volumes | |
| 6. Mine transportation | : KERLIN |

Blue Print of a Question Paper:

S. No	Chapter Name	Periods Allocated	Weightage Allocated	Marks Wise Distribution of Weightage				Question Wise Distribution of Weightage				CO's Mapped	
				R	U	Ap	An	R	U	Ap	An		
1	Conventional Face machinery	18	14	3	3	-	8	1	1	-	1	CO2	
2	Longwall Face machinery	17	14	3	3	-	8	1	1	-	1	CO2	
3	Flame proofing, intrinsic safety, Signalling and Cables in mines	15	14	3	3		8	1	1		1	CO1,CO3	
4	Winding system – Part –I	20	14	3	3	8		1	1	1		CO2	
5	Winding system – Part –II	20	14	3	3	8		1	1	1			
Higher order question from any chapters			10				10				1	CO2	
TOTAL		90	80	15	15	16	34	5	5	2	4		

R-Remember; U-Understanding; Ap-Application; An-Analysing

Table Specifying the scope of syllabus to be covered for Unit Tests

Unit Test	Learning outcomes to covered
Unit Test -I	From 1.1 to 3.8
Unit Test –II	From 3.9 to 5.12

Model Paper for Unit Test-I :

State Board of Technical Education and Training, A.P.

Diploma in Mining Engineering (DMNGE)

Fifth semester :: MNG-504 Mining Machinery-II

Time: 90 Minutes

Unit Test –I

Maximum Marks : 40

PART- A

16 Marks

Instructions :

- (i) Answer all questions
- (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

- 1.(a) The fluid which is used in the powered support system is 5 to 10% emulsion oil
– True/False (CO1)
- (b) Adjacent flanges must be placed metal to metal for a width of a least Two inches
---- True/False (CO1)
- (c) Weight of electric rotary drill machine is _____ (CO3)
- (d) Speed of jack hammer drill controlled by _____ . (CO2)
2. List the different drills used in mines (CO2)
3. List the types of power loaders used mines (CO1)
4. Classify the methods of signalling in mines (CO2)
5. List the factors governing the selection of power supports (CO3)

PART- B

3 x 8 = 24 Marks

Instructions :

- (i) Answer all questions
- (ii) Each question carries EIGHT marks
- (iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A) Explain the working of electric rotary drill with neat sketch (CO1)
(OR)
(B) Explain the principles of working of Load Haul Dumpers used in mines (CO1)
7. (A) Explain the working of Single Ended Ranging Drum Shearer (SERDS) with sketch (CO3)
(OR)
(B) Explain the principle of working of Armoured Face Conveyor (AFC) (CO2)
8. (A) Describe the gate-end switch gear (box) used for coal drills (CO2)
(OR)
(B) Explain the electrical signalling system used in underground haulage roadway with sketch (CO3)

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Model Paper for Unit Test-II :

**State Board of Technical Education and Training, A.P.
Diploma in Mining Engineering (DMNGE)
Fifth semester :: MNG-504 Mining Machinery-II**

Time: 90 Minutes

Unit Test –II

Maximum Marks : 40

PART- A

16 Marks

Instructions :

- (i) Answer all questions
- (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

- 1.(a) There is no fleet angle in the case of a koepe winder pulley
– True/False (CO1)
- (b) Re- Generative braking is Mechanical braking
---- True/False (CO1)
- (c) The suspension gear should be renewed after every _____ (CO3)
- (d) _____ is used to reduce oscillations of cage are used. (CO2)
2. Classify the types of cables used in mines (CO3)
3. State the necessity of guides for cage or skip (CO1)
4. List the types of safety hooks (CO2)
5. List the safety devices used on winding system (CO3)

PART- B

3 x 8 = 24 Marks

Instructions :

- (i) Answer all questions
- (ii) Each question carries EIGHT marks
- (iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A) Explain the signalling system in winding shafts (CO1)
(OR)
(B) Explain cable jointing methods in vertical shaft (CO1)
7. (A) Explain the working of kings-safety hook (detaching hook) with sketch (CO3)
(OR)
(B) Explain the constructional details of cage suspension gear (CO2)
8. (A) Explain the suspended calliper brake and anchored post brake (CO2)
(OR)
(B) Compare drum winding with friction winding (CO3)

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**BOARD DIPLOMA EXAMINATION,
D.MNG.E. – V SEMESTER EXAMINATION
MINING MACHINERY-II**

Time : 3 Hours

Total Marks: 80

PART – A**10 X 3 = 30**

Instructions: Part A consists of **10** questions. Answer **all** questions and each question carries **three** marks.

1. List the different drills used in mines and mention the field of use of each. (CO1)
2. State the purposes of air-leg. (CO1)
3. Write down the applications of SERDS. (CO2)
4. State purpose of power pack. (CO1)
5. Define the terms flame proof apparatus and intrinsically safe apparatus. (CO1)
6. Classify the methods of signalling in mines. (CO4)
7. State the necessity of flame proofing and intrinsic safety to apparatus used in mines. (CO1)
8. List the equipments required in a winding system. (CO1)
9. List the safety devices used on winding system. (CO2)
10. State the principle of braking in winding. (CO4)

PART – B**5 X 8 = 40**

Instructions: Part B consists of **5** Units. Answer any one full question from each unit. Each question carries 8 marks and may have sub questions.

11. A) Explain the principle of working of Side Discharge Loaders used in mines. (CO1)
(OR)
B) Explain the working of hammer rock drill with sketch. (CO1)
12. A) Explain the working of Double Ended Ranging Drum Shearer (DERDS) with sketch. (CO4)
(OR)
B) Explain the principle of working of Armoured Face Conveyor. (CO5)
13. A) Write down the care and maintenance steps to be taken for protection of mine cables (CO2)
(OR)
B) Describe the constructional features of flame proofing (CO1)
14. A) Explain the methods of intrinsic safety. (CO2)
(OR)
B) Describe the gate-end switch gear (box) used for coal drills. (CO3)
15. A) Compare cage winding with skip winding. (CO1)
(OR)
B) Explain the erection of flexible and rigid guides to cage or skip. (CO1)

PART – C

Instructions: Part C consists of **1** question which carries 10 marks.

1X 10 = 10

16. Explain the drum winding with drum construction and list the types of drums. (CO5)

ROCK MECHANICS AND STRATA CONTROL

Course Code	Course Title	No of periods / week	Total no of periods	Marks for FA	Marks for SA
MNG-505	Rock Mechanics and Strata control	05	75	20	80

TIME SCHEDULE

S. No	Major Topics	No. of Periods	Mapped CO's
1	Basics, Ground Forces and stress analysis	12	CO1,CO2
2	Rock properties and rock classifications	13	CO2,CO4
3	Rock failures, behaviour and measurements	15	CO3,CO4
4	Ground movements and subsidence	15	CO4,CO5
5	Strata control	20	CO4,CO5
	Total	75	

Course Objectives and Course Outcomes:

Course Objectives	<p>Upon completion of the course the student shall be able to:</p> <ul style="list-style-type: none"> - Analyze the different ground forces, - Explain stress analysis, - Describe rock properties and classifications, - Analyze different types of rock failures and behavior, - Explain different ground moments due to mining activity - Analyze different methods of subsidence and strata control
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Course Outcomes	CO1	Analyze Ground Forces and stress analysis
	CO2	Describe rock properties and classifications
	CO3	Explain the different ground forces, rock failures and behavior
	CO4	Explain different ground moments due to mining activity
	CO5	Explain different methods of subsidence and strata control

PO-CO Mapping:

Course Code: 505		Course Title: Rock Mechanics and Strata Control							No of Periods: 75		
PO No	Mappe d with CO no	CO Periods addressing PO in Col 1		Level (1,2,3)	Remarks						
		No	%								
PO1	CO3	10	14	1	>40% Level 3 Highly addressed 25 to 40% Level 2 Moderately addressed 5 to 25% Level 1 Low addressed <5% Not addressed						
PO2	CO1,CO 3	15	20	1							
PO3	CO1,CO 3	19	25	2							
PO4	CO2,CO 3	31	41	3							
PO5	-	-	-	-							
PO6	-	-	-	-							
PO7	-	-	-	-							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	
CO1	-	1	2	-	-	-	-	1	1	-	
CO2	-	-	-	3	-	-	-	-	-	1	
CO3	1	1	2	3	-	-	-	2	1	1	
CO4	-	-	-	-	-	-	-	-	-	-	
CO5	-	-	-	-	-	-	-	-	-	-	

3: High, 2: Moderate, 1: Low

LEARNING OUTCOMES

Upon on completion of the course the student shall be able to:

1.0 Basics, Ground Forces and stress analysis

- 1.1 Define the term Rock mechanics.
- 1.2 State the scope and areas of application of rock mechanics in mining.
- 1.3 State forces due to the weight of strata
- 1.4 State tectonic, orogenic, residual and thermic origin forces
- 1.5 List the ground forces acting on a block of in-situ rock in three dimensions
- 1.6 Define the terms stress – field, principal stress, principal strain, plane stress and plane strain
- 1.7 Explain the relation between vertical and lateral stresses
- 1.8 Explain hydrostatic and lithostatic states of rock.
- 1.9 Lists the induced stresses due to mining operations.
- 1.10 Explain stress distribution around a mine workings
- 1.11 Explain stress concentration around shaft of different shapes
- 1.12 Explain stress concentration on pillars.

2.0 Rock properties and rock classifications

- 2.1 List the physical and mechanical properties of rocks.
- 2.2 Explain about compressive strength of rocks.
- 2.3 Explain about tensile strength of rocks.
- 2.4 Explain about shear strength of rocks.
- 2.5 Lists the strength indices of rocks.
- 2.6 Explain about point load strength index.
- 2.7 Explain about Protodyaknov strength index.
- 2.8 Explain porosity, permeability and anisotropy of rocks.
- 2.9 Define the term rock mass.
- 2.10 Classify rocks by Moh's hardness scale.
- 2.11 Classify the rocks by RQD(Rock Quality Designation).
- 2.12 Classify the rocks by RMR (Rock Mass Rating).
- 2.13 List the factors considered for estimation of RMR and RQD.

3.0 Rock failures, behaviour and measurements

- 3.1 List the theories of rock failure.
- 3.2 List the confining pressures
- 3.3 State the effect of water ,time and temperature on failure of rocks
- 3.4 Explain the deformability of rock
- 3.5 Explain the concept of coal bumps and rock bursts.
- 3.6 List the causes of rock bursts and coal bumps.
- 3.7 List the preventive measures against coal bumps and rock bursts.
- 3.8 List the instruments used for measurement of stress
- 3.9 List the instruments used for measurement of strain
- 3.10 List and explain the instruments used for measurement of load.

4.0 Ground movements and subsidence

- 4.1 Differentiate the strata conditions before and after mining operations.
- 4.2 Explain the pressure arch theory
- 4.3 Explain Normal theory
- 4.4 Explain Dome theory
- 4.5 Explain Rzhijaz theory
- 4.6 Explain the strata pressure in and around bord and pillar and longwall workings.
- 4.7 Explain the term subsidence.
- 4.8 Define the different terminology used in subsidence.
- 4.9 Explain angle of draw positive and negative.
- 4.10 List the factors influencing angle of draw.
- 4.11 List the factors effecting subsidence.
- 4.12 List the effects and protective measures related to subsidence.
- 4.13 Explain the method of subsidence measurement.

5.0 Strata control

- 5.1 States the necessity of supports in mine.
- 5.2 List the various materials used for supporting in mines (timber, iron, steel, building stone, brick and concrete).
- 5.3 Classify the types of supporting systems.
- 5.4 List the applicable conditions and write the size of props, chocks, cogs, stulls, bars, linked bars.
- 5.5 States the principles of roof bolting.
- 5.6 Explain the system of roof bolting.
- 5.7 Lists the applicable conditions, merits and demerits of roof bolting.
- 5.8 Explain about the rigid and yield props.

- 5.9 Describe the constructional details of friction and hydraulic props.
- 5.10 Explain the method of setting props, bars and chocks at different situations.
- 5.11 Explain the method of fore-poling, roof stitching and state its applicability.
- 5.12 Explain the method of safari supporting, road way junction and state its applicability.
- 5.13 Explain the method of supporting after heavy roof collapse while clearing the debris, withdrawal of supports by safety prop with drawer with sketch

COURSE CONTENTS:

1. Basics, Ground Forces and stress analysis

Definition of rock mechanics – scope of rock mechanics- application of Rock mechanics to mining – field and ground forces - various forces acting on block – types of Stress – Relation between vertical and lateral stresses – Stress field – hydrostatic and lithostatic stage of rock - induced stresses due to mining – stress – field, principal stress, principal strain, plane stress and plane strain - stress distribution around a mine workings .

2. Rock properties and rock classifications

Rock properties – physical and mechanical properties of rocks – compressive strength – tensile strength - shear strength – strength indices of rocks – point load strength index - protodyakonov's strength index – porosity – permeability - anisotropy –RQD (Rock Quality Designation) - Mohr's Hardness scale. -RMR (Rock mass rating), factors consider for estimation of RMR – classification of rock based on RMR.

3. Theories of Rock failure, Rock Behaviour and Measuring Devices

Theories of failure of rocks - confining pressures - the effect of water ,time and temperature - deformability of Rock - instruments used for measurement of stress measuring load, stress and strain - bumps and rock bursts.

4. Ground movements and subsidence

Strata conditions before and after mining operations - pressure arch theory - normal theory -dome theory - rzhijaz theory -strata pressure in and around bord and pillar and longwall workings – subsidence – terminology - angle of draw-positive and negative - factors influencing angle of draw - factors effecting subsidence - effects of subsidence - protective measures on surface and underground to minimise damages due to subsidence - method of subsidence measurement.

5. Strata control

Supports – necessity – materials used – classification of supporting systems – applicability of various types of supports – size, shape of supports – principle of roof bolting, stitching – merits and demerits of bolting – rigid and yield props – constructional details of friction, hydraulic props – methods of setting various supports at different situations – fore poling - safari supporting- junction supports – clearance of heavy roof collapse – withdrawal of supports.

REFERENCE BOOKS:

- | | |
|--------------------------------------|------------------------------|
| 1. Rock Mechanics | : Richard E. Goodman. |
| 2. Introduction of Rock mechanics. | : V.P.Varma |
| 3. Rock mechanics and strata control | : Peng |
| 4. Long Wall Mining | : Peng |
| 5. Mining technology 1,2,3 | :D.J.Deshmukh&R.T.DeshmukVol |
| 6. S.M.E. Hand Books Vol. 1,2,3. | |
| 7. Soil mechanics | : Punmiya&Kulkarni. |

Blue Print of a Question Paper:

S. No	Chapter Name	Periods Allocated	Weightage Allocated	Marks Wise Distribution of Weightage				Question Wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	Basics, Ground Forces and stress analysis	12	14	3	3	-	8	1	1	-	1	CO3
2	Rock properties and rock classifications	13	14	3	3	-	8	1	1	-	1	CO1,CO3
3	Rock failures, behaviour and measurements	15	14	3	3	-	8	1	1	-	1	CO3
4	Ground movements and subsidence	15	14	3	3	-	8	1	1	-	1	CO3
5	Strata control	20	14	3	3	8		1	1	1		CO2
Higher order question from any chapters			10				10				1	CO4
TOTAL		75	80	15	15	8	42	5	5	1	5	

R-Remember; U-Understanding; Ap-Application; An-Analysing

Table Specifying the scope of syllabus to be covered for Unit Tests

Unit Test	Learning outcomes to covered
Unit Test -I	From 1.1 to 3.5
Unit Test –II	From 3.6 to 5.13

Model Paper for Unit Test-I :

State Board of Technical Education and Training, A.P.
Diploma in Mining Engineering (DMNGE)
Fifth semester :: MNG-505 Rock Mechanics and Strata Control

Time: 90 Minutes

Unit Test –I

Maximum Marks : 40

PART- A

16 Marks

Instructions :

- (i) Answer all questions
- (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

- 1.(a) Rock mechanics is applicable in Preparation of Coal seam into pillars
– True/False (CO1)
- (b) Compressive strength is the strength property of a rock
---- True/False (CO2)
- (c) Lateral Stress means stresses acting _____ (CO3)
- (d) Rock is subjected to Hydrostatic pressure due to presence of _____ (CO2)
2. Define the term Rock mechanics (CO1)
3. Classify rocks by Moh’s hardness scale (CO3)
4. List the physical properties of rocks (CO2)
5. List the theories of rock failure (CO3)

PART- B

3 x 8 = 24 Marks

Instructions :

- (i) Answer all questions
- (ii) Each question carries EIGHT marks
- (iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A) Explain the relation between vertical and lateral stresses (CO1)
(OR)
(B) Explain stress concentration around shaft of different shapes (CO1)
7. (A) Explain about compressive strength of rocks (CO3)
(OR)
(B) Explain porosity and anisotropy of rocks (CO2)
8. (A) Explain the deformability of rock (CO2)
(OR)
(B) Explain the concept of coal bumps and rock bursts (CO3)

oOo

State Board of Technical Education and Training, A.P.
Diploma in Mining Engineering (DMNGE)
Fifth semester :: MNG-505 Rock Mechanics and Strata Control

Time: 90 Minutes **Unit Test –II** **Maximum Marks : 40**

16 Marks

(i) Answer all questions
(ii) First question carries FOUR marks, each question of remaining carries THREE marks.

- 1.(a)The redistribution of pressure is explained by Mohr's theory
– True/False (CO1)
- (b) Wire mesh is used in Expansion shell type of roof bolting
---- True/False (CO1)
- (c) In normal theory fractures are developed at right angles to the _____ (CO3)
- (d) _____ is the Primary force acting on a rock. (CO2)
2. List the causes of rock bursts and coal bumps (CO4)
3. List the factors influencing angle of draw (CO3)
4. Classify the types of supporting systems (CO4)
5. States the principles of roof bolting (CO3)

3 x 8 = 24 Marks

- (i) Answer all questions
- (ii) Each question carries EIGHT marks
- (iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

- | | |
|---|-------|
| 6. (A) List the preventive measures against coal bumps and rock bursts | (CO1) |
| (OR) | |
| (B) Explain the instruments used for measurement of load | (CO4) |
| 7. (A) Explain the pressure arch theory and Dome theory | (CO3) |
| (OR) | |
| (B) Explain the strata pressure in and around longwall workings | (CO2) |
| 8. (A) Explain the method of setting props, bars and chocks at different situations | (CO2) |
| (OR) | |
| (B) Describe the constructional details of hydraulic props | (CO5) |

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**BOARD DIPLOMA EXAMINATION,
D.MNG.E. – V SEMESTER EXAMINATION
ROCK MECHANICS AND STRATA CONTROL**

Time : 3 Hours

Total Marks: **80****PART – A****10 X 3 = 30**

Instructions: Part A consists of **10** questions. Answer **all** questions and each question carries **three** marks.

1. Define the term Rock mechanics. (CO1)
2. Lists the induced stresses due to mining operations. (CO2)
3. Lists the strength indices of rocks. (CO1)
4. Classify rocks by Mohr's hardness scale. (CO3)
5. List the causes of rock bursts and coal bumps. (CO2)
6. List the instruments used for measurement of strain. (CO1)
7. List the factors effecting subsidence. (CO2)
8. Explain the term subsidence. (CO1)
9. Classify the types of supporting systems. (CO3)
10. States the principles of roof bolting. (CO1)

PART – B**5 X 8 = 40**

Instructions: Part B consists of **5** Units. Answer any one full question from each unit. Each question carries 8 marks and may have sub questions.

11. A) Explain stress distribution around a mine workings. (CO3)
(OR)
B) Explain the relation between vertical and lateral stresses. (CO3)
12. A) Explain porosity, permeability and anisotropy of rocks. (CO2)
(OR)
B) Explain about compressive strength of rocks. (CO1)
13. A) Explain the concept of coal bumps and rock bursts. (CO4)
(OR)
B) State the effect of water, time and temperature on failure of rocks. (CO5)
14. A) Explain the pressure arch theory with neat sketch. (CO2)
(OR)
B) Explain the method of subsidence measurement. (CO4)
15. A) Explain the method of safari supporting and state its applicability. (CO4)
(OR)
B) Explain about the rigid and yield props. (CO5)

PART – C**1X 10 = 10**

Instructions: Part C consists of **1** question which carries 10 marks.

16. Explain the method of setting props and chocks at different situations. (CO4)

PRACTICAL TRAINING AND ASSESSMENT

Course Code	Course Title	No of periods / week	Total no of periods	Marks for FA	Marks for SA
MNG-506	Practical Training and Assessment	01	07	20	30

TIME SCHEDULE

S.NO	Code	TOPICS	Duration
1	MNG-506	<ul style="list-style-type: none"> Practical training in Mines Training Report Preparation <p>Report Preparation: Title Page, Certificate, Acknowledgements, Abstract, Contents(introduction of Mine, Mine Layout, Organization Chart, List of Major Equipments, methods of working: Skills Acquired; Conclusions; Bibliography</p>	Two Months

Course Objectives and Course Outcomes

Upon completion of the course the student shall be able to	
Course Objectives	1.Expose to real time working environment 2. Enhance knowledge and skill already learnt in the institution. 3. Acquire the required skills of mining methods, supervising in the mines. 4. Instill the good qualities of integrity, responsibility and self-confidence.

Course Outcomes	CO1	Apply theory to practical work situations
	CO2	Cultivate sense of responsibility and good work habits
	CO3	Exhibit the strength, teamwork spirit and self-confidence
	CO4	Write report in technical projects

PO-CO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2								1	
CO2			2			3			1	1
CO3				2	2				2	
CO4			3							1

OBJECTIVES:

After the completion of these topics the student should be able to

1. Study / collection of History of Mine and organisation chart
2. Study/collection of Mine geological information/bore hole data
3. Study /collection of Mine Plans and Sections
4. Study/collection of Surface features related to Mine
5. Study of methods of working- COAL Mining methods/ METAL Mining methods
6. Study of method of drilling and blasting
7. Study of Transportation system and layouts
8. Study of Ventilation systems and layouts
9. Study of Drainage system
10. Study of Pit top and Pit bottom layouts.
11. Study of man Power plan
12. Develop the Lamp room layout and Magazine Layout
13. Calculate production / capacities of various mining operations –development, depillaring, advancing, retreating, machinery, pumps and man power

Note: Students will be sent for practical training to Coal/ Metal mines for one month at the end of I Year and for one month at the end of II year i.e., during summer vacation to different Mining industries. The training reports/records submitted by the students will be assessed in V semester for award of marks.

ROCK MECHANICS LABORATORY PRACTICE

Course Code	Course Title	No of periods / week	Total no of periods	Marks for FA	Marks for SA
MNG-507	Rock Mechanics Laboratory Practice	03	45	40	60

TIME SCHEDULE

S. No.	Major Components	Periods	Mapping CO's
1	Sample collection and specimen preparation	10	CO1,CO2
2	Determination of Compressive, Tensile and Shear strengths	10	CO3
3	Determination of hardness of specimens	15	CO4
4	Determination of abrasive resistance of the rocks	10	CO4
	Total	45	

Course Objectives and Course Outcomes

Course Objectives	<p>Upon completion of the course the student shall be able to:</p> <ul style="list-style-type: none"> - To familiarise with the specimen preparation - Analysis of compressive strengths, tensile strength and shear strength - Familiarize determination of various strength indices - Determination of hardness and abrasion
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Course Outcomes	CO1	Explain specimen preparation
	CO2	Familiarize determination of various strength indices
	CO3	Analysis of compressive strengths, tensile strength and shear strength
	CO4	Operation equipment and Determination of hardness and abrasion
	CO5	Determination of hardness and abrasion

PO-CO Mapping

Course Code: MNG-507		Course Title: Rock Mechanics Laboratory			No of Periods: 45
PO No	Mapped with CO no	CO Periods addressing PO in Col 1		Level (1,2,3)	Remarks
		No	%		
PO1	-	-	-	-	>40% Level 3 Highly addressed
PO2	CO2,CO3	10	22	2	
PO3	-	-	-	-	
PO4	CO2,CO3	15	33	2	25% to 40% Level 2 Moderately Addressed
PO5	CO2,CO3	20	45	3	
PO6	-	-	-	-	5 to 25% Level 1 Low addressed
PO7	-	-	-	-	<5% Not addressed

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-
CO2	-	2	-	2	3	-	-	-	2	1
CO3	-	2	-	2	3	-	-	-	2	1
CO4	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-

3: High, 2: Moderate, 1: Low

LEARNING OUTCOMES

Up on Completion of the course the student shall be able to:

1.0 Sample collection and specimen preparation

- 1.1 Collection of cores of rock samples.
- 1.2 Preparation of Samples for various tests test as per ISRM standards.

2.0 Determination of Compressive, Tensile and Shear Strength

- 2.1 Determination of area of the specimen.
- 2.2 Measuring load and determination of compressive strength of Rock specimen
- 2.3 Measuring load and determination of Brazilian tensile strength of rock specimen
- 2.4 Measuring load and determination of Shear Strength for given Specimen

3.0 Determination of hardness of specimens

- 3.1 Determination of Point Load Strength Index of Rocks
- 3.2 Determination of Protodyknov's Strength Index of Rocks
- 3.3 Determination of Schmidt Hammer Number of the rocks

4.0 Determination of abrasive resistance

- 4.1 Determine the abrasive resistance of the rocks using Los Angeles Abrasivity machine

LIFE SKILLS

Course Code	Course Title	No. of Periods/Week	Total No. of Periods	Marks for FA	Marks for SA
MNG-508	Life Skills	3	45	40	60

S. No.	Unit Title	No of Periods	COs Mapped
1	Attitude	4	CO1
2	Adaptability	4	CO1, CO2
3	Goal Setting	4	CO1, CO2, CO3
4	Motivation	4	CO1, CO2, CO3
5	Time Management	4	CO2
6	Critical thinking	4	CO3
7	Creativity	4	CO3
8	Problem Solving	5	CO3
9	Team Work	4	CO4
10	Leadership	4	CO4
11	Stress Management	4	CO4
Total Periods		45	

Course Objectives	To understand the importance of Life skills for acceptable, sustainable and ethical behaviour in academic, professional and social settings
	To exhibit language competence appropriate to acceptable social and professional behaviour.
	To demonstrate time management, stress management, team skills, problem solving ability to manage oneself in academic, professional and social settings.

CO No.	Course Outcomes
CO1	Demonstrates positive attitude and be able to adapt to people and events
CO2	Fixes personal and professional goals and manages time to meet targets
CO3	Exhibits critical and lateral thinking skills for problem solving.
CO4	Shows aptitude for working in teams in a stress free manner and sometimes/ very often/ mostly display leadership traits.

CO-PO Matrix

Course Code MNG-508	Course Title: English Number of Course Outcomes: 4				No. of Periods: 45
POs	Mapped with CO No.	CO Periods Addressing PO in Column 1		Level of Mapping (1,2,3)	Remarks
		Number	Percentage %		
PO1		Not directly applicable for Life Skills Course. However activities that use content and situations from academic, professional and social settings relevant to the Programme shall be exploited for triggering thought and interaction in the Course.			
PO2					
PO3					
PO4					
PO5	CO1, CO2, CO3, CO 4	11	25%		>60%: Level 3
PO6	CO1, CO2, CO3, CO4	27	45%		16 -59%: Level 2
PO7	CO1, CO2, CO3, CO4	7	30%		Up to 15%: Level 1

Level 3 – Strongly Mapped

Level 2- Moderately Mapped

Level 1- Slightly Mapped

Mapping Course Outcomes with Program Outcomes:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1					✓	✓	✓
CO 2					✓	✓	✓
CO3					✓	✓	✓
CO4					✓	✓	✓

Blue Print for evaluation based on Course Outcomes for SA:

Note: Every Activity based Question that focuses on COs and responses as exhibited through communication has to be given marks for the following parameters

- Clarity of Thinking as Exhibited through Content
- Features of Etiquette

***Rubric Descriptors ‘Outstanding/ Very Good/ Good/ Satisfactory/ Poor’ levels of Competence**

Level of Competence	Parameters of Assessment	
	Clarity of thinking as exhibited through content	Features of etiquette
Outstanding 10	Thinking is extremely logical and suggested course of action is feasible Shows creativity and uniqueness Exhibits expert use of expression (organizational devices and discourse markers) that denote clarity in thought.	Exhibits courtesy to all most appropriately with confidence
Very Good 8/9	Thinking is clear and logical Suggested course of action is feasible Shows traces of creativity Exhibits good expression (organizational devices and discourse markers) that denote clarity in thought.	Exhibits courtesy to all to a considerable level.
Good 6/7	Thinking is clear and logical most of the time. Lacks creativity or out of the box thinking as expressed through content.	Exhibits courtesy / politeness to an acceptable level.
Satisfactory 4/5	Thinking is logical; However expressing content is disjointed and disorganized.	Has courtesy but often fumbles with language.
Poor 3 or less than 3	Thoughts as expressed through content are incoherent. Language skills are very limited.	Fails to show courtesy to others.

Blue Print for evaluation based on Course Outcomes for SA of each student:

Note: Marks are awarded for each student as per the Rubric descriptors.

S No.	Questions based on Course Outcomes	Periods Allocated for practical work	Max Marks	Poor >3	Satisfactory 4 /5	Good 6/7	Very Good 8/9	Outstanding 10
1	Short presentation on GOALS with Timeline and Action Plan	12	10					
2	State what you will do in the given situation (Assesses adaptability and critical thinking skills, leadership, team skills)	12	10					
3	In how many different and creative way can you use _____ (Object) other than its primary use	8	10					
4	What solutions can you think of for _____ problem.	13	10					
	Total	45	60					

Note: The marks that are awarded for the student for 40 to be increased proportionally for 60.

LEARNING OUTCOMES

1. Attitude Matters :

- 1.1 Understand the importance of positive attitude and the consequences of negative attitude.
- 1.2 Demonstrate positive attitude in dealing with work-related issues and in personal life.

2. Adaptability....makes life easy :

- 2.1 Understand the significance of adaptability.
- 2.2 Show adaptability whenever needed, both at place of work and on personal front.

3. Goal Setting ... life without a Goal is a rudderless boat!

- 3.2 Understand the SMART features of goal-setting.
- 3.3 State one's short-term and long-term goals and spell out plans to achieve them.

4. Motivation ... triggers success!

- 4.2 Comprehend the need for motivation in order to achieve success in life.
- 4.3 State how one is motivated in life.
- 4.4 Show the impact of motivation on one's life

5. Time Management... the need of the Hour!

- 5.2 Understand the value of time management and prioritizing in life
- 5.3 Demonstrate the effect of time management on one's professional work.

6. Critical Thinking ... logic is the key!

- 6.1 Distinguish between facts and assumptions
- 6.2 Use logical thinking in dealing with professional matters

7. Creativity ... the essential you!

- 7.2 Understand the importance of thinking out of the box in dealing with critical issues
- 7.3 Solve problems using creativity / imagination

8. Problem Solving ... there is always a way out!

- 8.2 Understand the need for and importance of problem solving.
- 8.3 Use logic or creativity to solve a problem at workplace or home.

9. Team Work... together we are better!

- 9.1 Understand the need for team skills / team building
- 9.2 Demonstrate one's skills as a team player

10. Leadership... the meaning of a leading!

- 10.1 Understand the need for team skills / team building
- 10.2 Demonstrate one's skills as a team player

11. Stress Management... live life to the full!

- 11.1 Understand what causes stress and how to cope with stress at workplace.
- 11.2 Demonstrate how stress can be overcome in a healthy way.

CAD PRACTICE

Course Code	Course Title	No of periods / week	Total no of periods	Marks for FA	Marks for SA
MNG-509	CAD Practice	03	45	40	60

TIME SCHEDULE

S.No	Major Topics	No. of Periods	Mapped CO's
1	Understand Various CAD commands	10	CO1
2	Practice Geometric Constructions Using CAD	10	CO4
3	Practice 3-D drawings of underground Mine pillar ,section of Mine Plan using CAD Software	10	CO5
4	Digitization (R2V Conversion) of Mine Maps Using CAD Map	15	CO2
	Total	45	

Course Objectives and Course Outcomes

Course Objectives	<p>Upon completion of the course the student shall be able to:</p> <ul style="list-style-type: none"> - To familiarise with CAD commands, - Hands on experience on geometric constructions, - Hands on experience to draw 3-D drawings - Understand salient features of CAD Map - Hands on experience on digitisations Mine Maps
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Course Outcomes	CO1	Understand CAD commands
	CO2	Hands on experience on geometric constructions
	CO3	Understand salient features of CAD Map
	CO4	Hands on experience to draw 3-D drawings
	CO5	Hands on experience on digitisations Mine plans

PO-CO Mapping

Course Code: MNG-509		Course Title: CAD LAB			No of Periods: 45
PO No	Mapped with CO no	CO Periods addressing PO in Col 1		Level (1,2,3)	Remarks
		No	%		
PO1	CO1,CO2,CO3	10	22	1	>40% Level 3 Highly addressed 25% to 40% Level 2 Moderately Addressed 5 to 25% Level 1 Low addressed <5% Not addressed
PO2	-	-	-	-	
PO3	-	-	-	-	
PO4	CO1,CO2,CO3	20	45	3	
PO5	CO1,CO2,CO3	15	33	2	
PO6	-	-	-	-	
PO7	-	-	-	-	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	1	-	-	3	2	-	-	1	1	1
CO2	1	-	-	3	2	-	-	1	1	1
CO3	1	-	-	3	2	-	-	1	1	1
CO4	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-

3: High, 2: Moderate, 1: Low

OBJECTIVES:

1.0 Understand various CAD Commands

- 1.1 Study of drawing editor screen.
- 1.2 Practice the methods of selecting/entering commands to start new drawing accessing CAD commands by selecting from menus, tool bars and entering Commands on command line.
- 1.3 Sets the limits of the drawing to get the needed working area.
- 1.4 Practice the 'setting commands' Grid, Snap, & Ortho Commands.
- 1.5 Practice 'Draw commands'- point, line, pline, rectangle, circle, tangent, ellipse, arc, polygon and spline.
- 1.6 Dimensions the given figures.
- 1.7 Practice 'modify commands' – erase, copy, mirror, move, rotate, scale, stretch, trim, extend, break, chamfer, fillet, explode, Pedit, Mledit.
- 1.8 Practice 'construct commands' – offset, array, Divide, measure.
- 1.9 Practice 'edit commands' – Undo, Redo, Oops, Copy Clip, Paste Clip, Del.
- 1.10 Practice 'view commands' – Redraw, Regen, Zoom, Pan.
- 1.11 Practices 'Hatch commands' – Bhatch, Hatch
- 1.12 Practices 'insert commands' – Block, Wblock, Insert, Minsert.

2.0 Practice Geometric Constructions Using CAD

- 2.1 Practices dividing a line into number of segments.
- 2.2 Practices drawing external/internal common tangents for circles of same/different radii.
- 2.3 Practices drawing external/internal common arcs for circles of same/different radii.
- 2.4 Practices construction of ellipse, parabola, hyperbola, cycloid, and helix.

3.0 Practices 3-D drawings of underground Mine pillar ,section of Mine Plan using CAD Software

- 3.1 Practice drawing of different 3D solid objects.
- 3.2 Practice 3D view of given building plan
- 3.3 Draw the 3D view of the underground mine pillar
- 3.4 Draw the 3D view of given section of Mine plan

4.0 Digitization (R2V Conversion) of Mine Plans using CAD Map 3D

- 4.1 Download the free educational version of CAD Map 3D from AUTODESK using respective institute AICTE Id (<https://academic.autodesk.com/?nd=landing>)
- 4.2 Know the basic commands of CAD Map 3D for digitization of a given map
- 4.3 Carryout the digitization of given Mine Map by creating various Layers
 - a) Development plan Layer
 - b) Depillaring plan Layer
 - c) Ventilation plan Layer
 - d) Mine Survey Plan Layer
 - e) Mine Surface Plan Layer
- 4.4 Entering the relevant information of the above digitized layers

COURSE CONTENTS

- 1. Understand various CAD Commands-**Sets the limits of the drawing- Draw commands- Modify commands- Edit commands- View commands- Hatch commands
- 2. Practice Geometric Constructions Using CAD-**Draws simple geometrical shapes like circles, tangents
- 3. Practices 3-D drawings of underground Mine pillar ,section of Mine Plan using CAD Software-**3D Commands – Simple 3D elements- 3D view of underground mine pillar – 3D view of given section of mine plan
- 4. Digitization (R2V Conversion) of Mine Plans using CAD Map 3D-** Various options of AutoCAD Map 3D- Digitization options- Digitization in various Layers-Underground Development Plan- Depillaring Plan – Ventilation Plan –Under ground Survey Plan – Surface Survey Plan- entering relevant information

TOTAL STATION SURVEY PRACTICE

Course Code	Course Title	No of periods / week	Total no of periods	Marks for FA	Marks for SA
MNG-510	Total Station Survey Practice	03	45	40	60

TIME SCHEDULE

S.No	Major Topics	No. of Periods	Mapped CO's
1	Understand various menu options of total station	5	CO1
2	Field exercises using total station -I	10	CO2,CO4
3	Field exercises using total station -II	15	CO5
4	Transferring the field observation into Auto CAD	5	CO3,CO5
5	Surveying with GPS	10	CO5
	Total	45	

Course Objectives and Course Outcomes

Course Objectives	<p>Upon completion of the course the student shall be able to:</p> <ul style="list-style-type: none"> - To familiarise with various menu options and functional features of Total station - Hands on experience of traversing of given area using total station - Identify the surveying station of known location - Stakeout point and stake out lines using total station - Transformation of filed data from total station into CAD and vice versa - Hands on experience of identifying the co-ordinates of given location using GPS
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Course Outcomes	CO1	Explain Various parts of Total station
	CO2	Identifying the co-ordinates of given location using GPS
	CO3	Transferring the field observation into CAD
	CO4	Traversing of given area using total station
	CO5	Determination of length, width and area of given area

PO-CO Mapping

Course Code: MNG-510		Course Title: TOTAL STATION SURVEY PRACTICE			No of Periods: 45
PO No	Mapped with CO no	CO Periods addressing PO in Col 1		Level (1,2,3)	Remarks
		No	%		
PO1	CO1,CO2,CO3	10	22	1	>40% Level 3 Highly addressed
PO2	-	-	-	-	
PO3	-	-	-	-	
PO4	CO1,CO2,CO3	20	45	3	25% to 40% Level 2 Moderately Addressed
PO5	CO1,CO2,CO3	15	33	2	
PO6	-	-	-	-	5 to 25% Level 1 Low addressed
PO7	-	-	-	-	<5% Not addressed

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	1	-	-	3	2	-	-	1	1	1
CO2	1	-	-	3	2	-	-	1	1	1
CO3	1	-	-	3	2	-	-	1	1	1
CO4	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-

3: High, 2: Moderate, 1: Low

OBJECTIVES:

1.0 Understand Various Menu Options of Total Station

- 1.1 Familiarize various menu options of total station
- 1.2 Creation of new job
- 1.3 Open an existing job
- 1.4 Key In survey points
- 1.5 Options present under survey
- 1.6 Options present under COGO
- 1.7 Copy the surveying points from one job to another job
- 1.8 Linking of one survey job to another survey job
- 1.9 Options to take readings with Prism and without prism

2.0 Field Exercises using total station –I

- 2.1 Centering of total station over a given surveying station using optical plummet
- 2.2 Leveling of total station
- 2.3 Station setup given one known co-ordinate and one angle
- 2.4 Station setup using two known co-ordinates
- 2.5 Setting out orientation of total station by using resection method
- 2.6 Orientation of total station to true north
- 2.7 To measure distance between two given points and angle using total station
- 2.8 To measure multiple sets (rounds) of observations with total station
- 2.9 To carry out the surveying of given area by radiation method

- 2.10 To perform a station setup on a known point by making observation to one or more back sight points
- 2.11 To establish the position of an occupied point by total station relative to a baseline or boundary line
- 2.12 Calculation of traverse area , perimeter, and balancing of errors using total station

3.0 Field Exercises using total station –II

- 3.1 Stake out of a given surveying point
- 3.2 To carryout stakeout of a line
- 3.3 Carryout widening of given road way using stakeout line
- 3.4 To carryout stakeout of an arc connecting two roadways for a given radius and angle
- 3.5 Transferring the B.M located at an in accessible location into surveying area
- 3.6 Find out the height of remote object using Remote elevation method
- 3.7 Marking the surveying point of a given building plan using total station

4.0 Transferring the field observation into CAD

- 4.1 To Transfer the surveying points of a job into USB drive
- 4.2 To transfer the surveying points of job into the system
- 4.3 Conversion of total station job file to CAD file format
- 4.4 Conversion of job file into .csv file
- 4.5 Importing the .csv file surveying points into total station
- 4.6 Calculation of area and volume of a given job using CAD
- 4.7 Earth work calculation to fill or cut the profile a given area based on the pre-defined datum.

5.0 Global positioning system

- 5.1 Identifies the parts and the functions of Global Positioning System.
- 5.2 Determine the Coordinates of various points on the ground using GPS
- 5.3 Carryout of surveying to locate various geo special co-ordinates using DGPS
- 5.3 Link the G.P.S data with Total Station.
- 5.4 Link the GPS data with GIS software.

COURSE CONTENTS:

- 1. Understand Various Menu Options of Total Station** – Various menu options of total station – Creating new survey job – Open an existing survey job – Options for station setup- Options to carryout surveying- Options to take readings – Options for survey calculations – Options to draw the map – Options to transfer the survey job information to USB, system. Menu option to take reading without prism (if present with the instrument)- With prism.
- 2. Field Exercises using total station –I** – Station setup – by angle and survey station- by two stations – by two or more points (Resection method) – Single station setup and carry out surveying (radiation method), - Carry out traverse. Measurement of –angle between the stations –distance between the two given survey stations- Balancing the errors of the traverse.
- 3. Field Exercises using total station –II-** Stake out – point, Line, stake out an arc with the given angle and radius – Transferring the bench present in an in accessible location to survey area – Remote object height by remote elevation method- Marking the given surface plan location on the ground.
- 4. Transferring the field observation into CAD-** Method of transferring the filed observation to – USB, into system. Conversion survey job into csv file and the file format required by Auto CAD- Loading the AutoCAD drawing points into total station to mark them in the field. Calculation of area and perimeter of the given surveyed area using total station. Earth work calculations using AutoCAD based on the given datum
- 5. Surveying with GPS** - Various features of GPS and DGPS, Procedure to capture geo-spacial co-ordinates using GPS, DGPS – Method to transfer the GPS info into Total station and GIS software.

PROJECT WORK

Course Code	Course Title	No of periods / week	Total no of periods	Marks for FA	Marks for SA
MNG-511	PROJECT WORK	02	38	20	30

OBJECTIVES:

1. Identify different works to be carried out in the project.
2. Collect data relevant to the project.
3. Arrive at efficient method from the available choices based on preliminary investigation.
4. Design the required elements of the project as per standard practices.
5. Prepare working drawing for the project by CAD.
6. Prepare schedule of time and sequence of operations by PERT and CPM.
7. Prepare charts or models for each project.
8. Prepare project report
9. Prepare the production mathematical calculation /capacities of various operation(output ventilation, machinery and man power) in mines during period of project
10. Prepare the layout /Drawing of various operations by CAD

COURSE CONTENTS:

Identification of the Project- Collection of data- Organisation of the data- Design of Project elements - Preparation of drawings- Schedules and sequence of operations- Preparation of charts and models- Preparation of report-calculation /capacities of various operation-Drawing of various operations by CAD-time and sequence of operations by PERT and CPM

Note :

Students shall be divided into groups of five and each group shall be assigned a problem that calls for application of the knowledge. Project work will be allotted by the concerned Head of Section and assign a staff member as guide at the beginning of V semester. The students are exposed to the U/G workings or Industries for collecting relevant data from respective areas during the entire V semester, after the institutional working hours or during holidays – second Saturdays / Sundays/ Winter/ Pongal holidays and prepare project report under the supervision of guide. Project report will be assessed at the end of V Semester for final examination.

Project may be selected from among the following suggested topics

Underground mining (coal)

- a) Bord and pillar mining method
- b) Longwall mining method.
- c) Blasting gallery method.

Opencast mining

- a) Pillars extracting by open cast method(coal)
- b) Mechanized opencast mining.
- c) In Pit crushing technology
- d) Surface mining technology
- e) Blasting technology

Metal Mining

- a) Stoping methods
- b) Mechanized stoping methods

Other Methods

Any other method identified and suggested by the HOD

MNG-601 INDUSTRIAL TRAINING

Assessment no	Upon completion of	By	Based on	Max Marks
1	12 weeks	1.The faculty concerned and 2. Training Mentor of the industry	Learning outcomes as given in the following scheme of assessment	120
2	20-22 weeks			120
3.Final summative Evaluation	23 week	1.The faculty member concerned, 2.HoD concerned and 3.An external examiner	2. Demonstration of any one of the skills listed in learning outcomes, other than S.No. 2	30
			2.Training Report	20
			3.Viva Voce	10
TOTAL				300

INDUSTRIAL TRAINING

Course Code	Course Title	Duration	Marks for Formative Assessment	Marks for Summative Assessment
MNG-601	Industrial Training	24 weeks	240	60

Time schedule

S.No	Code	TOPICS	Duration
1	MNG-601	<ul style="list-style-type: none"> Practical training in Mines Training Report Preparation <p>Report Preparation: Title Page, Certificate, Acknowledgements, Abstract.</p> <p>Contents: analysis organisational setup of a mine, Geology of the mine , mine transportation, method of working, mine equipment /machinery, ventilation system/lighting , drilling and blasting, safety aspects, Charts, Diagrams, Plans etc., pertaining to organization, Literature.</p>	Six Months

COURSE OBJECTIVES:

Upon completion of the course the student shall be able to	
Course Objectives	1. Expose to real time working environment 2. Enhance knowledge and skills already learnt in the institution. 3. Acquire new skills of man and material supervising safety aspects and working in mines. 4. Develop qualities like team & work culture, integrity, responsibility and self-confidence.

COURSE OUTCOMES:

COURSE OUTCOMES	CO1	MNG601.1	Apply theory to practical work situations
	CO2	MNG601.2	Cultivate sense of responsibility and good work habits
	CO3	MNG601.3	Exhibit the strength, teamwork spirit and self-confidence
	CO4	MNG601.4	Write report in technical projects

PO-CO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2				2		1	3		2
CO2						3		3		2
CO3						3		3		2
CO4						3		3		2

Note : The gaps in CO-PO mapping will be met by one or more appropriate activities from the following:

- (i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest lectures (v) Group discussions
 (vi) Quiz (vii) Industrial visits (viii) Tech fests (ix) Mini project works (x) Library visits etc

LEARNING OUTCOMES:

The student shall be able to display the following skill sets

- 1) Technical Skills(*Drilling/Blasting/Method of working/Maintenance* etc)
- 2) Preparing Surveying plans, drawings and analysing method of working
- 3) Recognize and Practice safety Measures
- 4) Handling Tools/Instruments/Drilling and Blasting (ore/rock/coal)/Machines
- 5) Implementation of mine legislation in mines
- 6) Planning, Organizing and safety Skills

Scheme of Internal Assessment and Summative Evaluation for Industrial Training

Assessment no	Upon completion of	By	Based on	Max Marks
1	12 weeks	1.The faculty concerned and 2. Training Mentor of the industry	Learning outcomes as given in the following scheme of assessment	120
2	20-22 weeks			120
3.Final summative Evaluation	23 week	1.The faculty member concerned, 2.HoD concerned and 3.An external examiner	1.Demonstration of any one of the skills listed in learning outcomes ,other than S.No. 2	30
			2.Training Report	20
			3.Viva Voce	10
TOTAL				300

Weightage of marks for Assessment of Skill sets during first and second assessment.

Skill Set Sl.No	SKILL SET	Max Marks Allotted For each parameter
1	Technical Skills (Drilling/Blasting/Method of working/Maintenance etc)	20
2	Prepare different plans, drawings and analysing Specifications	20
3	Recognize and Practice safety Measures	15
4	Handling Tools/Instruments/ Drilling and Blasting (ore/rock/coal)/machines	25
5	Implementation of mine legislation in mines	20
6	Planning, Organizing and safety Skills	20
	Total	120

During assessment the performance of the students shall be assessed in those skills in which the student has been trained and be awarded the marks as per the weightage assigned as above. In case the student has undergone training in a few skill sets then the total marks obtained shall be raised to 120 marks for the given assessment i.e. either assessment 1 or 2. However the performance of the student shall be assessed at the most skill sets listed above but not less than three skill sets.

Illustration

If the student has undergone training in only 4 skill sets (namely serial number 1, 2, 5,6 of above skill sets) and marks awarded during assessment is 50 out of 80 marks, then the marks of 50 shall be enhanced to 120 proportionately as $(50/80)*120=75$.

GUIDELINES FOR INDUSTRIAL TRAINING

1. Duration of the training: 6 months.
2. Eligibility: The As per SBTET norms
3. Training Area: Students may be trained in the fields Underground coal mines/Underground metal mines/Granite quarry/Cement quarry/ Road metal quarry/Open cast mines etc.
4. The candidate shall put a minimum of 90% attendance during Industrial Training.
5. If the student fails to secure 90% attendance during industrial training, the student shall reappear for 6 months industrial training.
6. Formative assessment at industry level shall be carried out by the Mentor from of the industry, where the student is undergoing training and the faculty in charge (Guide) from the concerned section in the institution.
7. The Industrial training shall carry 300 marks and pass marks is 50% in assessments at industry (first and second assessment) and final summative assessment at institution level put together i.e. 150 marks out of 300 marks.
8. If the student fails to secure 50% marks in final summative assessment at institution level, the student should reappear for final summative assessment in the subsequent board examination.
9. Final Summative assessment at institution level is done by a committee including Head of the section of respective branch/ discipline, External examiner and Faculty members who assessed the students during Industrial Training as members.

Guidelines and responsibilities of the faculty members who are assessing the students' performance during Industrial Training:

1. **Every Teacher (Including HoD, if not holding any FAC) shall be assigned a batch of students of 10 to 15 for Industrial Training irrespective of students' placements for training**
2. Shall guide the students in all aspects regarding training.
3. Shall create awareness regarding safety measures to be followed in the industry during the training period, and shall check it scrupulously.
4. Shall check the logbook of the students during the time of their visit for the assessment.
5. Shall monitor progress at regular intervals and make appropriate suggestions for improvement.
6. Shall visit the industry and make first and second assessments as per stipulated schedules.
7. Shall assess the skill sets acquired by the students during their assessment.
8. Shall award the marks for each skill set as per the marks allotted for that skill set during 1st and 2nd assessments
9. Shall voluntarily supplement students learning through appropriate materials like photographs, articles, videos etc.
10. Shall act as co-examiner along with other examiners in the final assessment at institution.
11. Shall act as liaison between the student and mentor.
12. Shall maintain a diary indicating his observation with respect to the progress of students learning in all three domains (Cognitive, Psychomotor and Affective).

Guidelines to the Training Mentor in the Industry:

1. Shall train the students in all the skill sets as far as possible.
2. Shall assess and award the marks in both the assessments along with the faculty member .
3. Shall check and approve the log books of the students.
4. Shall approve the attendance of each student at the end of the training period.
Shall report to the guide about student's progress, personality development or any misbehavior as the case may be

Format for Internal assessment for INDUSTRIAL TRAINING DEPARTMENT OF TECHNICAL EDUCATION GOVERNMENT POLYTECHNIC: INDUSTRIAL TRAINING ASSESSMENT			
NAME OF THE STUDENT		PIN	
Sl.No	Learning Outcome	Max Marks	Marks awarded
1	<i>Technical Skills(Drilling/Blasting/Method of working/Maintenance etc).</i>	20	
2	<i>Prepare different plans, drawings and analysing Specifications</i>	20	
3	<i>Recognize and Practice safety Measures.</i>	15	
4	<i>Handling Tools/Instruments/ Drilling and Blasting (ore/rock/coal)/machines</i>	25	
5	Implementation of mine legislation in mines.	20	
6	<i>Planning, Organizing and safety Skills</i>	20	
	Total	120	
(Marks in words:)			
Signature of the Training In-charge(Mentor) Name: Designation		Signature of the faculty concerned(Guide) Name Designation	
