Implementation of Examination Reforms

The College also brought in several examination reforms keeping in view guidelines laid by AICTE. The college was conferred autonomous status by the University Grants Commission in 2014. Since then, there has been a persistent attempt to reform the overall system of engineering education, including curriculum, pedagogy and assessment.

Examination Center and its background

A fully fledged examination center was established based on the UGC and JNTUH guidelines in the academic year 2011-12. It started functioning with a full time Controller of Examinations and adequate number of staff to carry out the confidential work. While adhering to the JNTUH guidelines, the College has made several changes in the curriculum, assessments and evaluation patterns. All the changes were brought in after a careful study and analysis of several factors and stakeholder meetings/inputs and passed through various committees such as Departmental Academic Committees, Board of Studies, Academic Council and Governing Body.

The first examination reform was moving away from single evaluation to double evaluation. Then, the best of two evaluations was taken as final marks, if the difference in marks would be less than or equal to 14; otherwise the scripts were evaluated by the third evaluator and the marks given by the third evaluator were taken as the final marks. The number of credits for UG programs during this time was 220.

Outcome Based Education

The college has adapted Outcome Based Education in 2015 which shifted the approach from Teacher Centric to Student Centric one, for which several changes in the Curriculum, Pedagogy and Assessment patterns were introduced. Adhering to the AICTE guidelines, the College has implemented Choice Based Credit System (CBCS) and has been following the same since the academic year 2015-16. Further, the number of credits for the UG programs was reduced to 192 from 220 during this period. It is following a system of 160 credits for the UG programs since the academic year 2019-20.

Detailed System of Evaluation

Under the OBE system, all the assessment tests/ examinations are mapped to the program outcomes and specific course outcomes to achieve the desired level of learner outcomes. The question papers are set in such way through which the learner outcomes can be accurately measured.

Mapping of Examinations to Program Outcomes

Program Outcomes (PO) give the layout of an entire program, its curriculum, pedagogy and evaluation patterns. Since the achievement of the goals based on POs are quite generic and at a high level, it is necessary to identify specific competencies and performance indicators (PI). The PIs define the achievable and measurable learner outcomes of a particular program.

Mapping of Examinations to Course Outcomes

Each course under a program has its own Course Outcomes (CO), that define the skills and competencies a learner would acquire after undergoing that course. The COs are framed in line with the PIs. The question papers of all the internal examinations (CAT I and CAT II, both theory and practice) are framed in such a way that they indicate their mapping to course outcomes. This process ensures understanding of learner outcomes in a measurable way in line with POs and COs.

Bloom's Taxonomy

The college follows the Bloom's Taxonomy to **examine various cognitive skills of learners such as remembering, understanding, applying, analyzing, evaluating and creating**. It is also important to use appropriate action verbs in framing the questions in each assessment test. The action verbs clearly indicate the level of assessment a particular question is aimed at. The first four levels of the Bloom's taxonomy are usually mapped to the questions framed in the direct assessment such as CIE (CAT I and CAT II) and Semester End Examinations (SEE). The two higher levels of the taxonomy, i.e. evaluating and creating, are assessed through course projects and internships, etc. Each question paper is consists of parameters of assessment of learner abilities at various levels of difficulty.

Broad range of assessment methods

A variety of alternative assessment tools are used to bring innovation in TLP and assessment. Students in the college are encouraged to take up MOOCs which are given significant weightage in the system of evaluation. Other AATs include, quizzes, assignments, class tests and others, the questions in which are also mapped appropriately to the Course Outcomes and Bloom's levels. In courses where direct written examination may not be sufficient, the courses are evaluated through various other modes such as open-ended problem-solving assignments, term papers, project work and others. Moreover, for the courses which require the learner to comprehend and evaluate real-life situations, open book examinations are adapted, (e.g. Gender Sensitisation). The student's knowledge is assessed on a higher level of the Bloom's taxonomy.

Reforms

In view of bettering the system of evaluation to strengthen it further, it is thoroughly checked whether each course outcome is mapped in all the question papers. Focus is given on equal weightage to all the COs, so as to avoid overmapping or undermapping to any particular CO. Workshops and training programmes are conducted regularly for faculty in this regard.

Thus the Examination process at VCE is standardized based on the OBE-Curriculum, OBE TLP and OBE-Assessments. All the regulations are approved by the academic council and board of studies and published for the benefit of the stakeholders both in soft and hard copy formats. As one of management guru Peter Drucker said "If you can't measure it you can't improve it", we strive hard to measure all the learner outcomes following the methodology discussed hitherto. Based on the results of the assessment, the learning outcomes from the courses are measured and mapped to the programme outcomes with a desired mapping strength at the end of each academic year. The attainment of POs of the outgoing batch are carefully studied year after year and compared and analyzed for the improvement in the Learning Outcomes. Based on the mapping strength and PO attainments, suitable modifications were made to improve the Learning Outcomes. The examination reforms focus on meeting the targets, setting new-targets and this process indicates continuous improvement in the overall learning of the students. All the above mentioned reforms are being implemented rigourously and the examination processes are being thoroughly monitored and frequently audited both by internal and external experts in order to ensure proper checks and balances for transparency in evaluation.

Ravindra

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Hall Ticket No: | | | | | | | | | | | **Course Code: A6002**

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

Autonomous institute, affiliated to JNTUH

I B.Tech II Semester Continuous Assessment – I, August – 2021

(Regulations: VCE-R20)

Numerical Methods and Calculus

(Common to all)

Date:09.08.2021 **Time: 90mins** **Max Marks: 30**

Answer all Questions in Part-A

Answer any Three Questions in Part-B

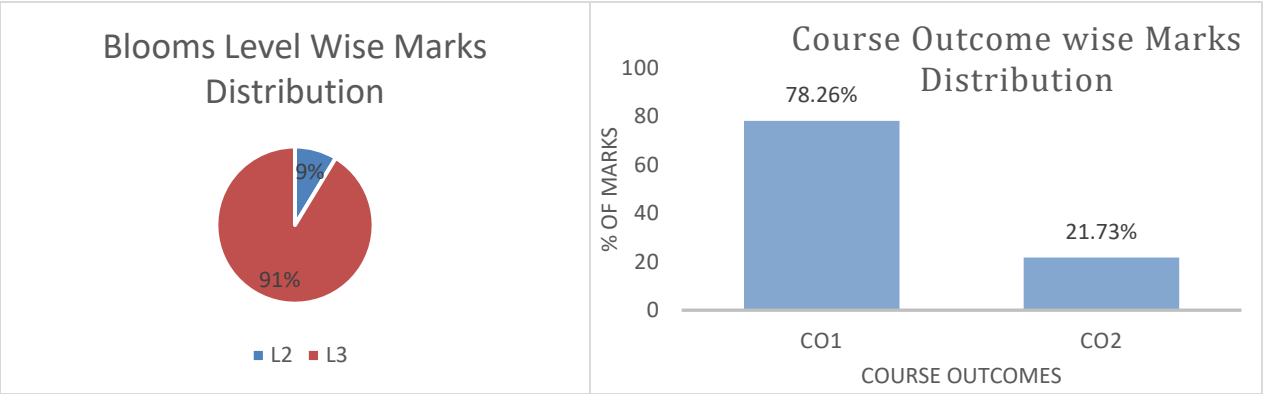
Course Outcomes with Bloom's Levels:

CO#	*CO Statement*	*Bloom's Level (L#)*
CO1	Apply appropriate Numerical method to find a root of an equation and interpolate to approximate the values of the function at intermediate points.	L3
CO2	Evaluate definite integrals using appropriate methods.	L3
CO3	Solve partial differential equations of first order.	L3
CO4	Examine the extremum of a function of several variables.	L4
CO5	Make use of vector integral theorems to evaluate area, surface area and volumes.	L3

Questions:

PART-A					
			Course Outcomes	*Bloom's Levels*	*Marks*
1.	a)	Rewrite $\sin x = 10(x-1)$ in the form $x=\phi(x)$ such that $\lvert\phi'(x)\rvert<1 \ \forall x\in[1,2]$ to apply iteration method	*CO1*	L3	***2M***
	b)	Evaluate $\int_1^3 y\,dx$ by Simpson's 1/3 rule, given $h=0.5$ and $y_0=1, y_1=2.875, y_2=7.000, y_3=14.125, y_4=25.000$	*CO2*	L2	***2M***
	c)	Evaluate $\Delta^8\left\lfloor(1-x)(1-3x)(1-5x^3)(1-7x^4)\right\rfloor$ by taking $h=1$	*CO1*	L2	***2M***
PART-B					
2.	a)	Find the real root of the equation $x^3-2x-5=0$ correct to four decimal places by Newton-Raphson method	*CO1*	L3	***4M***

	b)	Find the missing terms from the following data: x: 0, 1, 2, 3, 4, 5 y: 0, --, 8, 15, --, 35	*CO1*	L3	***4M***
3.	a)	Find a real root of $x^2 - \log x - 12 = 0$ using Regula-falsi method correct to three decimal places	*CO1*	L3	***4M***
	b)	Compute $y(1.2)$ using appropriate interpolation formula from the following data: x: 1.1, 1.3, 1.5, 1.7, 1.9 y: 0.21, 0.69, 1.25, 1.89, 2.61	*CO1*	L3	***4M***
4.	a)	The population (in thousands)of a certain town is given below: Year: 1951, 1961, 1971, 1981, 1991 Population: 19.96, 39.65, 58.81, 77.21, 94.61 Estimate the rate of growth of the population in the year 1986	*CO1*	L3	***4M***
	b)	Evaluate $y(0.4)$ by Euler's method given $y' = (x^3 + xy^2)e^{-x}$, $y(0) = 1$ with $h = 0.1$	*CO1*	L3	***4M***
5.	a)	Evaluate $\int_0^{\pi/2} \sqrt{\sin x}\, dx$ using Simpson's 3/8 rule by taking seven ordinates	*CO2*	L3	***4M***
	b)	Apply Runge-Kutta method of fourth order to find the value of $y(0.1)$ from $\frac{dy}{dx} = x^2 - y, y(0) = 1, h = 0.1$	*CO1*	L3	***4M***
6.	a)	Find $y(102)$ using Lagrange's interpolation formula from the following data: x: 100, 101, 103, 104 y: 2.000, 2.0043, 2.0128, 2.017	*CO1*	L3	***4M***
	b)	Evaluate $\int_0^1 e^{-x^2} \sin x\, dx$ using trapezoidal rule by taking 5 sub intervals	*CO2*	L3	***4M***



Bloom's Taxonomy Levels (1-Remembering, 2-Understanding, 3-Applying, 4-Analyzing, 5-Evaluating, and 6- CREATING)

CO-Course Outcomes

Hall Ticket No: | | | | | | | | | | |

Course Code : A6002

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

I B.Tech II Semester CAT-II Examinations, September - 2021

(Regulations: VCE-R20)

NUMERICAL METHODS AND CALCULUS

(Common to all Branches)

Date: 27 September 2021 **Time: 90mins** **Max Marks: 30**

Answer all Questions in Part-A

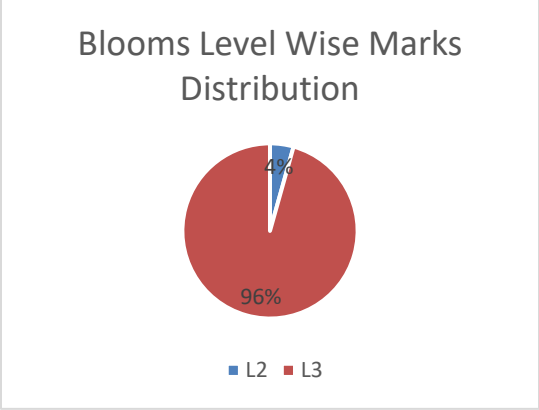
Answer any Three Questions in Part-B

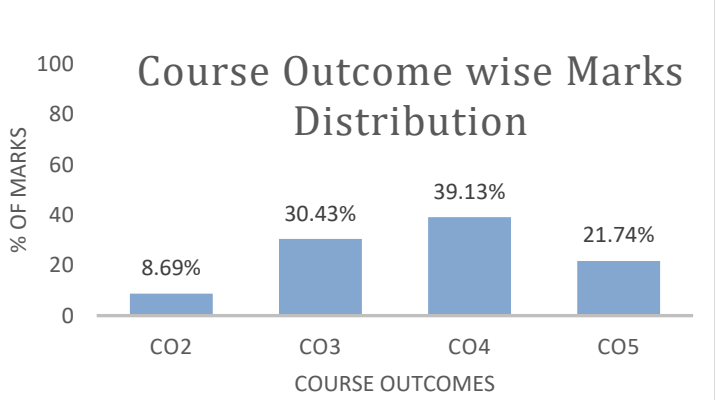
Course Outcomes with Bloom's Levels:

CO#	***CO Statement***	***Bloom's Level (L#)***
CO1	Apply appropriate Numerical method to find a root of an equation and interpolate to approximate the values of the function at intermediate points.	L3
CO2	Evaluate definite integrals using appropriate methods.	L3
CO3	Examine the extremum of a function of several variables.	L4
CO4	Solve partial differential equations of first order.	L3
CO5	Make use of vector integral theorems to evaluate area, surface area and volumes.	L3

		PART-A			
			Course Outcomes	***Bloom's Level***	***Marks***
1.	a)	If $u=e^r\cos\theta,\ v=e^r\sin\theta$, find $\frac{\partial(u,v)}{\partial(r,\theta)}$	CO3	L3	***2M***
	b)	*Solve* $y^2zp+x^2zq=xy^2$	CO4	L2	***2M***
	c)	If $\vec{F}=2x^2y\hat{i}+3xy\hat{j}$, evaluate $\int_C \vec{F}\cdot d\vec{r}$ along the curve $C: y=x^2$ in the $xy-$plane from $(0,0)$ to $(1,1)$.	CO5	L3	***2M***
		PART-B			
2.	a)	Show that $u=x+y+z,\ v=x^2+y^2+z^2, w=xy+yz+zx$ are functionally related and find the relation between them.	CO3	L3	***4M***
	b)	Evaluate $\int_0^1\int_0^{1-x}\int_0^{1-x-y} dz\ dx\ dy$	CO3	L3	***4M***

3.	a)	Evaluate $\int_0^1 \int_x^{\sqrt{x}} xy\ dydx$ by changing the order of integration	CO2	L3	***4M***
	b)	Fid the maximum and minimum values of the following function: $f(x,y) = x^3 + 3xy^2 - 15x^2 - 15y^2 + 72x$	CO3	L3	***4M***
4.	a)	*Form the partial differential equation by eliminating the arbitrary function* f *from* $z = y^2 + 2f\left(\frac{1}{x} + \log y\right)$	CO4	L3	***4M***
	b)	Solve $x^2(y-z)p + y^2(z-x)q = z^2(x-y)$	CO4	L3	***4M***
5.	a)	Form the partial differential equation by eliminating the arbitrary constants from $(x-a)^2+(y-b)^2=z^2\cot^2\alpha$, where α is a fixed constant	CO4	L3	***4M***
	b)	Solve $p^2z^2+q^2 = p^2q$	CO4	L3	***4M***
6.	a)	Find the directional derivative of $\phi(x,y,z) = xyz^2 + xz$ at $(1,1,1)$ in the direction of normal to the surface $3xy^2 + y = z$ at $(0,1,1)$.	CO5	L3	***4M***
	b)	Apply Green's theorem to evaluate $\int_C [(3x^2 - 8y^2)dx + (4y - 6xy)dy]$, where C is the boundary of the region enclosed by the lines $x = 0, y = 0$ and $x + y = 1$.	CO5	L3	***4M***





Bloom's Taxonomy Levels (1-Remembering, 2-Understanding, 3-Applying, 4-Analyzing, 5-Evaluating, and 6- CREATING)

CO-Course Outcomes

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: A6002

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

Autonomous institute affiliated to JNTUH

I B. Tech II Semester, Semester End Examinations, October - 2021

(Regulations: VCE-R20)

NUMERICAL METHODS AND CALCULUS

(Common for All Branches)

Date: 18 October, 2021 **Time: 3 hours** **Max Marks: 75**

Answer All Questions from Part-A

Answer ONE question from each Unit in Part-B

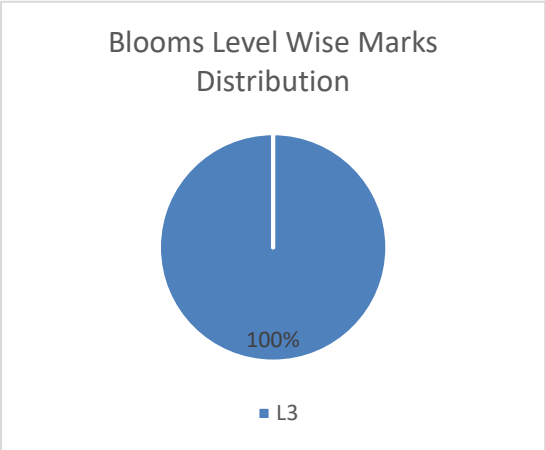
CO#	***CO Statement***	***Bloom's Level (L#)***
CO1	Apply appropriate Numerical method to find a root of an equation and interpolate to approximate the values of the function at intermediate points.	L3
CO2	Evaluate definite integrals using appropriate methods.	L3
CO3	Examine the extremum of a function of several variables.	L4
CO4	Solve partial differential equations of first order.	L3
CO5	Make use of vector integral theorems to evaluate area, surface area and volumes.	L3

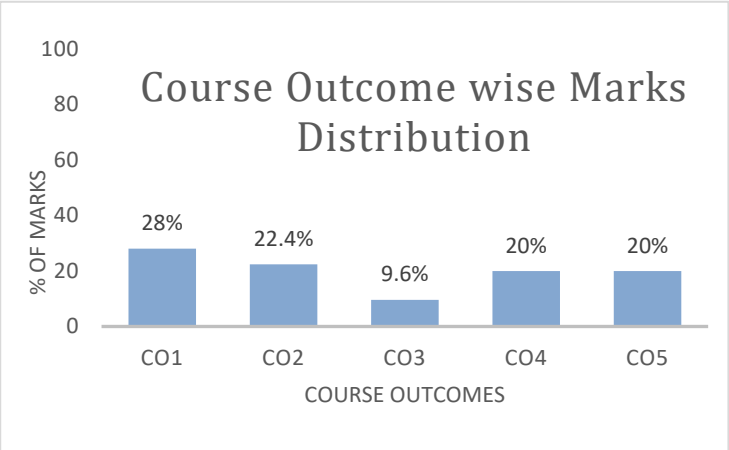
PART – A

			Course Outcomes	***Bloom's Level***	***Marks***
1.	a)	Write Newton's iterative formula to find the value of $\sqrt{N}$	***CO1***	***L3***	***2M***
	b)	Write Simpson's $\frac{1}{3}$ rule and $\frac{3}{8}$ rule	***CO2***	***L3***	***2M***
	c)	If $u = x+y+z, v = y+z, w = z$ evaluate $\frac{\partial(u,v,w)}{\partial(x,y,z)}$	***CO3***	***L3***	***2M***
	d)	Form the partial differential equation by eliminating the arbitrary constants from $z = alog\left(x^2+y^2\right)+b$	***CO4***	***L3***	***2M***
	e)	Find *curlF* of the vector $\vec{F} = xyzi + 3x^2yj + (xz^2 - y^2z)k$ at $(2,-1,1)$	***CO5***	***L3***	***2M***
	f)	Find the missing term in the table using finite differences x: 0, 1, 2, 3, 4 y: 1, 3, 9, ---, 81	***CO1***	***L3***	***3M***
	g)	Evaluate $\int_0^1 x^3 dx$ with five subintervals by Trapezoidal rule	***CO2***	***L3***	***3M***
	h)	Evaluate $\int_{x=0}^{1}\int_{y=0}^{2}\int_{z=0}^{3} xyzdxdydz$	***CO2***	***L3***	***3M***

	i)	Solve $ptanx+qtany=tanz$	**CO4**	**L3**	**3M**
	j)	If $\vec{F}=3xyi+y^2j$ evaluate $\int_C \vec{F}.dr$ where C is the straight line from $(0,0)$ to $(1,1)$	**CO5**	**L3**	**3M**
		PART – B			
2.	a)	Use Newton Raphson method to find the real root of the equation $x=cosx$ taking initial approximation as $x=0.7$	**CO1**	**L3**	**5M**
	b)	Use Newton's forward interpolation formula to find y_{35} *given* $y_{20}=612,\ y_{30}=539, y_{40}=446, y_{50}=343,$	**CO1**	**L3**	**5M**
		(OR)			
	c)	Find the real root of the equation $x^3-x-1=0$ using Bisection method, perform five iterations	**CO1**	**L3**	**5M**
	d)	Using Lagrange's interpolation formula find a polynomial which passes through the points $(0,-12),(1,0),(3,6),(4,12)$	**CO1**	**L3**	**5M**
3.	a)	Find the approximate value of $\int_0^{\pi/2}\sqrt{\cos x}dx$ by Simpson's $1/3^{rd}$ rule by dividing the $[0,\pi/2]$ into six equal parts	**CO2**	**L3**	**5M**
	b)	Using Runge-Kutta method of fourth order, find $y(1.1)$, given that $\frac{dy}{dx}=xy^{1/3}$ *and* $y(1)=1$ taking $h=0.1$	**CO1**	**L3**	**5M**
		(OR)			
	c)	Find $\frac{dy}{dx}$ at 0.1 from the following table x: 0.1, 0.2, 0.3, 0.4 y: 1.10517, 1.22140, 1.34988, 1.49182	**CO1**	**L3**	**5M**
	d)	Evaluate $\int_0^1 e^{-x}dx$ numerically by dividing the interval in to ten equal parts, use Trapezoidal rule	**CO2**	**L3**	**5M**
4.	a)	Show that the functions $u=x+y+z, v=xy+yz+zx, w=x^2+y^2+z^2$ are functionally dependent and find the relation between them	**CO3**	**L3**	**5M**
	b)	Evaluate $\int_0^1\int_0^x\int_0^{x+y} e^{x+y+z}\ dzdydx$	**CO2**	**L3**	**5M**
		(OR)			
	c)	Examine the function for extreme values $f(x,y)=x^4+y^4-2x^2+4xy-2y^2$	**CO3**	**L3**	**5M**
	d)	By change of order of Integration, Evaluate $\int_0^3\int_1^{\sqrt{4-y}}(x+y)\,dxdy$	**CO2**	**L3**	**5M**
5.	a)	Form the partial differential equation by eliminating the arbitrary function from $\phi\left(\frac{y}{x}, x^2+y^2+z^2\right)=0$	**CO4**	**L3**	**5M**
	b)	Solve the equation $p+3q=5z+\tan(y-3x)$	**CO4**	**L3**	**5M**
		(OR)			

	c)	Form the partial differential equation by eliminating a,b,c form $\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$	**CO4**	**L3**	**5M**
	d)	Solve $(x^2-yz)p+(y^2-xz)q=z^2-xy$	**CO4**	**L3**	**5M**
6.	a)	Evaluate $\int_C (y-\sin x)dx+\cos x dy$ by using Green's theorem where C is the triangle in $xy-plane$ bounded by the lines $y=0, x=\frac{\pi}{2}$ *and* $y=\frac{2x}{\pi}$	**CO5**	**L3**	**5M**
	b)	Show that $\vec{F}=(2xy^2+yz)i+(2x^2y+xz+2yz^2)j+(2y^2z+xy)k$ is conservative force field and find its scalar potential	**CO5**	**L3**	**5M**
		(OR)			
	c)	Find the directional derivative of $\phi=xy^2+yz^3$ at the point $(2,-1,1)$ in the direction of the normal to the surface $x\log z-y^2=4$ at the point $(-1,2,1)$	**CO5**	**L3**	**5M**
	d)	Evaluate by Stokes theorem $\int_C (\sin z dx-\cos x dy+\sin y dz)$, where C is the boundary of rectangle $0\le x\le\pi,\ 0\le y\le 1$ *and* $z=3$	**CO5**	**L3**	**5M**





Bloom's Taxonomy Levels (1-Remembering, 2-Understanding, 3-Applying, 4-Analyzing, 5-Evaluating, and 6- CREATING)

CO-Course Outcomes